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University of Wollongong

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TEACHING AND LEARNING, PROFESSIONAL DEVELOPMENT
AND COMPUTER TECHNOLOGY: AN ACTION RESEARCH
CASE STUDY OF FIVE CLASSROOM ENVIRONMENTS.

A thesis submitted in partial fulfilment of the requirements for the
award of the degree

DOCTOR OF EDUCATION

From

UNIVERSITY OF WOLLONGONG

By

Glen Patterson
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Department of Education
2001

University of Wollongong

Abstract

Teaching and Learning, Professional Development and Computer
Technology: An Action Research Case Study of Five Classroom
Environments.

by Glen Patterson

Supervisory Committee: Professor Barry Harper & Dr Ted Booth

Abstract:

This study documents the evolving form of the collaboratively designed professional development programs and the changes that took place in five classrooms when computers and related technologies were available and integrated into the teaching and learning environment. It also investigates the impact that this had on the teacher's view of how students "learn best" and what implication this has for future learning.

Furthermore, the study investigates changes in student learning outcomes and tracked changes in classroom climate and student/student and student/teacher interactions within the classroom. It was anticipated that this data would assist as a further indicator of changes in teaching practice and how these changes impact on classroom practices.

This study encouraged teachers to look at how students learn best and what their role was as an educator in this process.

The introduction of computer technology into the learning environment provided rich data across each of the classrooms involved in the study. Some of the issues that affected this process included such things as:

- * Years of teaching experience (reflected in developed teaching strategies in the classroom and an understanding of student learning);

- * An individual's pedagogy and a commitment to evaluation and continued improvement of teaching practice;
- * Issues within the learning environment (including school culture and class climate);
- * A classroom and school climate that promoted and supported learning for staff and students;
- * A teacher's involvement in a negotiated development program that met specific identified needs;
- * Engagement in a training and development program that was situated in the participants' own classrooms (with components of computer skill sessions and sessions that directly related to teaching practice);
- * The teacher's initial level of personal computing skills.

Yocam & Wilmore (1995), found professional development approaches that had the most impact did the following:

- * involved small-group collaborations between teachers;
- * took place in working classrooms;
- * built on teachers' existing knowledge about curriculum and practice;
- * provided opportunities to experiment and reflect on new experiences;
- * provided ongoing support to help implement change and innovation.

Literature reviewed and data collected from this study enhanced Yocam and Wilmore's findings. Programs also need to:

- * be twofold, with discrete in-class and individual training sessions for teachers;
- * be collaboratively designed;
- * be part of a whole school program that focuses on constant improvement and evaluation;
- * take place in a school that has a climate and culture conducive and supportive of change and innovation;
- * be longitudinal with a minimum of one school year;

6. place participants in close proximity to each other to maximise the possibility of the exchange of ideas and the development of support structures.

If the integration of computers into classrooms is to be successful, current practices in professional development in some schools must change. This change must be supported from the highest level with schools being equipped to carry out meaningful change monitored over substantial time periods.

ACKNOWLEDGMENTS

The author wishes to acknowledge the support of my wife Leanne and two children Matthew and Caitlin through the "life" of this study. Thanks also extended to the two supervisors, Professor Barry Harper and Dr. Ted Booth.

CERTIFICATION

I, Glen P. Patterson, declare that this thesis, submitted in partial fulfilment of the requirements for the award of Doctor of Education, in the Department 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.

Glen P. Patterson

20 April 2001

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GLOSSARY

ESL - English as a Second Language

STLD - Support Teacher Learning Difficulties

LBOTE - Language Background Other Than English

NESB - Non English Speaking Background

ADHD - Attention Deficit Hypoactivity Deficit

SSP - School for Special Purposes

RFF - Release From Face To Face

KLA - Key Learning Area

Sci Tech - Science and Technology Key Learning Area

HSIE - Human Society and Its Environment Key Learning Area

IM - Intellectually Moderate

IO - Special Education Class for Intellectually Disabled Children

CD-ROM - Computer Device Read Only Memory

QSR - Quality Solutions and Research (makers of NUD*IST)

NUD*IST - Non-Numerical and Unstructured Data Indexing Searching and Theorising (Computer Software)

ACOT - Apple Classroom of Tomorrow

TILT - Technology in Learning and Teaching

Living Books - Interactive Computer Reading Software

Wiggleworks - Interactive Computer Based Reading Resource including on computer and off computer resources. Distributed by Scholastic Inc. (1994)

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CHAPTER 1 INTRODUCTION

1.1 The Background of the Study

Presently, a number of New South Wales curriculum documents support the use of computers in teaching and learning situations (Board of Studies, 1993 and 1994). This study tracked the related teaching and learning practices (as suggested in the curriculum documentation), the professional development programs and activities collaboratively planned by five teachers. Furthermore, it followed the subsequent challenges to pedagogy and ultimately the change in teaching practice in the classrooms studied.

The teachers involved collaboratively designed their own professional development programs to assist with the introduction of computer technology into their classroom teaching schedule. Their individual programs formed a component of a whole-school professional development strategy that had been instigated at staff request. The whole-school strategy was timetabled to take place in the second half of 1997. This coincided with the major component of data collection for this study.

The whole-school professional development program was two-fold. Firstly, teachers were released from class for sixty minute and forty-five minute tutor sessions to work with another staff member, who had taken on the leadership of this professional development initiative. These sessions were completed with or without the teacher's class present, dependent upon the area being developed. The program was collaborative in nature and was negotiated to reflect emergent teacher needs. The changing nature of this collaboration became part of the inquiry process.

Secondly, a co-ordinated program of ten to fifteen minute after-school computer training sessions was conducted. These sessions concentrated on small areas of interest or concern as expressed by staff and were generally linked to basic computer usage. They were timetabled according to demand (Appendix 1).

This action research study, involving five teachers, was integrated with the whole school program. Although the teachers in the study worked on specific areas in a far more intensive way, they were also free to make use of any other training and development session (school-based or external) that they thought would be of benefit.

Whilst the school in the study, Meadows Primary, was involved in a number of high profile computer technology projects, a number of staff were relatively inexperienced in the integration of computers into their teaching practice. Most of the teachers involved in this study would have fitted this category. There were many more teachers at the school who were far more experienced with the use of computers both for personal productivity and classroom use.

Literature reviewed provided insight into components of this study. Authors such as Ringstaff and Yocam (1995) and Schiller (1992) acknowledged a need for teachers to modify teaching practices and organisational structures within their classrooms when computers were introduced into the learning environment. There was also agreement among authors Bellamy et al (1995), Jane (1992) and Wellburn (1996) that traditional forms of training development were ineffective with the introduction of computer technology into classrooms. Wellburn went further to call present training and development practices "vastly inefficient".

Sellers' (1996) work made special mention of the conditions that needed to exist in a school for sustained and meaningful change to take place in classrooms. This

notion of a school culture that promoted staff and student welfare, and a quest for improvement being present and nurtured, found support in findings from this study.

1.2 Significance of the Study

All teachers involved in the study had expressed a disenchantment with the role that computer technology played in their classrooms. There was a general belief that they were not giving their students "the best chance" and that they, the teachers, were being left behind by technological change. Personal and school-based goals reflected the need for a more concerted use of computers by students and a comprehensive program to support teacher implementation of computer technology into teaching practice.

The initiation of state wide professional development programs by the New South Wales Department of Education and Training, such as Technology in Learning and Teaching (TILT) and the increased funding and media attention that this area has attracted would suggest that this study has possible systemic implications.

This study documents the evolving form of the collaboratively designed professional development programs and the changes that took place in five classrooms when computers and related technologies were available and integrated into the teaching and learning environment. It also investigates the impact that this had on the teacher's view of how students "learn best" and what implication this has for future learning.

Furthermore, the study investigates changes in student learning outcomes and tracked changes in classroom climate and student/student and student/teacher interactions within the classroom. It was anticipated that this data would assist as

a further indicator of changes in teaching practice and how these changes impact on classroom practices.

1.3 Research Questions

Due to the nature of action research, the research questions addressed by this study evolved as a response to the work instigated by the inquiry group.

The primary question or focus of the study was stable throughout.

What are the implications for teaching and learning when computer technology and a collaboratively developed professional development program are implemented in a primary school?

To assist in the process of answering this primary question, secondary questions in the areas of pedagogy, professional development and computer technology included:

- a) Were there any changes to teachers' views about how children learn?
- b) Were there any changes in the learning environments?
- c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment?
- d) Were there any changes to teacher attitudes towards the use of computers and related technologies in their classrooms?
- e) Were there any changes to student-teacher and student-student interactions in classroom activities?
- f) Was there an increased use of computer technology to achieve curriculum outcomes?

- g) Were there any changes in teacher programming of lessons and units throughout the project?
- h) Was the collaboratively designed professional development program, in the area of computer technology, effective in supporting program preparation and class learning environments?
- i) Was there any development in teachers' skill in using computer technology?

These questions were specifically designed to provide data in the areas of:

Student Learning Outcomes;

Personal Computer Skills;

Learning Environments;

Teaching Practice.

1.4 Methodology Issues

The entire teaching population of the school was provided the opportunity to be involved in the project in February (at the start of the school year). The five teachers who became involved were the only volunteers. There was an added incentive of additional time off face-to-face duties to compensate for the extra workload resulting from their involvement. This was possible due to doctoral support funding for the researcher that was received from the NSW Department of Education and was used in such a way that it equated to an additional hour per fortnight for each participant.

Whilst teachers volunteered within the first week of the school year, the study was not in full operation for another six to seven weeks. It was then conducted over the remainder of the school year, which totaled eight months. Three of the

teachers involved in the study had their classrooms housed around one of the foyers within the school. This provided greater opportunity for sharing of resources and ideas between these individuals throughout the year. One of the other teachers was responsible for the Release-From-Face-to-Face teaching role in two of these classrooms. The final teacher, whilst based on the grounds of Meadows Primary School, was a staff member of the neighbouring School for Special Purposes.

The use of an action research design for this project provided an appropriate method for describing, interpreting and explaining the social world that was found within the school environment. As the project progressed issues were identified and the sub-questions were refined to better address the primary research question and the needs of the participants.

It is also important to note my role within the school. Not only did I fulfill the role of participant researcher, but also a mentoring role in the area of computer education across the staff (ancillary and teaching), and supervisory and mentoring role across the school in my role of Assistant Principal. Throughout the project I attempted to segregate myself from the emergent position of each of the participants. Furthermore, I maintained this position throughout the reflective process and data analysis.

This action research study provided an insight into five discrete, yet similarly challenged classrooms, as teaching colleagues grappled with issues that made them question some of their most "cherished" beliefs on the nature of learning and the role that the teacher plays in such an environment.

CHAPTER 2 REVIEW OF LITERATURE

2.1 Characteristics of Effective Professional Development

Professional development, staff development and inservice are three terms relating to improvement in teaching practice. Whilst a number of authors make distinctions among them, “in many school districts, both terminology and reality overlap” (Bellanca, 6, 1995) and in the context of this study the differentiation is not significant. In acknowledging differences in the literature reviewed, Bellanca (1995) makes the distinction between the three terms as follows:

Professional development is a planned, comprehensive and systematic program designed by the system to improve all school personnel's ability to design, implement and assess productive change in each individual and in the school organisation.
(Bellanca, p 6)

Staff development is the effort to correct teaching deficiencies by providing opportunities to learn new methods of classroom management and instruction
(Bellanca, p 6)

Inservice is the scheduling of awareness programs, usually of short duration, to inform teachers about new ideas in the field of education
(Bellanca, p 6)

Whilst Bellanca makes this distinction, others use the terms of professional development and staff development interchangeably. Cardno (1992) claims:

...professional development is about the improvement and growth of professional people which in turn has the positive impact on what happens in the classrooms and in schools generally.

(Cardno, p 16)

The professional development discussed by Maxwell (1993), writing in the Australian context, shows greater congruence with Bellanca's term of inservice. Maxwell believes:

until recently professional development in Australia has been largely adhoc provision of brief one-off activities and courses with little or no follow-up to support implementation.

(Maxwell, 31, 1993)

Over the last ten years the one-off type development activities have decreased with a more longitudinal approach to change being supported. The supporters of this approach including, Gelareh (1993), Sellars (1996), Davies and Bruning (1992) and Miles Grant (1996) have claimed that programs of greater quality have been designed in this way.

Whether termed inservice, staff development or professional development , a quality developmental program is the right of all teachers and a necessity for the growth and development of the profession. Such programs have a number of characteristics.

They require:

intensive training, ongoing support at school site, people will have some sort of structure at the school site for continually working on the implementation and solving any problems that result, and there'll be some sort of formative data collection and evaluation along the way so you can tell how you're doing and make adjustments. There'll be data not only about implementation but about student outcomes.

(Gelareh, 25, 1993)

Maxwell (1993) asserts that effective staff development is characterised by elements such as:

*relevance for teachers;

*time given for professional discussion during and between sessions;

*tutorial support is provided;

*relevant professional readings are provided to supplement meetings.

Whilst able to identify its characteristics, authors such as Sellar (1996) believe that a recipe type approach as given by Maxwell (1993) is not successful in all situations.

Gelareh (1993) does not claim one particular model is successful over another, but does identify common characteristics of schools and programs where successful professional development has taken place. For success, he has identified three main elements: "content, context and staff development. The three are interwoven" (Gelareh, 24, 1993). The innovation may not be powerful, the cultural backdrop may not be appropriate, even if the program is great. If this premise is to be accepted we must look closely at all possible influences in the school in addition to the design of a quality program. Further influences on individuals within the program may also impact upon the cultural backdrop or school climate.

This is supported by Sellars (1996):

teachers, individually and collectively, need to 'own' their professional development ... by collaborating with their peers and the school administration on professional issues, the career-long process of PD (professional development) can proceed and does happen.

(Sellars, 20, 1996)

In addition, Davies and Bruning (1992) claim:

the cornerstone of effective staff development ... is extended dialogue. Dialogue is the scaffold on which the conditions of effective changes are built.

(Davies and Bruning, 8, 1992)

An additional component for success is the maintenance of any professional development program. This includes consistent follow-up with teachers involved. Gelareh states,

Consistent followup and support seems to be one the elements present in all successful programs.
(Gelareh, 25, 1993)

An area of concern for the time frame I have set for this project is Gelareh's claim that "without continuing staff development support after the first year, a program might never reach that level of fruition" (Gelareh, 25, 1993). If this is true, although this project may document some of the changes in a classroom and a teachers' view of lesson delivery, the full impact of the professional development program may not be fully evident until some time later.

Davies and Bruning (1992) claim that:

" the art of staff development is to foster the conditions for change and to maintain them over time ... (and) if we provide the proper opportunities ... (we) create a new school culture together with those whom they interact" .

(Davies and Bruning, p9)

The type of staff development that produces improved student outcomes is collaboratively planned and is "intensive enough to allow people to develop new knowledge and skills. ... It has a component in the workplace as well as in the training environment" (Gelareh, 25, 1993).

Davies and Bruning (1992) claim that staff development is an evolving process and must be nurtured. In fact:

The best staff development is not "experts" teaching "novices", but rather is an ongoing process of shared dialogue among principals, staff developers, and peers.

(Davies and Bruning, 4, 1992)

Sellars' (1996) work pays special attention to the correct culture being present in a school.

It is by sharing ideas, beliefs, and practices that a culture in which teachers can analyse and reflect on teaching, especially their own teaching, is created. This then enables teachers to focus on what enhances learning for students.
(Sellars, 20, 1996)

It is in this environment that teachers are able to experiment with their practices in a quest for excellence.

Experimentation and evaluation also help teachers articulate an explicit teaching philosophy as a framework for their teaching practices.

(Davies and Bruning, 11, 1992)

One factor that can be noted from the literature review is the commonality of the theme of situated professional development. A major component of any strategies or programs to initiate or support a process of change must be imbedded in the school and classroom of each teacher involved. Without this long-term change in teaching practice would be significantly diminished.

2.2 School-Based Professional Development

The traditional function of teacher professional development was to uphold the status quo, through a series of structured activities, rather than change it. This model had "little impact on teacher practice" (Yocam & Wilmore, 1, 1995).

In more recent times, "educators have been concerned about the quality and effectiveness of staff (professional) development programs provided to school personnel" (McQuarrie & Thompson, 1992). This has led to an international trend with educators looking closely at the type and structure of professional development available to their teachers and its impact on student outcomes.

Davies and Bruning (1992) claimed that "current approaches to teacher development seem to be less effective than they might be" (p 2). The provision of quality avenues for teacher professional development is crucial, and in fact, "teachers cannot establish and sustain conditions necessary for growth and development of children unless those conditions exist for teachers first. (J. Sarason 1990)" (Davies and Bruning, 3, 1992).

2.3 The Role of Professional Development in Introducing Computers into the Classroom.

Wellburn (1996), in a report commissioned by the Ministry of Education in Canada, proposed that simple motivational and short workshop courses were ineffective and "vastly insufficient to enable veteran (and even new, computer-generation) teachers to teach differently, and to teach well with technologies." (Wellburn, www, 1996).

This issue was supported by a report commissioned by the North Central Regional Technology in Education Consortium (Rodriguez and Knuth, 2000). The report stated:

Lack of professional development for technology use is one of the most serious obstacles to fully integrating technology into the curriculum (Fatemi, 1999; Office of Technology Assessment, 1995; Panel on Educational Technology, 1997). But traditional sit-and-get training sessions or one-time-only workshops have not been effective in making teachers comfortable with using technology or adept at integrating it into their lesson plans.

(Rodriguez and Knuth, www, 2000)

Authors including Kosakowski (1998) and Grant (1996) make a strong case for the inclusion of educational technology in the classroom. Once this case has been

made and accepted the crucial role of professional development is of primary importance to educational administrators and leaders. Kosakowski (1998) stated that contemporary research enabled a number of generalisations to be made:

** Educational technology has a significant positive impact on achievement in all subject areas, across all levels of school, and in regular classrooms as well as those for special-needs students.*

** Educational technology has positive effects on student attitudes.*

** The degree of effectiveness is influenced by the student population, the instructional design, the teacher's role, how students are grouped, and the levels of student access to technology.*

** Technology makes instruction more student-centered, encourages cooperative learning, and stimulates increases teacher/student interaction.*

Positive changes in the learning environment evolve over time and do not occur quickly.

(Kosakowski, www, 1998)

Furthermore, Kosakowski (1998) claimed:

Numerous studies over the years, summarized by Bialo and Siviv-Kachala (1996), report ... that students feel more successful in school, are more motivated to learn and have increased self confidence and self esteem when using CAI. This is particularly true when the technology allows the students to control their own learning. It's also true across a variety of subject areas, and is especially noteworthy when students are in at-risk groups (special education, students from inner-city or rural schools).

(Kosakowski, www, 1998)

More striking findings were reported by Miles Grant (1996), who provided a stark warning for schools at a systemic level with regard to the use of technology in the classroom.

With schools increasingly investing in technologies for the classroom, there has been a growing realization that these expensive resources will never be used to their fullest unless teachers are provided professional development to guide their use.

(Miles Grant, www, 1996)

This is further supported by Rodriguez and Knuth(2000), who claim:

professional development for teachers becomes the key issue in using technology to improve the quality of learning in the classroom.

(Rodriguez and Knuth, www, 2000)

With a direct reference to funding levels required and a need for planning and strict budget levels, they suggest that between 15-30 percent of the school's technology budget must be devoted to training and development in the area of technology integration and usage *(Rodriguez and Knuth, 2000)*.

Miles Grant (1996) proposes certain principles of professional development that enable technology to be integrated into schools to enhance learning. Whilst most literature does not support recipe staff development, Miles Grant claims that the following need to be present for success:

- * Professional development for technology must extend a vision of technology as an empowering tool for teachers and students;*
- * Professional development must stimulate reflective practice and be grounded in the context of teaching;*
- * Professional development must exemplify our deepest beliefs about learning: inquiry, collaboration and discourse;*
- * Professional development must recognize the interplay in learning between activity and belief;*
- * Professional development must value and cultivate a culture of collegiality;*
- * Professional development programs must provide continual contexts for formal and informal learning;*
- * Professional development must provide opportunities for meaningful teacher leadership roles to emerge;*
- * Professional development must enable teachers to shape their own learning.*

(Miles Grant, www, 1996)

Rodriguez and Knuth (2000) suggest their own components which are essential for successful training and development, to support computer usage in classrooms.

These components include the following: a connection to student learning, hands-on technology use, variety of learning experiences, curriculum-specific applications, new roles for teachers, collegial learning, active participation of teachers, ongoing process, sufficient time, technical assistance and support, administrative support, adequate resources, continuous funding, and built-in evaluation.

(Rodriguez and Knuth, www, 2000)

Rodriguez and Knuth (2000), support the longitudinal nature of change involving the use of computers in classroom environments. Whole-school change has a direct relationship to the amount of technology available in schools, both for teachers and students.

Byrom (1998) states, "Truly integrating technology into teaching and learning is a slow, time-consuming process that requires substantial levels of support and encouragement for educators." This process may take three to five years in technology-rich schools and even longer in technology-poor schools.

(Rodriguez and Knuth, www, 2000)

At a classroom level, McNamara, Miles Grant and Davidson Wasser, (1998), quantify the number of computers required per classroom before a change in teaching practice was identified.

In developing ways to make optimal use of the two computers in their classrooms, teachers have changed their practice to include more inquiry-based and project-based activities.

(McNamara, Miles Grant and Davidson Wasser, 1998)

Whilst this was the number of computers required to notice observable change, there was no mention of an optimal level to make this change effective and powerful.

Ringstaff and Yocam (1995), claimed:

"Numerous studies have found that the introduction of technology can lead to important changes in teachers' method of instruction."

(Ringstaff and Yocam, 17, 1995)

They cited from the Office of Technology Assessment:

One of the most significant impacts of the use of computers in the classroom is change in teaching style. Teachers can go beyond the traditional information delivery mode where they are presenters of ready-made knowledge and become facilitators of students' learning.

(Ringstaff and Yocam, 18, 1995)

This was further supported in their work in the Apple Classrooms of Tomorrow (ACOT) project. This project was a ten year longitudinal study that looked at the use of computer technology in classrooms. It has provided a large quantity of data relevant to this study at Meadows Primary School.

Throughout the Apple Classrooms of Tomorrow (ACOT) projects in Australia and the United States, new patterns of teaching and learning emerged. The teachers' struggle to accommodate the new technology in their classroom began to dissipate during the first year (Dwyer, Ringstaff and Haymore, 1990). This fact alone has implications for any longitudinal study involving the use of technology in a dynamic environment.

The ACOT project claimed that teachers moved through three stages as they grappled with the introduction of computers in their classroom. The first of these was "Survival", where the teachers focus was on themselves. They were concerned with student behaviour, the physical environment and their own role

within the room. When they became more confident they moved to the stage termed "Mastery". Here teachers began to anticipate problems in the classroom and their teaching practice, and designed strategies to overcome these. The final stage was achieved when the teacher was able to use the computer to their advantage in the classroom with confidence. This stage was termed "Impact" (Dwyer, Ringstaff and Haymore, 1990b). This demonstrated that the teacher had made a successful transition to integrating the computer into their classroom environment.

Reporting on the wider issues raised by the ACOT study, Yocam & Wilmore (1995) found professional development approaches that had the most impact did the following:

- *involved small-group collaborations between teachers;*
- *took place in working classrooms;*
- *built on teachers' existing knowledge about curriculum and practice;*
- *provided opportunities to experiment and reflect on new experiences;*
- *provided ongoing support to help implement change and innovation.*

The staff development program that has evolved from these principles has carried teachers beyond the barriers of their beliefs to new conceptions about the constructivist nature of learning, the facilitative role of teachers, and the empowering influence of authentic forms of assessment."

(Yocam & Wilmore, p 2)

Jane (1992) claimed that in high-tech classroom traditional forms of training and development are not effective.

Teachers, like students, learn when they have on-the-spot access to help, models to learn from, other teachers to observe and be observed by, colleagues to share and discuss ideas with, as well as more opportunities to learn outside the classroom.

(Jane, 5, 1992)

Yocam and Wilmore's study was based on the premise that teachers:

"should be introduced to instructional strategies in the setting of real classrooms and have the opportunity to observe those practices employed in the routine of actual school days"

(Yocam & Wilmore, 2, 1995)

Furthermore this study found that teachers need a "supervised practice" time whereby a mentor observes lessons taught in the classroom and that when involving the use of computers and related technology, that individuals must have access to hardware and software in their normal classroom after training sessions.

This is supported in a study by Bellamy et al (1995) who claim their study was impeded by the lack of experience among participating teachers in using the necessary technology. The teachers involved in their study did not have the personal computing skills they had anticipated. Workshops were conducted to overcome this problem in addition to collaborative design of curriculum incorporating the use of required technology.

One challenge was:

to help teachers successfully integrate the technology that was available in their classrooms with their teaching methods. Perhaps more challenging, however, was getting teachers to think about changing their role in the classroom in order to create a more collaborative, active, student-centred environment.

(Yocam & Wilmore, 5, 1995)

The role of professional development for the teacher is a crucial one. This professional development is not just in the area of information technology but is also imbedded in more fundamental issues of pedagogy. Teachers must analyse the best and most appropriate way to utilise technology in the classroom.

Computer education requires teachers to learn and to demonstrate entirely new skills and understandings, both in the use of the new and unfamiliar device within the classroom, and in the restructuring of classroom schedules and practices.
(Schiller, 36, 1992)

2.4 Classroom Computer Usage and its Relationship to Curriculum

Curriculum documentation now in place in New South Wales Department of Education schools makes recommendations on the use of computers in classrooms and in some instances makes reference to specific software titles (Board of Studies, 1993). In addition to this, educational projects that contain components of computer use are also referred to, giving the teachers further scope for the integration of computers into the curriculum (Board of Studies, 1994).

The Science and Technology syllabus states that:

Technology education embraces computer and communication technology. This syllabus recognises the need to provide students with experiences which assist them to:

- * understand computers by using them;*
- * understand the nature of communication technology and to become competent mass media users.*

(Board of Studies, 2, 1993)

A major stumbling block that educators face in their quest to integrate computers into the curriculum and give students a chance to be competent users of technology is influences from outside the school. The longitudinal study reported by the various researchers in the Apple Classroom of Tomorrow project provided rich data linked directly to the integration of computers into the learning environment. Early reports state, "Cultural norms continue to support lecture-based instruction, subject-centred curriculum, and measurement-driven accountability" (Dwyer, Ringstaff and Haymore, 1, 1990). Whilst public education supports cultural norms and is driven by such beliefs, changes in the area will be slow. Educators' attempts to challenge students in new and innovative ways may be stifled.

The nature of the changing role of the teacher in such a setting can be seen through the later reports on the ACOT research.

"The chart below shows the shift that occurred in classrooms as the ACOT teachers extended their traditional views of teaching and learning—from instruction to knowledge construction."

Please see print copy for images

Figure 1.1 Shifts in Teachers' Views of Teaching and Learning

(Chart from Tierney and Dwyer, 13, 1995) - ACOT Program

In addition to the changing role of the teacher, the ACOT studies observed that a teacher's approach to the use of computers in their classroom evolved through a number of stages of development.

Entry: Learn the basics of using the new technology.

Adoption: Use new technology to support traditional instruction.

Adaptation: Integrate new technology into traditional classroom practice. Here, they often focus on increased student productivity and engagement by using word processors, spread-sheets, and graphics tools.

Appropriation: Focus on cooperative, project-based, and interdisciplinary work—incorporating the technology as needed and as one of many tools.

Invention: Discover new uses for technology tools, for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies.

(Tierney and Dwyer, 16, 1995)

The research by Tierney and Dwyer (1995) demonstrates the amount of change that a teacher must encounter when integrating the computer into their teaching practice. Not only is there a change in their role in the classroom, then entire dynamics of the learning environment changes. There is a more fundamental change in the nature of learning. Coupled with this is the teacher's own evolving view on the use of the computer in the classroom and the types of activities that they ask the students to engage in.

2.5 Action Research

"Lewin described action research as proceeding in a spiral of steps, each of which is composed of planning, action and the evaluation of the result of the action" (Kemmis & McTaggart, 8, 1988). The cyclic nature of the process is a recognition of "the need for action plans to be flexible and responsive" (p8). Due to the dynamic nature of any real setting, Figure 1.2 shows how the action and reflection overlap allowing for the modification of plans. This research study followed this traditional action research model. As a qualitative study with an emergent design, the action research model was the most appropriate methodology. The research was self-reflective and by definition the participants were "trying out ideas in practice as a means of improvement and as a means of increasing knowledge about the curriculum, teaching and learning." (p 6).

The journey that was undertaken by each of the participants during the year was embedded in a whole school context. These five individual teachers interacted with each other and the rest of the staff on a daily basis. Whilst forming a multi-leveled collegial team each were focused on a similar goal of improvement and integration of the computer into their classroom. Each participant was directly involved a whole school training and development program involving focusing on the use of technology in addition to their own individually negotiated professional development plan. To some extent some of the five teachers had similar goals and as a result formed loosely formed collegial teams when

appropriate. At other times their struggle was personal as they coped with interventions of training and development, curriculum issues, technology and the basic notion of how students learn best.

Please see print copy for images



Figure 1.2. The Action Research Spiral (Kemmis and McTaggart, 11, 1988)

2.6 Summary

Research reviewed provides a body of evidence about "best practice" ideals that can or have been directly applied to the introduction of computers in classrooms. Best practice processes in programs suggest that they must:

- be longitudinal;
- be collaboratively planned;
- include a major training and development component situated in the classroom with immediate assistance on-hand if required;
- allow teachers opportunity to discuss work with colleagues; and
- allow for time for teachers to reflect.

There appears a great deal of common ground among studies cited including Wellburn (1996), Rodriguez and Knuth (2000), Miles Grant (1996) and Yocam and Wilmore (1995). All suggest that any program looking at a change in practice in a classroom must be implemented and supported over an extended period of time.

Professional development programs with teachers need to be collaboratively planned and someone must be “close at hand” for teachers if they have any pressing issues that need to be addressed. Training must be ongoing and twofold in nature. Whilst aspects of grappling with the technology and familiarity with the hardware and software may need to take place away from the classroom in a separate training situation, a large component of training needs to take place in the teacher’s classroom with their students present. This will produce learning in context and may incorporate demonstration lessons and modelling through to the observation of teachers as they attempt to include the computer in lessons that they may not have done before.

Teachers must be extended the opportunity to spend time in meaningful dialogue with others in addition to time set aside for reflection. This allows time for a teacher to synthesise his/her beliefs in addition to raising concerns among trusted colleagues and or with a mentor.

The work in the Apple Classrooms of Tomorrow project also suggests that teachers need time to experiment and reflect on their new experiences and that any development program should build upon a teacher's present knowledge of curriculum and practice. This is further supported by the more recent work of Rodriguez and Knuth (2000) and McNamara, Miles Grant and Davidson Wasser (1998).

Each of these themes required that the design of this enquiry take into account not only the dynamic nature of learning but also the dynamic nature of schools and the influences that affect what happens in classrooms on a daily basis. This study places a number of these characteristics of "best practice" in the area of professional development and embeds them in an Australian context. Whilst the ACOT schools in the United States and Australia had one singular focus across an entire staff, this study will look solely at five teachers within a school where limited resources must be shared across an entire staff. A school where the program for this focus group of five teachers is also located within a whole school training and development program. It is anticipated that this study will make a contribution to the enhancement of the literature on effective/best practice for the introduction of computer technology into schools.

CHAPTER 3 PROFESSIONAL DEVELOPMENT CONTEXT OF SCHOOL

3.1 Context of the School

Meadows Primary School, in which the project was set, caters for students from Pre-school to Year 6 and was established on a campus of schools between a High School and School for Special Purposes (SSP). This "special school" provides educational opportunities for moderately and severely intellectually disabled children. At the time of the study, the student population of Meadows Primary School was approximately 450, and was principally drawn from the adjacent Department of Housing estate in south western Sydney.

Sixty-five percent of the families at the school were reliant on some form of social security payment as their income. The Language Background Other Than English (LBOTE) population of the school was slowly increasing with thirty-nine percent in 1997. There was a significant turnover of students, with annual transience rates averaging forty-six percent. In addition, the school had a significant Aboriginal population of over twenty students.

Collaborative decision making was a key feature of the school. Young teachers were able to lead specialised areas resulting in a vibrant and committed staff. Teachers took a major role in making decisions on new school strategies, courses and programs. This was a direct result of the inclusive leadership style of the principal and other senior school executive.

Training and development that resulted in a pursuit of excellence and constant improvement in teaching practice was strongly valued. The Principal had put processes in place that enabled and encouraged staff to identify and plan for celebrations of outstanding achievements by the teaching team or individuals.

Classrooms were open for others to observe, team-teach and adopt ideas and strategies. This was also extended to other educators from outside the school on "selected " occasions. The ethos of the school acknowledged that a team ethic, shared leadership and decision making, reliable support networks, high staff morale and quality training and development contributed to significant improvement in student learning outcomes. Furthermore, the fostering of this school culture or climate provided opportunities for the students at this school that would not previously have been available to them.

Due to a number of security problems at the school, a whole-staff decision was made in 1996 to create a secure computer room of seventeen machines. This was in addition to one computer shared by three to four classes in separate foyers around the school (Appendix 2). The detached nature of the buildings did not make networking financially viable at this stage, except within the computer room. This room became the focal point for computer use and teacher training for the whole-school training and development initiative. As the study with the five teachers progressed, it was very evident that their training and development was required in their classroom with their children.

Licensing for programs such as Kid Pix Studio, Clarisworks and a number of CD-ROMS had been gained for the computer room. Due to the cost of licensing, only software that was suitable for a wide range of age groups in the school was purchased for this room.

3.2 Context of The Study

During the planning conference for the upcoming school-year, the teachers and school executive at Meadows Primary had identified a need for a co-ordinated and comprehensive program to increase the use of computers in classrooms. An increased student and teacher computer proficiency would be one of its main focus areas over a two to three-year period.

This study coincided with the first year of the whole-school program and therefore became a component of a larger training and development initiative. The whole-school program included voluntary mini-training sessions conducted by the researcher once or twice a week. These sessions were 10 minutes in duration and targeted discrete skills that had been identified by staff as ones that had inhibited their use of computers. Such topics as how to send email, how to save to the correct folder, and how to print to a designated printer were covered.

In addition to computers being in classrooms, the school created a computer room to enable full class instruction. This room was also a venue for parent training courses on computer usage, and individual professional development time for teachers with or without their class present. These one-hour teacher sessions were focused on negotiated topics that would assist teachers in integrating computer usage into their classrooms. The program was multi-faceted and was embedded in classroom practice. Its focus was to upskill staff, students and parents in the actual environment in which they learnt. Training sessions involved actually working with their own class with a mentor at hand providing demonstrations, advice or to be a sounding board for trialed strategies.

The five teachers involved in this study also took part in the whole-school training and development strategies as were appropriate. Each teacher had differing needs dependent upon their teaching and computing experience and the teaching situation in which they found themselves.

Galletea, was teaching a special education class from the neighbouring SSP. Maree was team-teaching on a multi-age class with students from Year 1 to Year 5. This class consisted of specially selected students who were achieving at an academic level above that of their peers. Myself as researcher and Assistant Principal at the school was the other teacher in this classroom. Maree had specific responsibility for the younger component of students in this classroom. Amber and Debbie were both teaching multi-age classes at the beginning of the year, but

due to an influx of students, Debbie ended up teaching a Year 1 class and Amber taught a multi-age Year 2/3 group of students. Josephine who was the fifth teacher involved full-filled a RFF teaching role across the school, in addition to training activities with specific teachers.

Josephine, one of the participants in this project, negotiated a professional development program that included her conducting the parent and teacher training sessions that had previously been run by the researcher. These sessions were co-ordinated by both of us and conducted independently, dependent upon the necessary skills required. Training in the area of specific software packages was of interest to Josephine and one she attended to with great enthusiasm. In conjunction with her Release-From-Face-To-Face (R.F.F.) role in the school, Josephine began to be allocated more time working in this area. This was partially due to the additional flexibility her R.F.F. role allowed, with minimal disruption to a specific class.

Josephine and I were the two staff members who conducted the whole school training and development program in the area of computer education. Each of us had specific and joint roles that combined to provide what we believed was a beneficial co-ordinated and comprehensive program within the school. The introduction of this particular "doctoral study", enabled a more specific and in-depth program to take place with a small and committed group of staff. This focus group was not only able to take part in the regular whole school program but was able to benefit from specifically negotiated and designed professional development that had the "luxury" of additional resources. These resources were in the form of time "off class" for the teachers and the time for me to be in the classroom as a participant observer. These were paid for through a study grant that I applied for specifically to complete this doctoral project.

To assist the completion of this project, the Department of Education made available forty days teacher relief for the researcher to use as I saw fit to complete

the study. These days had been allocated through the Training and Development grant as part of support for doctoral research. There were no specific controls placed on the research after the original approval of its methodology and research questions had been submitted. However, there was an expectation that a report would be supplied to the Training and Development Directorate at the completion of the thesis.

As three of the teachers involved in the study were interested in the use of the Wiggleworks program, it became a major component of the study. The Wiggleworks program used was an integrated leveled reading program that utilised, interactive CD-ROMS, individual readers, big books and audio tapes. The interactive CD-ROMS contained activities related to the text and text construction. This early literacy program was highly motivational for the children involved.

3.3 Individuals Involved

The five teachers who volunteered to be involved in the study had varied backgrounds. They ranged from those with minimal teaching experience to very qualified, respected and experienced classroom practitioners. Three of the teachers were teaching mainstream classes, one took the Release-From-Face-To-Face component of teachers' programs, the other taught a satellite class from the adjoining S.S.P. school. One commonality for each was the reason they gave for being involved; the use of computers in teaching was an area they wished to know more about and become better skilled.

Detailed information on each of the participants can be found in the relevant sections of Chapter Five. However, the basic introduction that follows will provide some insight into each individual.

Galletea: More than twenty five years teaching experience in the area of Special Education. Galletea was actually on the staff of the adjoining S.S.P

school but taught her class on the grounds of Meadows Primary. She also had experience as a relieving executive teacher at her S.S.P. school.

Maree: More than ten years full-time teaching experience that had been interrupted by the time off she had taken to raise her young family. 1997 was her first year back to full-time employment after five years. Maree had teaching experience from Kindergarten to High School students.

Debbie: Five years teaching experience all as a casual relief teacher, all at Meadows Primary School. Predominantly she had taught Upper Primary classes until 1997. During the study she was teaching a Year 1 class in her first year as a permanent teacher.

Josephine: Four years teaching experience all as a permanent teacher. Josephine was first appointed to a neighbouring school after being awarded a permanent position straight out of university as a targeted graduate. She was a mature-aged student with experience in the banking sector. During 1997 she was fulfilling the role of R.F.F. teacher in the school.

Amber: Amber had five years teaching experience. Three of these were as a permanent teacher at Meadows Primary School. The other two years were as a relief teacher at various schools. She was acknowledged by the School Executive and her peers as a talented teacher. Her involvement in the project was cut short to six months due to her taking leave for the birth of her first child.

To provide a better understanding of my relationship with each participant and my role within the school and this study, the following information will provide a context for readers.

Glen Patterson: I have had over ten years teaching experience in both city and country school locations. Further experience was gained as a computer education consultant for the NSW Department of Education in two city regions and one region on the north coast of New South Wales. My Masters of Education was awarded at the University of Wollongong majoring in the area of educational computing. Coupled with my work experience this enabled me to present at state, national and international educational conferences and lecture at a post-graduate level. My role in 1997 at Meadows Primary School was as Assistant Principal, class teacher and co-researcher for this study. I am aware that the duality of my supervisory role as Assistant Principal and as mentor and co-researcher for this study took a while for some participants to feel comfortable with. This was mostly evident in the first few visits to classrooms where teachers appeared a little nervous with my presence. This appeared to dissipate as the study progressed.

CHAPTER 4. METHODOLOGY

4.1 Theoretical Framework for the Investigation

The project comprised five separate case studies within the one school. It began with the "assumption that competent practitioners usually know more than they can say. They exhibit a kind of knowing-in-practice" (Schon, viii, 1983). Connelly and Clandinin (1988) discuss teachers' "personal knowledge" in a similar way, "this determining all matters of significance relative to the planned conduct of classrooms" (Connelly and Clandinin, 4, 1988). Such a premise had direct implications for the type of data that were collected and the way that they were gathered. Classroom observation notes and each teacher's journal reflections were crucial in gaining insight into the change process.

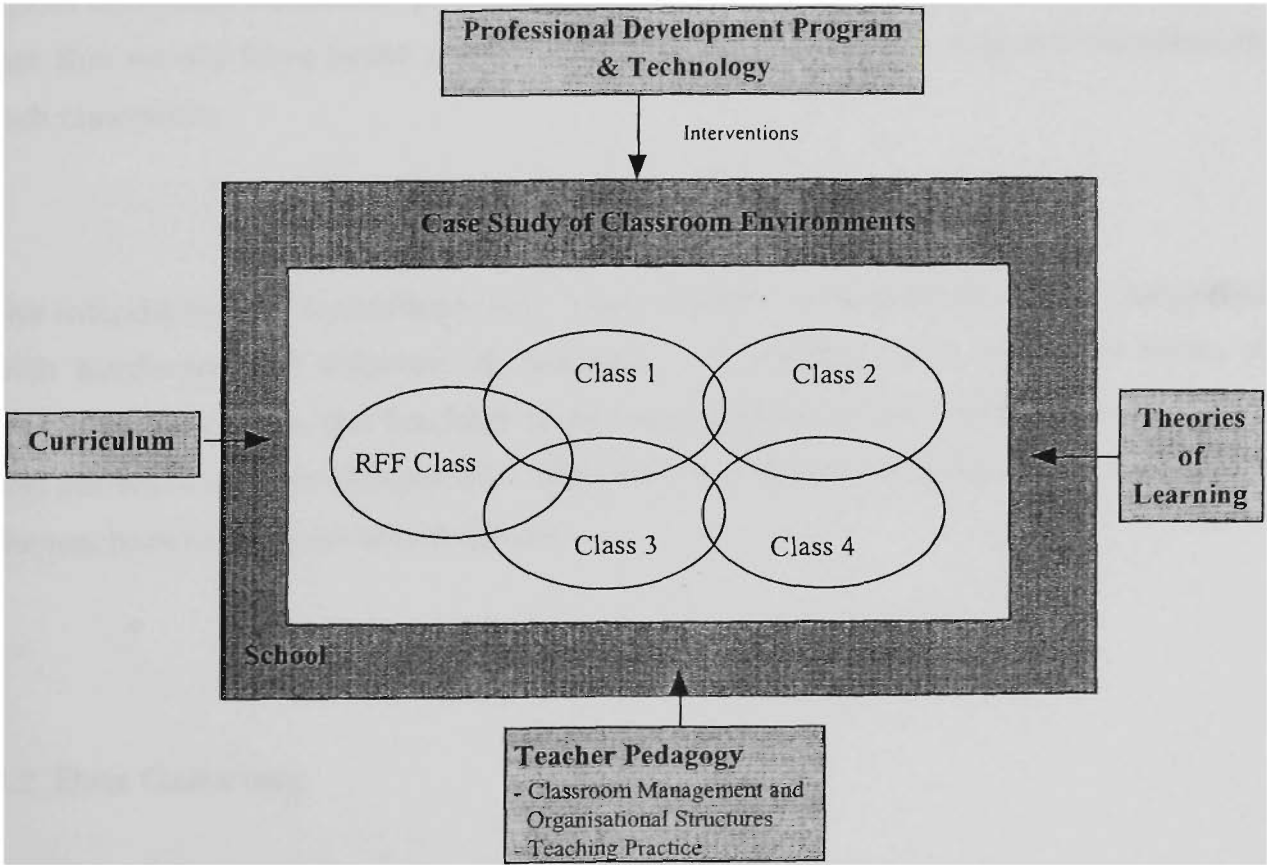


Figure 4.1. Model for Case Study of Five Classroom Environments

Figure 4.1 illustrates the interactive and dynamic nature of the project with the five classroom environments involved in the study at its focus. The individual teacher's philosophy of how students learn best underpins each class's learning setting. The workings and changes in teaching and learning practice were of primary interest as one of the major indicators of a change in pedagogy. The outer layer of influence is the school; this interacting with the practices and learning environment of each of the classrooms.

The two interventions in the study were a co-operatively designed professional development program with each teacher and the introduction of computer technology. The collaboratively designed professional development program was implemented throughout the eight-month study in conjunction with a whole-school computer education professional development program. It was anticipated that this would have some impact on the teaching and learning environment in each classroom.

The introduction of technology was "need driven", with teachers being supported with hardware and software as required. In addition to a computer room of seventeen machines, the teachers were supported with both additional hardware and software in their classrooms. This was as a direct result of requests made by the teachers to support this initiative.

4.2 Data Gathering

a) Mode of Inquiry

The study was an action research project, involving five teachers, conducted across a single school setting. It had a collaborative approach involving the five teachers and myself as participant researcher. A larger contingent (including most staff) were involved in a whole-school professional development program that ran concurrently with this action research project.

This project investigated the workings of the five classrooms, the function of computer technology in children’s learning and the professional development undertaken to assist teachers in its implementation. The design of this project was consistent with the emergent nature of such studies. Data was only collected in relation to the five volunteer teachers and their classes.

| Major Themes | Dimension | Inquiry Questions | Data | Source |
|--------------------------|---|-------------------|--|--|
| Teaching Pedagogy | <ul style="list-style-type: none"> ◦ Student Learning Outcomes | a, b, c, d, e, g | a) Interviews, Journals, Observation b) Photos, observations and journals c) Journals, Observation d) Interviews and Journals e) Interviews, Photos, Journals and Observations g) Documentation Review and Interviews | a) Teachers, Participant Researcher b) Teachers, Participant Researcher c) Teachers d) Teachers e) Teachers g) Teachers |
| Professional Development | <ul style="list-style-type: none"> ◦ Computer Skills ◦ Learning Environment | b, c, h | b) Photos, observations and journals c) Journals, Observation h) Professional Development Programs, Journals, Observations | b) Teachers, Participant Researcher c) Teachers h) Participant Researcher, Teachers |
| Computer Technology | <ul style="list-style-type: none"> ◦ Teaching Practice | f, i | f) Student Work Samples, Documentation Review i) Observation | f) Students, Teachers i) Teachers |

Figure 4.2 Data Collection Matrix

b) Context

The study was unique, involving one primary school in Sydney's south west. The school is placed in a low socio-economic area. It has a significant Aboriginal and increasing L.B.O.T.E. population and for the purpose of this study was called Meadows Primary School.

c) Participants

The entire teaching population of the school including the satellite classes was invited to be part of the project by the researcher on the first day of school in 1997. The teachers who took part were self-selected. Volunteers were given an added incentive of additional time off face-to-face duties to compensate for the extra workload resulting from their involvement. This equated to them receiving an additional hour per fortnight to pursue matters related to the project.

Each teacher participant was assured of their anonymity in the project and even selected their pseudonym to be used for their name during the project. Permission was also sought and granted from the NSW Department of Education. Permission was also sought and granted by each of the parents of students whose work or photograph appeared in the study. Pseudonyms for each child's name were also created to ensure their anonymity.

d) Data Collection and Analysis Methodologies

Data was gathered in the classrooms through a variety of methods. These methods were selected to best collect data related to the sub-questions as they developed throughout the project. Data collection methods included:

Data gathered by co-researchers (teachers):

* Journals tracking changes in the classroom were kept by the teachers involved.

The journals were kept by the teacher as a record of their thoughts about processes and changes taking place in their classroom. Negotiation with teachers took place and, when appropriate and acceptable by the teachers involved, the journals became a two-way discussion of changes in their classroom environments. I would read through the journal making comments if required once a fortnight. Teachers were encouraged to make entries one to two times per week, in addition to making comments regarding my entries.

To begin with, journals were reflective and concentrated on the teacher's personal views, questions and direction for the study. As the study progressed, common themes were used by all teachers, enabling easier comparison and the correlation of data collected. These themes were:

- Successes -
 - Pupils
 - Self
 - With the Technology
 - With relationships with other staff

- Concerns/Frustrations

A sample of a section of one of the journals can be found in Appendix 3.

* Review of curriculum documentation applicable to classes involved in the study.

The teachers were encouraged to re-examine curriculum documentation and where computers and related technologies were suggested to be used to enhance teaching and learning in the classroom.

- * Review of transcripts and observation records.

Transcripts of meetings or notes taken were made available to the teacher involved allowing her to comment upon my account of the conversations that had taken place. Conversations that took part as part of scheduled meetings were tape-recorded. At all other meetings, notes were taken and written-up by myself at a later date.

Data gathered by research co-ordinator:

- * Narrative (storytelling).

The construction of a narrative archive, allowed collection of all appropriate data from classroom interactions, providing information about the whole learning environment. It comprised "storytelling" of classroom events and focused on the past, present and future. These narratives were reviewed by the classroom teachers involved.

- * Classroom observations (of teacher and students) using prepared observation sheets.

These took place once per fortnight for an hour at a time that was negotiated at the beginning of each term. The structure of these observation sheets comprised:

- a) Observation of classroom layout - particularly any changes.
- b) Observation of the lesson in progress. This included type of teacher-student interaction.
- c) Observation of the interaction of the students with each other.

These observation records were used to assist in the construction of narratives.

* Teacher semi-structured interviews.

Teacher interviews were as free-flowing as possible. They were designed to be a discussion of teaching pedagogy. The interviews possessed the commonalities of:

- a) What do you believe about children, teaching and learning and curriculum?
- b) How do you believe students learn best?
- c) How would you characterise your teaching style?
- d) What role do you believe computers and related technologies play in your classroom?

Interviews concentrated on pedagogy, the modification of teaching strategies and professional development procedures. The semi-structured interviews engaged participating teachers in discussions about their work in education; they discussed their thoughts and feelings about the workings of their classroom and their own philosophies of teaching and learning. In addition to this, the function of the use of technology in the teaching and learning was discussed.

Interviews were conducted over an eight-month period at three time periods; these were: initial (May), mid (September/October) and end of project (December).

One of these interviews can be found in Appendix 4.

Professional development activities designed to assist teachers were undertaken by personnel both within and outside the school throughout the year. The actual personnel required was decided as the project evolved and as needs arose.

Each interview took up to one hour and included viewing of work samples and teaching programs.

- * Review of any joint planning sessions.

Joint planning sessions for professional development activities and classroom programs were noted and reviewed by all parties concerned.

- * Detailed sketches and photographs of classrooms, furniture, materials and resources. (At a minimum, this was completed at the beginning of the study - mid study and at the completion of the data collection time period. Additional comments were made during classroom observations if required).

- * Joint review of the teachers' programs.

This was completed at the beginning of the study, mid-study and at the completion of the data collection period. Any noticeable changes were commented upon in the written reports.

- * Review of curriculum documentation applicable to classes involved in the study.

The researcher reviewed current curriculum documents and school policies with regard to the use of computers and related technologies to assist in the delivery of teaching and learning in the classroom.

- * Copies of the Staff Development CD-ROM: Teaching, Learning and Technology. Planning for Staff Development. This CD-ROM was part of the Apple Education Series and dealt with issues and themes that arose out of the ACOT Projects.

The CD-ROM provided resource material and background information.

* Students' work samples (concentrating on notable changes).

Student work samples were collected in all key learning areas. These samples were collected in conjunction with Student Assessment folders. Collection took place in Week Three, Term Two; Week Four, Term Three; and Week Nine, Term Four. Parent, student and teacher permission was sought and folios for six students from each of the classes involved were collected.

A copy of various student work samples across the duration of the study can be found in Appendix 5.

* Copies of the teachers' collaboratively designed development programs required for this project.

Staff development timetables and plans were noted. Activities delivered by external and internal personnel were included. Evaluations of activities were included if individuals believed it was necessary or appropriate.

Reliability and Validity of The Study

The quality of any action research study is based on how true and accurate, its findings are. The primary ways that this is dealt with is through managing and ensuring internal and external validity and reliability are maintained (Guba and Lincoln, 1994). Internal reliability looking at specifically whether the findings represent a sub-set of reality was dealt with by the utilisation of numerous methods. One of the methods instituted was a process whereby all transcripts were presented back to each participant to ensure their accuracy. In addition to this, the findings of each case study were read by the individual involved before they were included in the final dissertation. Each agreed they were an accurate representation of their involvement in the project. This was also a measure of validity as individuals agreed with the analysis and data presented as being an accurate representation of their "story".

As this study was an action research project of a unique single school setting concerns for external validity, looking at the ability for findings to be generalised, were of less concern. Generalisation from such a small sample of teachers may be difficult to make accurately. However, trends in the data collected may provide valuable information that may be used for others who wish to look at similar studies.

The reliability of data was checked against the known body of knowledge analysed as part of the literature review. In addition, internal consistencies in the data were checked by cross-referencing data through triangulation to ensure multiple sources of provided information for analysis.

4.3 Data Organisation and Analysis

Use of NUD*IST

QSR NUD*IST stands for Qualitative Solutions and Research - Non-numerical Unstructured Data Indexing Searching and Theorising. NUD*IST was used to both store and code data. Transcripts were coded per line (called text units) and assigned to appropriate nodes. (see Node List Appendix 6.2). The use of this program facilitated an easier triangulation of data enabling the identification of emergent themes.

*"QSR NUD*IST is a computer package designed to aid users in handling Non-Numeric and Unstructured Data in qualitative analysis, by supporting processes of coding data in an Index System, Searching text searching patterns of coding and Theorising about the data".*

(Quality Solutions and Research Pty Ltd, 2, 1997)

All documents or information about artefacts that were collected were housed in the NUD*IST Document System. These documents were then explored and appropriately coded. This coding began on broad themes and then narrowed

according to the volume of data held at each node. Each text unit was also coded by date, type of document and participant involved. The documents included such things as photographs, interview transcripts and program notes. Data that comprised written text was housed online within the NUD*IST program. Diagrams, photographs and student work samples were offline documents that were coded in NUD*IST as single entries.

Text unit analysis was then possible through the use of the NUD*IST program. Such analysis was possible through the generation of text unit frequency tables, which enabled the aggregation of some data. It must be noted that the sheer number of text units in NUD*IST was only a rough guide of the relative importance of any node. Appendix 6.1 shows an example of one of the first node list created.

Thematic matrixes were constructed around emergent themes in addition to matches on intersecting data from different nodes. The program allowed the fast testing of theories and the ability to quantify where large amounts of data had been collected. The emergent nature of the research necessitated the modification of nodes during the life of the study. One such example was the original node for categorising teaching practice finally became eight nodes looking at more discrete themes including classroom climate, teaching style, and physical environment. Appendix 6.2 is a representation of the final list of nodes used to categorise data.

4.4 Summary

The collegial team were able to make a number of recommendations regarding the introduction of computer technology and the function of professional development to embed it in a teaching and learning environment. It is anticipated that this information will contribute to the professional body of knowledge regarding teaching practice, the role of computer technology in education and the prerequisites necessary to promote and foster development of staff in an ever-growing and topical area.

5. FINDINGS - TEACHER CASE STUDIES

OVERVIEW OF FINDINGS

Research Question

What are the implications for teaching and learning when computer technology and a collaboratively developed professional development program are implemented in a primary school?

To assist in the process of answering this primary question, secondary questions in the areas of pedagogy, professional development and computer technology were required to provide a broad base of information to allow for detailed analysis. Information regarding each of the teachers and their classrooms were categorised in this way. This information is dealt with specifically in each case analysis in this chapter providing a framework whereby data are analysed and emergent themes developed.

Whilst there are similarities found between each of the participants engaged in the study, the findings involving each teacher, as an individual, are dealt with first in this chapter. This has led to five discrete case study reports.

The discrete reports are structured with an introduction to each teacher followed by the nine sub-questions. This enables the cross referencing of data and responses in Chapter 6 "Cross Theme Analysis".

5.1 GALLETEA

5.1.1 Background Information

Teaching Experience and Educational Setting

Galletea was employed at a neighbouring School for Special Purposes (S.S.P.) and taught a satellite class on the site of the Primary school. She was a teacher of more than twenty-five years experience. In Galletea's own words:

I teach a special class of nine (I.O.) moderately intellectually disabled students. These students have a variety of disabilities - Down Syndrome, Autism and other disabilities with unknown aetiology. The class is a satellite integration class located in The Primary School. Our home school is A School for Special Purposes in Sydney's South West, only minutes away in the same complex, but separated by a large wire fence. All students are integrated into mainstream classes for a variety of activities - from academic K.L.A's (Key Learning Area) to sport and assemblies. So far the teacher's aide (Sarah Cousins) and I, have no computer skills whatsoever and we have no computers in our classroom. It is for this reason that I have decided to join Glen's research. We want to be computer literate - although I am a 'luddite' at heart.

(Galletea, Journal, May)

Galletea's classroom was colourful, whilst she talked of some behaviour problems in the class, each time I visited there was little or no trouble with all students actively engaged in learning activities. Some of Galletea's children I noticed in the playground or on lines in the morning. They did not seem to handle change very well. They would become upset quite easily and were extremely difficult to console once routines were broken. At the beginning of the research program I made some observation of Galletea's classroom.

5.1.2 Teaching Philosophy in Practice

The climate in Galletea's room was warm and friendly. Against this back drop was a very rigid and structured learning environment. There were visual clues around the room that reinforced daily routines. This was in addition to Galletea's own comments regarding the day to day workings of her classroom.

We do pretty well the same thing each day. We do sight words, phonics, reading, and a little bit of stencil work like a cloze passage, or looking at word families. It's very much structured and very much the same every day. Maths follows that same routine ... very little flexibility in our daily structure, mainly because I work with special kids, people with autism and Down Syndrome and ADHD and kids with foetal alcohol syndrome and they really function better, I have found, if they have the structure there every day. Sometimes I let a little bit of flexibility into the day but that often causes disruption with one or two children, they fly off the handle, cry, carry on and can be quite difficult. Behaviour disturbances happen if I don't stick to a fairly regimented routine.

(Galletea, Interview 1, May)

This philosophy of how to best meet the needs of her students was consistent throughout all associations that I had with Galletea. However, it did appear that she was looking for something more. She was a teacher who wanted to push the bounds of what she believed her students were capable. She was most probably one of her hardest critics - never satisfied with her own performance and pushing for more from herself.

When I am teaching the children - I feel that the way my children learn best is for me as a teacher to look at not what those children can do but where they can go in their learning. How I can stretch them. So I look for that gap which is further on from what they know.

(Galletea, Interview 2, October)

As an experienced, well-organised classroom practitioner, Galletea attempted to minimise the possibility of problems in the classroom and minimise any disruptions that may affect the learning of the students in her care.

This was evident from her second interview when I asked about her students' ability to handle change.

Some children cope really well with change and they can do it. A number of children, especially the autistic children in my classroom, can not cope with change at all. They start to all start flap hands and cry ... they'll get very agitated, and they'll start to repeat things over and over. They just can't cope. But I have lots of little strategies in place, I have little cards on tables, that I point to and remind them to be focussed ... just little strategies in place to assist the children to cope with the change.

(Galletea, Interview 2, October)

Strategies that were proactive in nature were in place and Galletea knew where she was going and why. As Connelly and Clandinin (ix, 1988) state, "experience is the primary agency in education". Galletea's experience with her students and experience from the preceding years had enabled her to have a sound understanding of what the students needed. Her knowledge " ... grows out of and is expressed in practice ... (it) is less one of fixed ideas that are expressed in practice and more one of developing ideas that are found and grown in classroom practice." (Connelly & Clandinin, 20, 1988). This was further characterised by her quest for improvement in herself and her students, and the very reason she volunteered to be involved in the project.

I'm hoping that if I have knowledge of computers and my children do then it will free up a sort of loosening of my of role as the teacher the kids will feel a little freer. They won't sort of freak out and that they will just become more independent and more, just a loosening, a more democratic type of learning and teaching taking place.

(Galletea, Interview 2, October)

5.1.3 First Observations

It was a cool morning in May. There were nine students in the classroom as two were away. There were two discrete groups operating. One group of five was being taken by the teacher's aide Mrs Cousins and the other by Galletea. Both groups were working in the area of Mathematics and both were using concrete materials.

My name was listed on the board to say I was visiting that morning. A class timetable was also on the board. It showed that I would be arriving during Maths

Group Time. Sound blend charts were displayed around the room. Two computers were placed at the back of the room. They were not fully unpacked. Each of the students in the class had his/her name on the back of his/her chair.

There was a two-seater armchair on one wall and a large soft toy sitting against the other wall. There were photographs of children engaged in activities on the cupboard door, each photograph portraying regular jobs in the classroom. Both groups of students were seated on the floor with paddle pop sticks in front of them. On closer inspection the paddle pop sticks were bundled into groups of ten.

Throughout the lesson Galletea was giving positive reinforcement. She was moving her attention from child to child. She posed questions to the students: e.g. "make a group of 30"... Galletea then moved on to the next student then returned to the first to elicit an answer.

At the completion of the lesson, David left to go back to his regular class. Tony left to go back to his integration class. Angela left for Mrs Shaw's room.

The students moved back to their seats to do their spelling test. Steve was doing a separate test. (A blue card saying "listen" was placed in front of him).

Galletea had a bundle of cards with words on them. She shuffled them, then began to ask words. She placed them into sentences speaking with much animation and energy in her voice.

All students were on task. Concentration could be seen on their faces as they strove to write each word correctly. Jessie seemed easily excited. As soon as they had completed their words they put their hands on their heads. Galletea rotated around to mark each child's work in addition to giving stickers out as reinforcement for good work.

There were nine words in the dictation. Lenny did well, correctly spelling nine out of nine words. Positive reinforcement was given to all students. The teacher spoke to the students about being kind and being good friends. The bell went and she dismissed them to the playground.

5.1.4 Initial Computer Usage

As I noted in my initial observation in Galletea's classroom, two computers were still in their boxes at the back of the classroom. I was also aware that Galletea's class was not timetabled to use the primary school's newly completed computer room. Galletea admitted in her journal that she had no computer skills whatsoever, nor had she ever had a computer in her classroom. She wanted to become computer literate and wanted to modify the way she presently taught her children.

5.1.5 Galletea Case Analysis

Galletea was the most experienced teacher involved in the project. She was a self-confessed "luddite" who had little or no involvement with computers in her classroom. Her teacher's aide, Sarah Cousins was experienced dealing with, special needs, students. However, she also had little personal computing skills.

Galletea was slow to start her integration of computers into her classroom. As her confidence grew that this piece of technology would not disrupt her classroom, so

did the frequency of computer usage. She operated a system of withdrawal where individual and pairs of students used the computer during regular lesson time. With small class numbers and children on Individual Education Programs (I.E.P) this model suited her situation well.

One of the major changes noted in Galletea's classroom was the increased meaningful interaction among students. This occurrence excited Galletea! Although she had hoped that computer usage would allow a freeing up of her teaching style; this was an added bonus.

a) Were there any changes to teacher's views about how children learn?

It was clear that Galletea had strong convictions as to why she did things in certain ways in her classroom. She spoke nervously (but passionately) in our first interview about her children and told of specific instances in her classroom that portrayed her teaching practice. By the second interview, Galletea was able to articulate, with greater ease, her belief in how the students in her care learnt best. Information that was provided at this interview was supported by observations made in her room. In Galletea's second interview she stated:

With the children I teach... I feel that (they) need a lot of structure in their day. I am a very interactive teacher in that I participate in a very mobile, in-your-face sort of a way, with my children. Ah---- I always have a big timetable up so the children can walk in and see how their day is going to be structured. They know what is going to happen, if changes take place we talk about them. And so they are all prepared.

(Galletea, Interview 2, October)

In December at her third interview, our dialogue focused on change in her original beliefs about how her students best learnt.

Glen: What are your thoughts now on how your kids are learning best in their classroom now? Has what you've been doing affected your view of what your kids are capable of?

Galletea: Oh absolutely. Yes, definitely. It has opened up a really big field.

Glen: Back in May you were saying that your students learn best with lots of structure, lots of sameness, lots of rote learning. Has that belief changed at all when you reflect on this project?

Galletea: Yes, it has changed. I still feel that children with disabilities need a certain amount of structure. In some ways, I've put that on my children through the learning that I had. But I still feel my children need a structured timetable up on the blackboard each day. They need to see what's going on, especially children with autism, they really need that - they like to come in and see how their day is going. But, as far as the computers (are concerned) - I can see this change coming in them.

(Galletea, Interview 3, December)

Photographs of Galletea's classroom in early December indicated a change in the way that the computers were integrated into the learning environment. Before December when the computers were in use, they were the main focus. This even included being written in the class timetable as "Computers". In December, the curriculum outcome became the focus and the computer usage became secondary. On December 5th, "Christmas Story – Write your own Christmas story (Computers)", was written on the board. This marked a subtle but important change in Galletea's thinking. It was not evident that this was a conscious change, but it was at this time more of a curriculum focus entered her lessons where computers and related technologies were present.

b) Were there any changes in the learning environment?

Physical Environment

There was little change in the physical environment of Galletea's classroom throughout the year. This may have been as a result of the amount of free and open space available to Galletea. With only nine children in a regular-sized classroom, space was never a real problem.

It was obvious throughout the project that Galletea was happy to try different environments for the children to use computers and related technologies in their learning. Her own home classroom had two computers and a printer; she made use of the school computer room of eighteen machines and also at one stage in the year trialed a computer afternoon. This last option was a direct result of Galletea's feeling that she was not providing enough opportunity for her children to have "hands on" time. This was a direct result of pressures coming for class time from other parts of the curriculum and other activities that impinged on class lesson time. In August Galletea reflected in her journal,

Back at school, however, hardly any time available to use the computer.

Education Week in Week 10 and our class must prepare an item for the Primary School Production. This is more time consuming for my children than the mainstream classes - each dance step, each movement takes hours of teaching. As a compensation I have timetabled every 2nd Thursday to having from recess to home time, a computer day. So far it is great. Sarah Cousins goes and borrows as many computers as possible - Maximum seven. This has been wonderful for the children, but hey, it's still mostly Living Books - that tune is driving me bananas.

(Galletea, Journal, August)

By September, Galletea had evaluated her "every 2nd Thursday Computer Afternoon" and had returned to use of computers that were permanently housed within her classroom. This was to be the main learning environment in which the students had access to computers. In October, Galletea began to access the school computer room. This coincided with a growing self-confidence in her own ability to assist the children. She had a growing breadth of knowledge of how computers could complement and supplement classroom learning activities. Galletea wrote in her journal,

We used the computers 2-3 pm. Took turns, Living Books again. I have made a booking to use the Primary School Computer Room every Monday from 11.30 till 12.30.

(Galletea, Journal, October)

By October, a curriculum focus was becoming evident in her journal, when her comments were starting to be driven by the curriculum issues. Children were no longer (to use Galletea's words) "playing" on *Grandma and Me* or playing with *KidPix*. They were beginning to write stories, edit text and draw illustrations.

Well, here we go again. Today we wrote our own stories on the computer using Kid Pix studio. We had the support of Rosie and Tabatha from 1/5 Red. They worked with the children and some fine stories were produced and printed. Sarah Cousins and I wrote everything down. This afternoon we are hoping to continue without the older students' help.

(Galletea, Journal, October)

By the next week :

The older students taught our students how to choose:

typewriter

about the space bar; stamps

how to choose,

how to make their choice bigger on the page;

how to save

how to print.

Children were able to take their stories to our Principal for some positive reinforcement and reading practice. All in all, a most positive morning.

(Galletea, Journal, November)

It was at this time that I observed that computer printed stories written by the students were being placed up on walls of the classroom (see Figure 5.1). These stories included very colourful pictures created in KidPix.

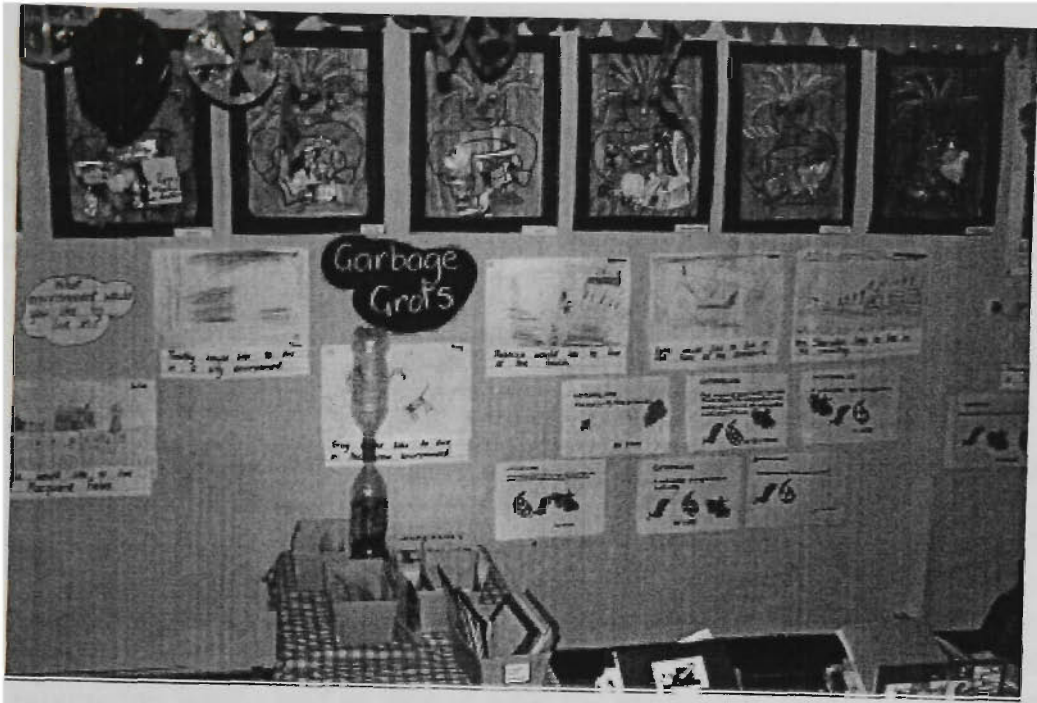


Figure 5.1.1 Photographic evidence of student work on the walls of Galletea's classroom

Classroom Climate

One of the most striking changes in Galletea's classroom was in the class climate. This was most apparent with a modification in the way that the students interacted with their peers. The change was gradual at first. Galletea knew there was something going on but was not sure what it was. It was quite apparent from my observations that students were beginning to interact in a different way, in addition to a growing independence. The computer had become a place where the students discussed things and shared their successes. The dialogue from our second interview shed light on this very issue.

Glen: Can you see your role ... when the computers are going on in the classroom or being used in the classroom is your role as teacher any different at all or is it the same?

Galletea: No , no, it has changed.. Definitely more independent ... It has helped the classroom climate.

(Galletea, Interview 2, October)

By the time of the third interview in December Galletea was able to state exactly the type of changes that were taking place in her classroom. During the interview she spoke of a more relaxed mood in her classroom. This was strongly supported by her journal entries in December:

Classroom climate has changed - much more sharing and watching others use computer - more student interaction with each other. They don't need me. They discuss, assist and laugh lots more with each other. Their interaction with each other is far greater and much more relaxed. Different buddy groups have emerged because of this interaction ... So far learning outcomes may not have changed - but classroom climate and student interaction have - and as this is only the beginning, hopefully as we move further along the technology pathway as a class, learning outcomes will change.

(Galletea, Journal, December)

c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment?

The initial change in teaching practice in Galletea's room came in late May. It was at this stage that she moved two computers into her classroom. Galletea sought advice, from other colleagues and myself, as to the most appropriate place to have the computers in her room. This position can be seen in the diagram in Appendix 7, a position that she kept the computers in for the entire year.

In October, Galletea spoke about problems when a change in teaching practice or routine takes place in her classroom. She noted that the autistic children in the room did not cope well.

In the same interview we spoke about issues related to her role in the classroom when computers were in use.

Glen: I suppose you mentioned it then. The children are working on the computer; it sort of allows you to "stand on the outside" and watch what is happening.

Galletea: Absolutely. I need to only step in so very rarely. Mind you, we are working on are very basic programs. The sharing and the teaching that they give each other and ... the student interaction is really really wonderful. And I feel as I become over the next few weeks more familiar with the programs and can introduce it on a curriculum level in a stronger way ... The learning outcomes will change in my classroom.

(Galletea, Interview 2, October)

Galletea was well aware that in the early months of the project that curriculum was not her focus when computers and related technologies were present in the classroom. She spoke of students needing to learn how to use the programs involved, but also spoke of her anxiety about her lack of knowledge. It was obvious that there was a change in the teacher's role in the classroom when the students were engaged at the computer. Galletea at this time made no comment on the curriculum value of the use of computers in her classroom. A number of instances of change in student interaction, increased verbal interaction and greater socialisation were noted.

Throughout Interview 2 with Galletea it was easy to see that she had spent a deal of time beginning to internalise what the use of computers offered her children. She had begun to plan or map out strategies for the up-coming term.

Glen: What role do you think computers and technology might play in your classroom over the next term?

Galletea: I actually jotted a few things down thinking about that. The role the computer will play ... ahhhh. I think it will play a bigger part in my daily lessons. Umm... I think that we will see that every one in the classroom will be using the computer much much more. In fact I had planned when I got back this term to make sure ... not make sure ... encourage the use of computers from 9 o'clock to 3 o'clock. Because at present it is a bit more teacher guided and I would like to see ... I just would like to see a lot more use of the computer.

(Galletea, Interview 2, October)

An enthusiasm and excitement (even more than normal) was beginning to be noticed in Galletea's voice, when she spoke of plans for her classroom. She was happy to modify structures that had already been in place in her classroom to maximise the opportunities for her students using these technologies. These technologies had not been previously available to her or her students. In Interview Two, I asked her whether a change in classroom structure would be required next term to further explore opportunities for her students. Her answer was positive and blunt.

Galletea: Oh yes absolutely! Absolutely –I'm going to have to change the structure and in fact I have already drawn up a timetable.

(Galletea, Interview 2, October)

In Interview Three, that took place at the end of the school year, I asked Galletea to summarise some of the changes that took place in her classroom. I paraphrased some of her initial responses at the start of the project and asked her to comment upon them.

Glen: Galletea, the project is winding to an end. I might turn some of the questions around a little. At the start when we first spoke, you mentioned, and I will just read part of this ... what you were looking for out of the project was with your structure being fairly regimented, you are hoping that a knowledge of computers and your children, might be able to free up, or loosen your role as teacher to make your children feel freer so that I suppose they wouldn't freak out, and maybe be a little more independent. Have you really noticed any change in your children, or your teaching style when using a computer in the classroom?

Galletea: Yes, Glen I have. I've noticed quite a dramatic change. Maybe you wouldn't notice such a dramatic change in a mainstream class, but definitely in this special setting. I am a lot more relaxed at letting the children take control of some of their learning. ... They've learnt how to use the computers, and there's just a freedom and independence - I can't describe it any more than that, but there's definitely has been quite a significant change in how I teach and the children have grown in their skills. They can do something for themselves. They can get to that computer, they can turn it on. Yes it's exciting.

(Galletea, Interview 3, December)

Galletea's excitement was primarily focused on what the students had achieved to date. On a number of occasions throughout the project I had to remind her to read over her journal to see how far she had come. In the third interview, when discussing changes in her teaching style and how she interacted with her students, she said:

Well, before you came along, I didn't even turn a computer on. As you know I had that computer there, so yes, it's more exciting teaching and I am able to give the children more responsibility for their own learning. I know that sounds a bit trite.

(Galletea, Interview 3, December)

The use of the computer in the classroom allowed some of the goals that Galletea wished to set to be obtained more naturally. Up until the time that Galletea introduced the computers into her classroom she "had to create a lot of opportunities a lot of the time for verbal interaction" (Interview Three). This was not necessary with the introduction of the computer. The children freely spoke with each other when on computer tasks.

In Galletea's journal I asked her about this goal of student interaction in a special education setting. She wrote:

Always a goal for Special Ed. This can be difficult for these children to achieve.

(Galletea, Journal, December)

Galletea had the belief that once the classroom climate had changed and there was an increase in student interaction in meaningful situations, this would lead to a change in student learning outcomes. In her journal we conducted a written dialogue on this issue.

Galletea: So far learning outcomes may not have changed - but classroom climate and student interaction have - and as this is only the beginning, hopefully as we move further along the technology pathway as a class, learning outcomes will change.

Glen: What sort of change are you hoping for?

Galletea: Always looking for 'higher order' learning outcomes for children with disabilities. Always demanding excellence - demanding more - going the extra mile - all children have the ability to learn - a disability means the teacher must look at a variety of teaching strategies to elicit the 'best' or 'more' from his/her students. I'm hoping that with the use of computer technology my students will progress further in their achievements. It is such a 'fun' way to learn. Over the years of teaching in Special Ed. I have seen my own expectations of what my students can achieve grow. The students have grown with me - as we as educators have given these students the opportunity to gain more knowledge etc. I'm hoping that with the use of computers my children can move through another learning barrier - break that 3 minute mile run. Soar, fly. Already my expectations of what these children can achieve with computers has been exceeded.

(Galletea, Journal, December)

This dialogue between Galletea and myself was sobering. It was obvious that Galletea believed that something had changed in her room; something that was improving the learning of the students in her care.

It was in November, that I noticed a marked change in computer usage in the classroom. The students were more autonomous in their learning. My observation notes at this time also noted that student skills in computer use had improved and that student activity in the classroom had changed. I remarked:

Student activity in classroom has changed.

Station type work.

Galletea's role - "floating" or working with individual students.

(Galletea, Observation Notes, November)

d) Were there any changes in teacher attitudes towards the use of computers and related technologies in their classroom?

Galletea confessed from the outset of the project that she had little or no computer expertise. She was enthusiastic for what computers may offer her students but was not clear exactly what benefit she thought they would be. The major theme that appeared to run through all discussions was the hope of freeing up her teaching in the classroom, of giving the students some degree of autonomy.

Her lack of skill in the area of computer technology may be attributed to a lack of confidence and willingness to embrace the use of computers personally and in teaching. In her second interview we discussed curriculum support material and the Department of School Education's expectations of teachers as set out in syllabus and syllabus support material:

Glen: What about curriculum documentation; have you seen much in curriculum documentation saying how computers should be used in your classroom?

Galletea: Well no I haven't. No and being a luddite. I sort of avoid reading anything to do with computers. O.K I have read your bits and pieces that you have written and handed out. But no I really have avoided it.

Glen: What about say the English syllabus? Have you noticed much mention of computers usage in the syllabus?

Galletea: Well I do look at those documents and that; I take lots of things that I need. But up to this point I have avoided computers. So if something has mentioned a computer I don't read it. I haven't known how to ... Up to recently I haven't even had a computer in my room so I have avoided it.

(Galletea, Interview 2, October)

Interview Three took the concept of autonomy one step further. Galletea's positive attitude throughout the project meant she kept an open mind to all suggestions. As an experienced teacher she then modified ideas and used them in an appropriate way for her in her classroom. Some unexpected changes did take place. Galletea spoke of the need for her students for structure and routine and that a change from her normal approach was met with "flapping and crying".

An unexpected twist was Galletea's student's new-found wish to explore and experiment when computers were used in the classroom. Students who would never experiment or explore in any other arena would do so on the computer.

In our third interview we discussed this issue:

Galletea: Yes, yes. I was concerned at first that they wouldn't be able to do that. But I was proven wrong. I thought that with their disabilities they may not.

Glen: That's what I was wondering - with other lessons, do they normally like experimenting with things in other KLA areas?

Galletea: No a lot of my autistic children don't like change at all. But the computer was a whole different thing. They were not frightened of change or experimenting, which is a very fascinating point. They've done storywriting on the computer - everyone, which is fabulous. And most of them know how to print, which the last time I spoke to you we hadn't started doing yet.

(Galletea, Interview 3, December)

Data collected supported the observation that the most dramatic changes in Galletea's classroom took place towards the end of the school year. October through to December was the time that change was noted in her classroom. Ninety-one percent of all issues concerning change and Galletea were coded in these three months.

Galletea also commented on one particular child, and her belief that the use of computers in the classroom had a "spill over" effect into other areas for this child.

Galletea: Actually, one child - a little boy named Mark - he has really shown that he has become more adventurous with all sorts of things within the classroom, and that has been very noticeable. And when I reflect back I think that perhaps that has come from the less rigid structure and using the computers. And I would say that as I continue to use computers. Yes, he really is more adventurous. He'll sit down and write a story himself - now we're talking about disabled kids here - he's just so thrilled with using that computer that he just comes back and he writes screeds. He's just looser and there's just a different feel.

(Galletea, Interview 3, December)

With perceived successes such as this one and Galletea's endless enthusiasm it was evident a change took place in Galletea's opinion on the relative worth of computer use in the classroom. This may have been related to an awakening and broadening of her knowledge in this area.

An issue that continued to be raised throughout the project was that of time constraints and time pressures. Galletea's ability to follow through with her enthusiastic attitude towards computer usage was dependent upon issues of time. Pressures came not only from involvement in this project, but also from within her own school and from teaching a satellite class in a mainstream school. Galletea not only had to be involved in activities from her own home school but also had to integrate into activities of the mainstream school. At times this appeared to be a marvellous juggling act.

An example of this was her journal entry in September:

We are totally focussed on concert item. Have only managed one new thing:

have used a new software (program) "Computer Classroom" during maths lessons - my first taste of truly using the computer to deliver curriculum. Still not enough time for Sarah Cousins and self to go through programs - you really need a computer at home. Oh to live in Singapore - the government provide all teachers over there with a computer at home!!

(Galletea, Journal, September)

e) Were there any changes to student-teacher and student-student interactions in classroom activities?

Student-Student Interaction

This was the major area of change in Galletea's classroom. Change in the student-student interaction and student-teacher interaction was noted in observation notes, the teacher's journal, photographs and mentioned in teacher interviews. It was the most obvious change that occurred as a result of the project. In Interview Two, Galletea spoke at length regarding this change. Her belief was that, as she became more familiar with the computer programs in her room, she could introduce them with a curriculum focus. This would in turn lead to improved student learning outcomes. The change in the interaction between students was commented on.

Galletea noted:

There is a lot more laughing and talking and sharing with those children that was just never there. Because there was no opportunity. There were different sort of opportunities. But the freedom that the computer gives them away from me is lovely to watch. So that is one change or one role. ... And the interaction and camaraderie that has built up has been wonderful. And new buddy groups have been formed. And those things didn't happen before.

(Galletea, Interview 2, October)

In Interview Three, Galletea commented on a change in student-student interaction as she looked at the project in a longitudinal manner. This change was a positive one, and one that Galletea wished to continue. She was impressed with how the integration of computers into her classroom had made this change possible.

Yes, there has been quite a change in how the children relate to each other, how they communicate with each other.

(Galletea, Interview 3, December)

Student-Teacher Interaction

In Interview Three, I spoke at length to Galletea about her role in the classroom and her direct interaction with students. She had mentioned that the students were not threatened by experimentation when using the computer. I asked:

Glen: Do they normally like experimenting with things in other KLA areas?

Galletea: Now they can and they run to me and say "look, look at this" and I've had nothing to do with the process.

Glen: Do you get that chance to 'float' in other KLA's when the computer hasn't been there, or is it the fact that children are engaged on the computer that you have that freedom?

Galletea: Yes, it does. I don't get many opportunities in this setting to just 'float' with the small numbers and the intensive programs ... Hands on all the way.

(Galletea, Interview 3, December)

This point was supported by comments earlier in the year when Galletea said, "the freedom that the computer gives them away from me is lovely to watch" (Galletea, Interview 2, October).

f) Was there an increased use of computer technology to achieve curriculum outcomes?

As previously mentioned, changes in class climate and student interaction were noted. Galletea did not focus heavily on curriculum outcomes until late in the year. There was evidence of students producing published pieces of writing that was not as evident in early Terms One and Two. Photographs taken of the classroom in December noted a greater curriculum focus from Galletea. Once the curriculum became the focus and students were being assessed against student outcomes more information could have been collected. It was interesting to note that in July / August Galletea wrote:

I'm determined to progress this term. Have got into Kid Pix - with difficulty - Jessie and Rosie have typed one of their stories - also Tony - and they have drawn a picture with their stories. I'm very excited, so were the children. We printed them up in colour - they look wonderful. We are all so excited. This is progress.

(Galletea, Journal , July/August)

This was in stark contrast to what Galletea had written in her journal in June. At this time she appeared very unsure of the path she wished to take. It was interesting to note that even at this early stage she was evaluating the work she

was doing in relation to the student outcomes and the delivery of curriculum. This was a recurring theme for Galletea throughout the project. In June she wrote:

Glen has given me the Staff Development CD - oh dear - I can't even begin to know how to use this! Glen said he'd come and show me just before the holidays - he has also suggested I take a computer home with me in the holidays and run through the Development CD. In the classroom - we are at the same space - just having turns on Living Books - having arguments - whose turn?!! Waiting for our turns - I mean their turns. I don't feel the Living Books is contributing in a big way to the delivery of the curriculum within the class - but next term may be better.

(Galletea, Journal , June)

It was in December that I noted in my observation notes, photographs and collected student work samples, that the students themselves were now typing up their own stories with minimal assistance from the teacher or teacher's aide. Furthermore, in Interview Three Galletea said of her students:

They've learnt how to use the computers, and there's just a freedom and independence - I can't describe it any more than that, but there's definitely been quite a significant change in how I teach and the children have grown in their skills. They can do something for themselves. They can get to that computer, they can turn it on. Yes it's exciting!

(Galletea, Interview 3 , December)

Galletea noted a growing curriculum focus when in December she wrote: "have begun to use computer meaningfully and comfortably - up to a point" (Galletea, Journal , December).

g) Were there any changes in teacher programming of lessons and units throughout the project?

There was little evidence of change in relation to programming work for the students in Galletea's class. Changes made were minor and included such things as modification of the class timetable and the use of the computers as a resource in the classroom. Most change was noted in the skills of the students and their teacher and a modification in the way lessons were conducted in the classroom.

By the end of the year Galletea was giving students more autonomy and at times used the computer as an independent work station in her classroom.

h) Was the collaboratively designed professional development program in the area of computer technology effective in supporting program preparation and class learning environments?

The journey on which Galletea embarked in this study provides an excellent snapshot of an evolving classroom where students with special needs “find their wings and begin to fly”. Galletea's role becomes one of the control tower and engineer – ensuring weather forecasts are fair and vehicles ready. The gains made by these students left Galletea heralding her new-found enthusiasm for the use of computers in special education classrooms. Her professional development program assisted in supporting her classes learning environment.

The growth of independence in the students and the “natural” verbal interaction that ensued impressed all who visited her classroom.

Even the self confessed “luddite”, Galletea, and her teacher's aide, Sarah Cousins, became quite proficient computer users over the duration of the study. The frequency of calls for help for small technical problems decreased as the year progressed. It appeared that Galletea's personal professional development program was having an effect on her classroom. Her learning environment was in fact changing.

Galletea moved from a teacher grappling with how to make the technology work in the classroom to a teacher who was evaluating the most appropriate methods to integrate its usage in teaching practice.

Improvements to the project

In the last interview I had with Galletea I questioned her as to possible improvements to this study if it were to be replicated. The scenario I gave her was in relation to another school wishing to integrate computers into their teaching practice.

Galletea stated:

Galletea: Well actually, I have been really happy. I have learned so much, so has my Teacher's Aide, and so have the children. But for me, I would have liked it weekly. I would have liked you coming into the classroom weekly rather than fortnightly.

(Galletea, Interview 3 , December)

Galletea commented in the third interview that the collaboratively designed professional development program had assisted her throughout the year. It had provided focus for her work, in addition to providing a framework for assistance when needed. The ongoing nature of the professional development and the very nature of both the formal and informal components of the program assisted her throughout the project. The use of a journal for reflective purposes and as another means of communication with me was important. Galletea noted the importance of a mentor in the classroom assisting with problems and frustration immediately. In Interview Three we discussed such issues.

Glen: What about the time for the person to be in the classroom observing, helping etc? Is an hour a good time frame?

Galletea: I think an hour is a good time. But I think it should be an hour per week. But that's only my personal opinion, though. An hour a week rather than fortnightly, especially for people who are as computer illiterate as I was when I started.

Glen: Actually writing things down in the journal - did this help at all?

Galletea: Oh absolutely. Yes, it really made me think about what was happening, what my needs were, where I was going - a pivotal part of the program for me.

(Galletea, Interview 3, December)

i) Was there any development in the teacher's skills in using computer technology?

In Interview Three, I spoke with Galletea regarding her professional development program. One of the areas of development she had listed was to gain more confidence in using the computer in the classroom.

Galletea: Well I'm definitely more confident. And the collecting of the work samples; we've managed to do that. We've got some lovely bits of storywriting and pictures and things that the kids have done. I didn't have the time to make an assessment video. I really, really wanted to do that, but I just ran out of time.

(Galletea, Interview 3, December)

The whole-school reading program that Galletea's home school engaged in made the use of computers difficult in reading. She felt she was unable to integrate the computers into these lessons as she had a different group of children. The "rigidity of the system", as Galletea put it, was something that she would like to look at changing next year.

The improvement in her own computer skills was evident as she grew in confidence. In her third interview she stated:

Well, before you came along, I didn't even turn a computer on. As you know I had that computer there, so yes, it's more exciting teaching and I am able to give the children more responsibility for their own learning.

(Galletea, Interview 3, December)

In her journal in December Galletea made note of some of the skills that she now possessed. Whilst almost all skill development mentioned by Galletea during the project was in relation to her students or how she could enhance student learning this was one of the only times she specifically mentioned – personal skill improvement. She wrote:

December

Things I can do:

Open up computer;

Close down;

Living Books - programs;

Kid Pix program - parts of;

Classroom Computers - program;

Write up a note - print it out.

(Galletea, Journal, December)

Throughout the project Galletea worked as a co-learner with the students. Each step they took she took with them. Her journal entry in November was testimony to this.

Excellent - used Kid Pix. Children were adept - it was also a great learning experience for the four adults.

(Galletea, Journal, November)

A growth in confidence by Galletea, her teacher's aide and her students was clearly evident as the year progressed. As their skills grew so did their confidence. This cycle then fed itself throughout the project with increased gains in both areas.

Galletea's growth in confidence was most evident throughout October to December. Her journal reflected a range of different aspects of this.

We have had a great week. We are using the computers in a much greater way - everyone has written a story and drawn a picture this week. Some frustrations - had to call on Glen, and also the children in his class to help. I can't even remember now why I needed the help. Sarah Cousins and I have decided to keep a book and pen by the computers so we can write down immediately our frustrations and successes. So much happens in one day and we both forget. Glen has given me a Professional Development Program. I am already implementing some of the strategies - we are on track - feel a little frustrated about making an assessment video. Will I have the time- the end of the year is fast approaching and my diary is looking full, full, full.

(Galletea, Journal, November)

Galletea was able to reflect on her work throughout the project in the last entry in her journal. Her comments suggest that she was pleased with her decision to become involved in this project; pleased not only for herself but also pleased to be able to involve others in her journey. Not only did Galletea benefit from this training and development activity; evidence collected demonstrates that her teacher's aide, Sarah Cousins, and her students gained confidence and skills through their involvement.

**December*

Well - no video made. Wonderful idea, time ran out on me. Overall, my year with Glen's program has been a great success. I have gone from computer illiteracy to some degree of being computer literate. My Aide, Sarah Cousins is now a 'whizz', and she was almost too scared to even turn them on at the start. But the greatest triumph is the kids. Nine students, all with disabilities are using the computers with ease. Some have more expertise than myself. They show confidence with their knowledge. They are not afraid to experiment and they readily ask for assistance - from each other and myself and Sarah Cousins. It is a joy to see them (and myself) using the computers across the KLA's - I now may be teaching a group of five and the remaining children will work on a program on the computers. I can give instructions and away they go ... The overall change in the dynamics of this classroom has been significant. There has been growth for us all.

(Galletea, Journal, December)

5.1.6 Summary

Galletea's journey over the duration of the study was not one in isolation. The journey on which she embarked directly affected not only herself; it affected her students and her teacher's aide, Sarah Cousins.

By the end of the year the students, Galletea and Sarah had increased skills in computer usage. In addition, there was a noticeable growth in confidence by each involved. For the students, this also manifested itself in an increase in "natural" verbal interaction between students and a variation in buddy or friendship groups within the class.

When the computers were in use in the classroom Galletea's role changed. Data collected in the early stages of the project typified Galletea's classroom routine as being very structured and teacher-dominated or controlled. When computers were in use, the students were capable of working with a degree of independence within the learning environment that had been set up by their teacher. This did not take place until the teacher and students had some basic computer usage skills. A further requirement was a willingness on the part of the teacher to release some amount of control. A detailed knowledge of curriculum and well developed beliefs in how students learn best and an educator's role in the process were of great importance.

A supportive wider environment within the school, a valuing of training and development, and a mentor close and immediately available were other factors that Galletea noted as important for her development throughout the year. These factors were interactive and provided the necessary conditions for change to take place.

5.2 MAREE

5.2.1 Background Information

Teaching Experience and Educational Setting

Maree was a teacher of more than ten years experience. She was a late inclusion in the project after replacing a teacher who received a promotion necessitating a move from the school only weeks before the commencement of the project. Whilst Maree had over ten years full-time teaching experience the last five years had been spent raising her young family and casual relief teaching. This was Maree's first full-time class since 1992. Her role as teacher was in a team teaching class of sixty students from Kindergarten to Year Five. The class was deemed an "extension class", for students who were working at a higher level than the rest of the students in their grade. It was designed to provide enrichment and accelerated progression for these students in a "family grouping" environment. The majority of the group had been in this class for three years. As older students left for high school, younger students in Kindergarten or Year One moved in. The whole atmosphere across the class was warm and friendly. It was this class that most teachers in the school volunteered for each year.

Maree's major focus was on the Kindergarten to Year Two students. In literacy work the Year Three students joined her. In mathematics the Year Three joined with the Year Four and Year Five students. This meant that Maree had anything from twenty two to thirty four students in her care, dependent upon the activity being completed. When team-teaching lessons were in progress, generally in Human Society and Its Environment and Science and Technology, Maree would work as one of two teachers with the sixty students. As part of my teaching role in the school I was Maree's team-teaching partner. As I was off class for up to two days a week, Mrs. Sheet (the wife of the teacher Maree replaced) would take my place to partner Maree. Mrs. Sheet was less experienced than Maree, but was keen to share her knowledge and worked well with her and with me. All three of us appeared to have teaching philosophies and personalities that complemented each other.

5.2.2 Teaching Philosophy in Practice

During the first interview Maree did not thoroughly articulate her teaching philosophy. She looked at her role in the classroom in a limited manner. Observation of her classroom practice found a teacher who did far more than just a teacher who taught in a certain way because students learn best.

“By practice and by doing it. By being taught on the board and going to their desks and practicing the task.”

(Maree, Interview 1, May)

After initial classroom observation of Maree “in action” in her classroom it became apparent that she did not accurately articulate her teaching style in the first interview. It was obvious when in her classroom that she was a very good classroom practitioner who used a wide variety of teaching practices in her classroom. In her second interview Maree spoke about her teaching style in a way more commensurate with what was in evidence in her classroom. She described her teaching style as:

Bits and pieces of everything. When I am teaching a new concept I am very directed, then as they are mastering what I have been teaching them, I will use groups like in reading, where the groups are levelled according to their ability.

(Maree, Interview 2, October)

The reason for this change in the ability to analyse pedagogy seemed to be evident through a heightened awareness that not only Maree but all participants mentioned as the project developed. No one had ever really challenged why the teachers involved did things in certain ways, nor had they accurately analysed or attempted to articulate how they taught things in their own classrooms.

Maree's program demonstrated a varied approach to teaching students. Ability grouping of the children and an attempt to address work at different stages of

development was evident in Maree's program. Four groups were listed in her Term One reading program.

Maree was comfortable delivering lessons in a variety of ways. Some lessons were quite teacher directed where others incorporated group work and the students rotated through work-stations. The movement from one type of lesson to another appeared seamless, with students able to cope well with the different environments. Maree herself appeared to have set routines, where different types of lessons and activities were best taught in a particular way. She taught students in ways that she believed would best achieve the outcomes that were appropriate.

I do whole class activities, group work with a variety of different levels in one group.

(Maree, Interview 2, October)

5.2.3 First Observations

During my first visit to Maree's classroom, I noted a warm and inviting feeling in the room. It was one of those classrooms, where if I didn't look where I was walking, I would be poked in the eye by a space ship hanging from a hoola hoop. At adult height, I had great difficulty seeing more than one metre in front of me, because of the children's work that was hung from wire lines across the classroom.

I noted on my first visit that curtains with a space print were hung half way up the window to obscure some of the view from outside. Maths and Language work was hung from wire above adult height in the room. Two teachers' voices could be heard. This classroom was set up with an open concertina door as the only divider between this room and the classroom next door.

As I walked into the room the students were completing a cloze activity on a "big book". Choral reading was taking place. The cloze activity was done with yellow 'post it' notes, stuck on covering the words that were omitted.

The eyes of students were drawn to the text. Hands were eagerly raised to answer questions. The teacher's questions were focussed on text and meaning.

Noise was coming from the classroom next door as the students moved to the next activity. This obviously disturbed the teacher who winced, then she raised her voice above the increasing volume from next door. Maree questioned the students about what they do when they play. The Year Three students moved in from next door to collect their reading books. This disturbed the lesson. Maree asked them to move away with their books a little more quietly.

Maree then began to hand out the Year One and Year Two books. She reinforced where the margin on the page should be and then spent time with Fiona (Kindergarten child who only recently joined the class) teaching her about margins.

The handwriting lesson was about to start. Maree demonstrated handwriting on the blackboard. Each child was then told what to complete while Maree rotated around the room assisting students.

Maree demonstrated a single "a" on the board and discussed options. She then asked students to complete one "a". Nancy stole her brother Jamie's pencil and left him with a broken one. He looked confused but didn't make a fuss. (This class was dotted with over eight sibling-related children.) Maree noticed the problem and asked her to give it back and to sharpen her own. This was done with a minimum of fuss. It is as if the other students in the class did not even notice. A smile came to Jamie's face.

The Year Two students folded their arms and waited for the teacher: a few were chatting. The noise from next door began to get louder Mrs. Sheet must have been working on an interactive activity.

Maree continued and took students through ghost writing of a capital "A" in the air. The students followed her directions and the lesson continued smoothly. At its completion the students moved to the floor to play a word game. I noted that there were two computers at the back of the classroom, but they were not turned on. It was at this stage that I made my exit.

5.2.4 Initial Computer Usage

While some of the teachers made an almost instant attempt to move the computer into their classroom lessons, Maree appeared more reserved. From discussions with her it appeared that she was very concerned at making sure that she made the transition from the former teacher to herself as smooth as possible. Mr. Sheet had received his promotion only one week before the start of the term which necessitated Maree moving into the position at short notice. This was also the most high profile class in the school. She had mentioned that she was feeling some pressure to achieve, and for the students to make observable gains. Maree therefore had "her work cut out". She had to juggle a number of challenging and varied experiences: a new class; team teaching a class with sixty students; her first full time class in five years; a family group of "more able" students; replacing a teacher who had taught the same students for over two years; and being involved in this project.

5.2.5 Maree Case Analysis

Maree was another experienced teacher who was engaged in the study. Her classroom was vibrant with students actively involved in learning tasks. Little or no change in teaching organisation took place over the duration of the study, as her use of groups and a degree of independent learning that was normal in her

room moulded well with the integration of computers in to her teaching environment.

In the area of reading, the integration of computers into Maree's classroom took place as a direct substitution of a "paper-based" group activity with a computer based activity in reading. The major change that Maree noted through this process was the increase in enthusiasm of the students. Students who did not appear to enjoy reading before the use of *Wiggleworks*, now had new found enthusiasm.

Maree was slow to start the integration of computers into her lessons. She seemed cautious and needed to convince herself of their relative worth before exposing her children to them. Maree and her students' skill in computer usage grew as the year progressed. Maree's personal skills showed marked improvement. Through her own admission she went from a teacher who at the start of the year had trouble finding the on switch to a "quick fix computer technician" by the end.

a) Were there any changes to teachers' views about how children learn?

Maree had spent the preceding five years of her teaching career without her own full-time class. She had worked in a role as a R.F.F. teacher, in addition to raising her young family. Prior to this time she had spent over six years teaching classes from Year Two to Year Five.

Maree had specific views on how students learnt best and expressed a view from the beginning of the project that she would only use computers in her teaching if she could be convinced that was some benefit for her and her students.

At the beginning of the project Maree did not accurately assess her role in the classroom. As a teacher she believed she was “mainly chalk and talk”. This proved to be incorrect as observation visits showed a teacher and a class well versed in group work and independent study.

When asked in Interview One how students learn best she stated,

By practice and by doing it. By being taught on the board and going to their desks and practising the task.

(Maree, Interview 1, May)

When probed further in relation to her role in reading and the way in which the children responded the following dialogue was noted:

Maree: Well I suppose they are given the book and half the time it's unsighted so they are relying on what they have learnt beforehand: you're hoping that by using what they have learnt before that they can apply it to ah ... words they haven't sighted before. Like sounding out techniques and picture clues and that sort of thing.

Glen: What about when you have had older classes before, have you taught in any different sort of way? Or is it just peculiar to the group you have now?

Maree: That's peculiar to the group I have now. When you have older kids, you are drawing on a lot more background knowledge.

Glen: For example when you are in the class with the bigger kids?

Maree: There is a lot more talk with the bigger kids. A lot more talk, a lot more explaining.

Glen: Teacher talk or ...

Maree: Teacher talk , no both, a lot more conversation-type talk. So more chalk and talk-type stuff with the bigger kids. A lot more group work. Less sort of practice and more doing, actually getting their hands on and doing, less practice.

Glen: I suppose that fills in the next part on how you think children learn best. You have already mentioned that. Ahh, you were saying about the basics and learning from there?

Maree: Yeah they have got to have the basics to form their base and build up from there. If they have missed their base they have got nothing to draw on. And then they are floundering. Some kids will keep on learning. But I have found on the whole, students who have missed their bases don't learn as effectively.

(Maree, Interview 1, May)

Observations of Maree's classroom still showed that she was understating the use of groups and the teaching of discrete content to different ability levels in her classroom. By Interview Two she was better able to articulate what was taking place in her classroom, but was still underplaying this important area. When asked how students learn best:

... by doing. By actually doing what you are setting out to teach and by practising, not just giving it to them once. Teaching it and then keep on giving them practice at the same thing in different sorts of ways. Don't always introduce new things in the same way, because kids learn differently so you need to teach them in a variety of ways.

(Maree, Interview 2, October)

Observation of lessons in Maree's classroom demonstrated little or no change in her view of how students learned best throughout the project. In the third interview she reaffirmed the need for students to learn "the basics" and then work from there.

b) Were there any changes in the learning environment?

Physical Environment

There was no discernible change in the physical environment in Maree's classroom throughout the project. At the beginning of the project Maree had no computers in use within her classroom. The tables in the classroom were set in the whole in groups which were grade appropriate. When the computers came into operation they were housed in the foyer.

In original discussions with Maree it was evident that if computers were going to be used in her teaching she wanted them in her classroom. Due to a lack of resources and discussion with the other teachers in her foyer this decision was reversed. The decision to use the foyer option was necessary to get the number of computers she, and the other two teachers, believed would make it possible for her to use computers in her reading lessons.

Maree's main concern about the usage of the computers in the foyer was one of supervision and monitoring of the students' on-task behaviour. Her comments on this issue were made in Interview Three:

It worries me that if you get the wrong sort of kid they can hoon around out in the foyer. I suppose you could set it up in your classroom, but, Jody Higgin's kids worked really well in the foyer and they were pretty ratty kids.

(Maree, Interview 3, December)

When I first visited Maree's classroom I was impressed by the level of activity and the basic "look" of the room. It was a room that I had to continually duck from adult height or be "impaled" by a piece of student work hanging from a mobile.

All seventeen photographs taken in Maree's classroom captured its "visual feel". I noted in May:

Space curtains are hung 1/2 way up the window. Maths and Language work hangs from string at adult height in the room.

(Maree, Observation Notes, May)



Figure 5.2.1 *Photograph of Maree's Classroom*

Classroom Climate

Maree was an experienced classroom teacher who was working with a class of talented children. She was team teaching on a Year One to Year Five composite class of 60 children. Maree had direct responsibility for the junior section of the class in most areas. These children were selected in the class due to their well-developed independent work ethic and their high attainment levels in academic areas. My first observations in the classroom noted the use of groups in most areas of the curriculum and the use of parents in the room to assist in the teaching

of reading. The students were very tolerant of each other and were used to adults other than their teacher wandering through the room. The class had a “warm” feel about it at the beginning of the project. This did not change throughout the year. The analysis of the NUD*IST node “classroom climate” indicated no change over the duration of the project.

Maree’s program also supported her view of the importance of classroom climate. Notes made from her program stated:

Maree’s program includes a philosophical statement that includes:

“The role of the teacher has a number of facets.

A classroom needs to be a warm and friendly environment in which the students are able to work.”

(Notes from Maree’s Program)

Field notes on Maree’s room reflect a warm classroom climate and one that valued learning and the wellbeing of all students. Below is an excerpt from my observation notes made during a handwriting lesson in May. Although this exchanged has already been earlier noted, the actual field notes demonstrate the typical way that the classroom operated and is an accurate representation of how the class operated throughout the year.

Eyes of students are drawn to the text.

Hands are raised eagerly to answer questions.

Teacher demonstrates a single “a” on the board and discusses options.

She then asks students to complete one “a”. Nancy steals her brother’s pencil and leaves him with a broken one. He looks confused but doesn’t make a fuss.

Teacher notices problem and asks her to give it back and to sharpen her own.

Smile comes to Jamie’s face.

Year 2 students fold arms and wait for the teacher - a few are chatting.

(Maree, Observation Notes, May)

Most students in Maree's classroom would have not been aware when management issues with the children arose. She handled these instances with a minimum of fuss and little effect on the flow of lessons.

Observations in November demonstrated almost no change. Children were working independently in some cases, in groups, and at times, of instruction as a whole class.

Louise does it easily. Nancy struggles.

Phillip and Alan are writing their own story at the computer.

Louise works on her own.

Meryl and Holly work together on My Book.

Jimmy and Noel work on writing their own story.

(Maree, Observation Notes, November)

c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment?

Throughout the project there was little change in Maree's teaching style or organisation. Whilst the integration of computers into her classroom was a relatively easy move, it was a slow process. Maree's teaching style allowed for groups in her classroom. Each of these groups working on related activities. The introduction of computers meant that a "paper-based" group activity was replaced by a computer-based activity.

In Interview One Maree described her regular reading lesson:

In their reading groups they will read books like peer reading and reading to a parent or teacher. And then all different sorts of activities. Cloze, comprehension, sequencing, retelling ... that sort of thing.

(Maree, Interview 1, May)

By the third interview Maree noted some change in her role in her classroom. She noted she now had to oversee groups. The use of computers freed up one group in the classroom. Her role of teacher had changed slightly and this was not expected.

Glen: Did you notice your teaching role changed during reading at all?

Maree: Yes, I became a quick-fix it computer person, which was a pain in the neck. Yes, my role changed. I roamed a lot more because I was out in the foyer helping the kids out there, I helped children with their independent activities, I heard to children read and then set them to their activity and I was also with the parent, to make sure they were going OK. So instead of doing one job I was actually doing four, but it was all just monitoring, it wasn't actually teaching.

(Maree, Interview 3, December)

d) Were there any changes in teacher attitudes towards the use of computers and related technologies in their classroom?

Maree stated from the outset of the project that she was not going to be forced to use computers in her classroom. If she could see the benefits she would give it a try. Progress was slow to begin with in Maree's room. During my first two observation visits I did not see any evidence of computer use. It was not until June that changes became evident.

Glen: What role have computers and technology played in your classroom over the last couple of months?

Maree: I started using them more and more (partly because I had to) and I'm still not real comfortable with them. I tried word processing and I became frustrated with it and ended up doing it for the kids. They were far too slow, but that's my fault because they don't have the skills to do it quickly. So it's sort of a catch 22. I've been using Wiggleworks in reading. It's really really good except that I don't have the time to go back and see what they've actually done but that's not really a problem because it's always there in the computer. The only problem I did have was that other kids got into my kids' stuff and changed it and messed everything up completely. I found that when I was using the computer, it was like a reward type thing for the kids to get their work finished because then they were able to publish it on the computer. It'd be good to have more than 4 computers with 24 kids. But I am starting to use it more and more.

(Maree, Interview 2, October)

The change in her view also matched with her first attempts at using the computer room with her class. Up until that time I had worked with the children during Maree's class during part of her Release time.

e) Were there any changes to student-teacher and student-student interaction in classroom activities?

Student-Student Interaction

The students worked well with each other at the computer and during other activities in the classroom. An increase in enthusiasm was noted when the groups were at the computer. Children at the computer shared with each other well and took turns with different aspects of the program.

Student-Teacher Interaction

There was little or no change in student teacher interaction throughout the project. The only point to note was Maree's admission that once the computers were in use she seem to "be able to float" more. She had what she called a more monitoring role. This was a role I believe Maree was not all that comfortable with. In fact in her journal in November she commented:

"I felt as though I was losing control of what they were doing."

(Maree, Journal, November)

f) Was there an increased use of computer technology to achieve curriculum outcomes?

As stated previously, the integration of computers into Maree's classroom took place as a direct substitution of a paper-based group with a computer-based activity in reading. This meant that there was a corresponding increase in the use of computers to achieve curriculum outcomes. When asked how the structure of her classroom changed when Wiggleworks was in use the following dialogue was noted:

Glen: How did you structure your classroom when that program (Wiggleworks) was being used?

Maree: I had four (one, two three, four) four reading groups that during the week the kids moved around to each station - one was Wiggleworks, one was oral reading and questioning with a parent, one was oral reading and questioning with me, and the other group was independent type activities. Reading activity, spelling activities. That type of thing.

Glen: How many children did you have in each group?

Maree: Eight.

Glen: Is it possible to run it by yourself totally?

Maree: Yes, if you train your kids to work independently. No, it would be pretty hard actually. The advantage I had was that I had really independent type kids and I also had a parent working with me and they worked out in the foyer, so they were out of the classroom.

(Maree, Interview 3, December)

When asked if there was any benefit in Maree's class using computers in reading, and in particular Wiggleworks, she commented:

The sort of children I had would improve anyway. But the level of enjoyment they got out of it was amazing. It encouraged kids to read, so that kids who can read, but aren't real interested in reading (like Phillip), were reading without actually realising that they were reading. It also improves their computer skills without them even thinking about it.

(Maree, Interview 3, December)

g) Were there any changes in teacher programming of lessons and units throughout the project?

The introduction of computers into Maree's lessons was also noted in her program. When I viewed her program in August, I noted that use of computers was listed as a component of her reading program. The use of the computers and the Wiggleworks program was part of a rotational group process for reading that was taking place in Maree's classroom.

h) Was the collaboratively designed professional development program in the area of computer technology effective in supporting program preparation and class learning environments?

Maree's goals set at the start of the project were to use Wiggleworks effectively, to use computers more with the children and to start the children word processing.

She was happy with her attainment of two of these goals. Maree was using Wiggleworks with some effectiveness in her reading groups and was using computers much more in the classroom as a whole. This not only included the usage of computers in reading groups but Maree's efforts in taking the children to the computer room.

In her journal Maree made comment about the effectiveness of the use of Wiggleworks in her classroom.

Debbie and Amber were pretty keen on buying Wiggleworks. I had been out of fulltime teaching so long I didn't feel that I had enough insight to agree or disagree with any decision. Wiggleworks proved to be fine.

Wiggleworks

Positives: The kids loved Wiggleworks. I can see that it will be really valuable as part of our reading program. The way it records everything the children do is great. Choice and quality of books is great. Easy to use. American accent is no drama really.

(Maree, Journal, November)

Maree made positive comments in relation to the use of her journal as a means of professional development.

Glen: What about keeping the journal? Was that any use to reflect on what you were doing in the classroom at all?

Maree: Yes, it made me reflect. When I sat down to write, I realised I was doing more on the computer than I actually realised.

(Maree, Interview 3, December)

Maree valued the informal professional development that took place as part of the project. In fact, she made no negative comments in this area throughout the duration of the project. Specifically in the third interview I asked her to comment on components of her professional development plan.

Glen: Teacher talk. Time to talk with other teachers involved with the project, or who have some expertise in the area - has this been valuable at all? Have you talked to any other teachers about what you are doing?

Maree: Yes, we all seem as confused as each other, which is good. Amber and Debbie and I were getting together more and more trying to figure out Wiggleworks. Having three of us working together in the one foyer on the one project is really helpful because we are swapping ideas. Having Josephine doing what she is doing helping with the computers was really, really good because it's good to be able to call on her when you're not available. So I think the program has helped her as well as us.

Glen: Where in the school have you found that these meetings, or bumping into each other takes place?

Maree: In the Staff Room, on Assembly or in the Photocopying Room.

Glen: Have there been any other things that have been helpful at all?

Maree: Well just the fact that we're doing this project makes us more aware of them and it sort of forces you to use them and they're not as daunting as you think they are. The kids know more about the computers than I do, and that's fine - they can fiddle in their own way - but I have learnt a heap more. I am more confident now than I was. There's still a long way to go though.

(Maree, Interview 3, December)

Improvements to the project

Maree made a number of evaluative comments in relation to the project and its possible replication in another setting. This issue was one that was raised in Interview Three.

Glen: What if this program was being replicated again somewhere - this program we've done at the school, the Staff Development angle, the integrating computers into the classroom - what changes do you think you'd probably want to see made?

Maree: Make sure the printers are linked up to your computers. And that you got the right little icon things that you press or whatever you do.

Glen: So there were a few technical problems?

Maree: Yes.

Glen: But I mean, for example, length of time?

Maree: I had plenty of time. But it was hard though, because sometimes when things were changed some kids were disadvantaged because you couldn't keep swapping the other teachers' computer times to suit yourself.

Glen: So limited resources was a bit of a problem?

Maree: Yes. Also with Wiggleworks it's a bit hard having four computers, with only three copies of each CD. You need 4 copies of each CD. It doesn't sound as though it's a drama, but it is when you've got say 3 groups on level 3C and one group of level 2C it is a hassle trying to coordinate them. It is easier if you keep them on the same CD so that they are moving in the same direction ...

Glen: What about the time off each fortnight? Was it enough, not enough?

Maree: Yes, that was enough.

(Maree, Interview 3, December)

i) Was there any development in the teacher's skill in using computer technology?

By the end of the project Maree stated she would be far happier to have the computers in her classroom.

Maree: Yes if you gave me the computers. We'll always find room for a computer. Yes, and that would just be part of your reading.

(Maree, Interview 3, December)

Her personal skills in using computers were beginning to show development. Whilst I noted that her program had been handwritten for the entire year, each of the assessment tasks that were included in the student portfolios had been word processed. This was the first indicator of a change in this area.

Maree had taken quite a deal of time to integrate the computer into her classroom, as she had with the increase in her own computer skills. There did appear to be a definite process she went through before a meaningful integration took place. Similar to Galletea, Maree was slow to start but showed good insight into why she did things in certain ways and was able to evaluate not only her own usage but also the relative worth of the entire project.

5.2.6 Summary

Maree's journey throughout the year was different from the others involved in the study. Her teaching style and the way in which she organised her room and lessons necessitated only minimal change to take place for the integration of computers into her daily routine. The major hurdle was for Maree to be convinced that there would be an educational benefit for her children to use them, and that this would be better than methods that she presently used. In addition, Maree was working with a group of children that were hand picked for this "extension" class; children who had shown skills above those of the students in other classes and were students who were able to work independently when required.

Success by other students in the same foyer seemed to one of the major turning points. If students of lesser ability were making gains and the Wiggleworks program was proving successful it should be for her children as well. This coupled with a "critical mass" of people engaged in the same project grappling with similar issues assisted Maree in her journey. Josephine was beginning to be held in high esteem by the teachers in the foyer due to her personal skills in computer usage. She was able to fix hardware problems that the other teachers could not. Maree believed that this was also good for Josephine.

The use of the Wiggleworks program reaffirmed a number of Maree's beliefs that developed as the project progressed. If computers were going to be integrated effectively they needed to be in the classroom. Whilst she acknowledged that the foyer option had worked during this study it was not the optimum model she wished to use. Four computers in her room with four copies of each of the CD-ROMS would be the most effective way of implementing the program. Like others, Maree had to be reminded how far she had come through the year. The journal that was kept was a constant reminder and a chance to reflect on what had happened, why and to what benefit throughout the year.

Maree's personal professional development program, a mentor close at hand, available resources, and more importantly, a willingness to be open to new ideas, made for a situation that assisted Maree to use computers in her classroom. Whilst integration of the computer in the area of reading required only a small modification in teaching practice, Maree and her students developed a new set of skills related to computer use.

5.3 DEBBIE

5.3.1 Background Information

Teaching Experience and Educational Setting

Debbie's first appointment as a permanent teacher was in Term 1 of 1997, to her present class. She had been working as a relief teacher for five years before this appointment, all at Meadows Primary School. The fact that Debbie was employed for the entire five years demonstrated the principal's belief in her abilities. She was a capable and committed classroom teacher who had a genuine care for the children in the school.

1997 was a year of change for Debbie. She had just received her "permanency". She agreed to be involved in this project and was to be teaching a Year One and Year Two composite class. An influx of Year One, Two and Three children necessitated a change for Debbie, losing all her Year Two students to Amber who was teaching in the class next door. Debbie was left with twenty-two Year One students.

5.3.2 Teaching Philosophy in Practice

During the first interview it was evident that Debbie had a relatively good grasp of why she taught things in certain ways. As the project developed Debbie was better able to articulate subtle differences in her teaching style. In her first interview she stated:

I believe they (children) learn by example and by doing, hands-on and just by copious examples. Going over and over the concept over and over again until they have got it.

(Debbie, Interview 1, May)

When asked to further clarify some of the group work that I had noted in her program and observed in the classroom she commented:

It varies depending upon what I am teaching. But I have to be honest ... most of the time it is teacher centred. Where I direct from the front of the board ... and we do a lot of stuff whole class because I feel like I am getting to more of the kids that way. But in reading groups and things where it definitely has to be ability-based to get to all the kids to target their level ... Then we go into groups and work that way. Groups for some things and a lot of stuff is teacher directed.

(Debbie, Interview 1, May)

By the time of the second interview Debbie was able to further expand on her initial comments:

I think students learn best by many and varied experiences ... learning experiences and ones which cater for not just one type of learning but for all types. So that you are targeting more than one type of child. They learn by working individually, and by working in groups, and by working as a whole class. And for me... I found that with my class this year ... (they) tend to learn better when they begin the lesson as a whole class ... With my instruction and then move off into groups or into pairs or working individually after that.

(Debbie, Interview 2, October)

5.3.3 First Observations

During my first visit to Debbie's classroom I noted that the tables were set into four groups - two groups of six and two groups of five. Colourful wall displays were evident in the classroom. In addition, there were signs around the room whose obvious function was to further develop the climate within the classroom. Signs included:

"It's cool to be at school".

"We are terrific team members".

"1 / 3 Aqua Super Sensible Students".

"Days in a Month".

Some of these signs appeared to be reflective of the sorts of affirmations that were suggested at an accelerative learning workshop that Debbie I and a number of other teachers had attended the year previous.

When I first arrived the students were completing a stencilled cloze passage activity. The students read along with the teacher and put up their hands to give suggestions of answers. When this was complete the students then completed their own sheets.

I could see from a table that was drawn on the top right corner of the board that Debbie was using a table points system as one of her behaviour management strategies. Points were allocated for each group of tables. Each of these groups was named after an Australian animal: Kangaroos, Possums, Koalas, Platypuses.

As the lesson continued, a number of students struggled with "At last the egg _____ to crack". Debbie accepted each answer and placed it into the sentence and repeated it back to the students. It was then easy to decide if the students' attempts were correct. Each response wasn't appropriate and finally Debbie gave the students the correct answer.

Debbie continued to circulate checking students as they worked individually on their cloze passage. Positive reinforcement was given at all times. It was noticeable that the "Koala" group was fussing around, not really on task. Debbie moved towards them and drew them back into the activity.

Debbie continued to circulate again, checking on each student's responses for each missing word in the cloze activity. Students assisted others at their desks - also discussing what the answers could be. The students strived to answer questions and were well on task. It was at this stage that I gave Debbie a wave and slipped from the room attempting not to disturb the children at work.

5.3.4 Initial Computer Usage

Debbie's background in the use of computers in her classroom is best described in her own words.

When Glen first approached me about undertaking a course/program designed to teach us how to effectively integrate computers and the use of technology into the classroom, I knew that I was certainly a prime candidate. In my 5 years of classroom teaching I had never successfully used computers in the classroom ... Initially, this was due to pure lack of know-how. Although we had touched on the use of computers at University, I was still at the stage where I would need a student to help me turn the darn thing on! I spent three years writing my programs, stencils, (fancy headings and all) by hand - hours of painstaking hard work (and colouring in) because I never felt confident enough to ask someone to help me learn computer basics.

(Debbie, Journal, August).

It was evident from Debbie's program and my observations that computers were not used in her classroom at the start of 1997.

Although (by 1997), I felt confident myself in my ability to use the computer, I was still very nervous about integrating them into the classroom because I imagined that I would be needed to supervise and assist students at the computer in order for them to produce high quality work on it. I couldn't see that I could effectively timetable its use so that each child would get a fair go.

(Debbie, Journal, August).

5.3.5 Debbie Case Analysis

Debbie was a young and enthusiastic teacher who had committed herself to work at the school. This was a major decision as it involved one hour travel per day each way. Whilst relatively inexperienced as a teacher and spending almost all of her short career at this one school, Debbie had developed successful teaching practices. She was now engaged in a process of refining them and applying them to younger classes. This was only Debbie's second year involved in teaching an Infants class. The introduction of computers and the use of Wiggleworks challenged her thinking.

Debbie's classroom was an interesting and vibrant place to be. It was conducive to learning with children happy and interested in the work that Debbie prepared. The teaching of reading in her classroom saw a major shift throughout the project. Teacher-centred whole-class instruction was replaced by group work with children having some degree of independence.

At the commencement of the study, Debbie attempted to fit Wiggleworks into her current teaching practice in literacy. This was unsuccessful. She was challenged to look for new ways to teach literacy and to talk to other staff in her foyer and myself as to other options.

It was this talk that began Debbie's journey of change in this project. She was exposed to new ideas and new resources that challenged some of her previously held beliefs. Change was slow to begin but when it started the enthusiasm of the children and Debbie's views of its success meant there was no turning back. Her teacher-centred literacy lessons were disappearing.

a) Were there any changes to teacher's views about how children learn?

During the first interview Debbie was able to nervously articulate how she believed students learnt best.

Debbie: I model. So I'd go over it generally on the board and we would discuss it and talk about it.... talk about the positives and the negatives. Just go at it from different angles.... and then examples.

(Debbie, Interview 1, May)

By Interview Two there was a greater depth in the information supplied by Debbie. She was able to talk about the needs of students in relation to learning styles. This was an area that was being dealt with by the whole staff at the school. Debbie was able to transfer this work into her thoughts in this study. She believed students learnt from varied experiences from a whole class through groups and to an individually setting.

Interview Three demonstrated Debbie's ability for self-evaluation. It was in this interview that I put to her her original belief on how students learnt best. I then asked her to comment upon the relationship between this and the way in which she structured the learning environment for the children in her class now that computers were in use. The focus of this was the use of the computerised reading program, Wiggleworks, in her literacy program.

Glen: Originally, you were talking about how children learn best. You said that they learn best by example and by doing, having hands-on copious examples and going over and over a concept. Is that how Wiggleworks worked or did it open up a different way of learning...does it fit into that mould?

Debbie: No, it doesn't. I actually thought that it would. As I said, the only examples I gave the kids, was the very day before we started our program we went through it once. There certainly weren't copious examples, and they went ahead and worked it out from there. But I still agree with that method of teaching when it comes to teaching mathematical concepts, the more they do, and the more hands-on they have the quicker they pick up concepts. But, yes for literacy, my opinion has definitely changed. They seem to just go with the flow and develop from there themselves. They work really well independently. So Wiggleworks has changed my philosophy there.

Glen: So there's a requirement for the teacher to provide whole-class input?

Debbie: The whole class input - I think that just saved time for us, doing it all at once. At least one lesson of the group input. Each group then needs to see Wiggleworks run right through. To understand what is going to happen when they press this button. To see what is going to happen when they press that button. And also if you wanted your program to run the way I did where I had a set pattern I wanted the kids to go through so I knew they were actually doing the Literacy side of it rather than the Artistic side. Then you definitely need to model what is going to happen. And what is expected of them in each area.

(Debbie, Interview 3, December)

b) Were there any changes in the learning environment?

Physical Environment

Debbie was quite sure at the commencement of the project that she wanted to integrate the use of Wiggleworks into her reading groups using one computer. This was different from the other teachers in her foyer who believed they needed at least four computers and four copies of each Wiggleworks CD-Rom to utilise the program effectively.

By July, Debbie had decided that her present model was not working successfully. My Observation Notes stated,

"Teacher informed me she has moved to the organisation structure of the other 2 classes because it 'just wouldn't work' with me."

(Debbie, Observation notes, July)

Debbie shared my concern about the location at which the computers were to be used. In her journal she wrote:

The other option was to keep one or two computers in our classroom and have one whole group working together on it / them. I initially chose this option because I could not see my students being able to use the program effectively, as a means to improving their literacy, out in the foyer, working in pairs, unsupervised.

(Debbie, Journal, August)

However, this was the location that the teachers negotiated and felt would be a better utilisation of the limited resource. The computers were placed in the foyer, which was a common area to all classrooms. This then enabled the teachers to stagger times that they completed reading groups, to enable the computers to be used for almost the entire time from the morning bell until lunch-time. Whilst not a perfect place for the computers to be housed, the teachers appeared relatively confident in their ability to ensure that the computers were being used as a valuable resource in reading lessons. The fact that the computers were in the foyer was of little consequence as each of the teachers regularly used the foyer as an extension of her classroom when reading groups were in operation. This took place even before the initial integration of computers into classroom practice.

Debbie did show some concern with her students' ability to work independently. However, she was surprised by their ability to work with a lower level of supervision in the foyer. In her final interview in December, Debbie stated that in a perfect world she would have preferred to have children individually using Wiggleworks in the classroom, on computer, when it was their group's turn to use the program.

Classroom Climate

No data was coded at the “change of classroom climate” node throughout the study in relation to Debbie’s room. It was a classroom where children appeared tolerant of each other, and Debbie’s enthusiastic attitude to school was infectious. The children responded well to the classroom climate that had been created. Debbie was “walking her talk” – her program stated that she was attempting to “create an accepting, non threatening classroom environment” (Debbie, Teacher’s Program, May). Observations of her classroom showed that she had achieved this. The scene from her classroom was one where positive reinforcement was given to students at every opportunity; this was done by a teacher who was always circulating assisting students who were in need.

An example of student expectation and what was considered appropriate behaviour towards classmates was observed in June.

“Teacher counts to 3 - should be ready.

Adds points to table group doing the right thing.

One group loses points.

Teacher asks students to turn to a new page.

Small hum in room - Shane calls out.

Teacher admonishes class for being noisy - especially with me in the room.

Josh holds up work - teacher praises.

Helen passes comment on Josh’s work - teacher tells her she must only give compliments.”

(Debbie, Observation Notes, June)

c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment?

Debbie was quite clear that there was a change in her teaching practice when computers were used as part of her reading program. In Interview Three she stated:

What I meant was, I was really teacher-centred, but then when we started doing Wiggleworks, I realised just how teacher centred I was, because it was totally different for me to be running groups like that and it just went like clockwork. It went better than it had when I was doing it myself. It was a big change for me. It was really excellent. I really enjoyed it. It was like WOW this is really working and I never sort of thought it could. I thought 'oh no, if you have computers going then you have to be there and oh what a hassle and what a heap of extra work to do' - and it wasn't. It worked really well.

(Debbie, Interview 3, December)

Whilst group work was used in a number of Debbie's lessons, her admission shows she had, before to this year, used a teacher-centred approach to the teaching of reading in her classroom. This included joint story construction and a strong use of "Big Books" for demonstration purposes.

In addition to her aborted attempt at whole-class – one computer use of Wiggleworks, her move from a more teacher-centred teaching of reading to a child-centred – group work model may have been a contributing factor to Debbie taking almost one full term to successfully begin to integrate Wiggleworks into her class. Once this first step had been taken Debbie embraced the new model with the enthusiasm that she attempted all work in the classroom. Her thoughts from her journal suggest:

"This term has just been absolutely crazy with Production and Education Week and the other billion things due that I haven't had the opportunity to really sit down and work out a rotational reading group plan so that the students are getting the most out of Wiggleworks. I feel that until I have done that and thoroughly planned activities related to each book, it is almost pointless to continue sending two groups a week into the foyer to work on computer books which are unrelated to our other reading activities. Therefore, I will continue with my original reading group program until I can do the other properly."

(Debbie, Journal, August)

Debbie evaluated the use of Wiggleworks regularly and it was apparent that she was making minor changes to teaching practice in her classroom. In her journal in August she wrote:

"Some children spend much of their time using the "My Book" option which involved colouring in and while I let it go for the first two weeks, after being told to choose the "Read Aloud", "Read", and "Write" options first, the children were guiding themselves and often doing their own trouble -shooting."

(Debbie, Journal, August)

By November, Debbie was not only happy and comfortable with her approach to reading, but was beginning to investigate new way and different areas to integrate computer usage into other Key Learning Areas and give students new skills.

"Perceived success at last! Wiggleworks is running brilliantly. The kids are loving the books activities and are feeling more confident in their reading (especially my less able kids). I think having the one book per group per week with all of the related activities has proven more successful than having a new reader each day or week (as with the original reading groups).

I would like to start sending the children out in groups to work on the computers for other activities totally unrelated to the Wiggleworks program. Maybe some KidPix work. I thing I'll try it next week and see how it goes."

(Debbie, Journal, November)

d) Were there any changes in teacher attitudes towards the use of computers and related technologies in their classroom?

Debbie had a positive attitude towards the use of computers in her classroom. As previously mentioned this was demonstrated by her enthusiastic attitude. It was interesting to note that Debbie bought a computer for home in the year prior to her involvement in this project. There appeared a small increase in her use of the computer as a teacher tool for administrative purposes. This was predominantly in the use of the computer to prepare work-sheets and assessment tasks for her class. However, it was noted that her program was predominantly hand written. In addition to this her artistic ability made it difficult for her to make assessment tasks on the computer look as attractive as those she had designed by hand.

e) Were there any changes to student-teacher and student-student interaction in classroom activities?

Student-Teacher Interaction

Debbie noted a definite change in the student-teacher interaction in her classroom specifically when computers were used in reading. Whilst group work was used in other areas such as Human Society and Its Environment (HSIE), this had not previously been the case in her reading lessons. Teacher-centred activities were predominant with the students completing similar set tasks. The introduction of computers led to a shift to group work and some degree of independence for the students in the area of reading.

Student-Student Interaction

There was little change in the student/student interaction in the classroom. It was a classroom where the students worked well together and, whilst not previously in Reading, the students were used to working in groups and assisting each other if difficulties arose. This fact was evident and noted during both computer usage and when students were engaged in non-computer activities in the classroom.

f) Was there an increased use of computer technology to achieve curriculum outcomes?

There was a definite increase in the use of the computer to achieve curriculum outcomes in the classroom. Debbie was one of the teachers who strived to have Wiggleworks bought by the school in the first instance. Once she began to integrate the computer into her reading lessons, the computer was instrumental as a tool for students to complete work as assigned by the teacher. Debbie, like Maree and Amber, was using Wiggleworks as their major reading resource. Without the increase in computer usage curriculum outcomes would not have been achieved. It is important to note that Wiggleworks included, Big Books, individual readers and taped stories to supplement the CD-ROMS. Debbie made use of all these components. Her organisation for Reading demonstrated the function the computer had in these lessons. Her typical reading lesson is listed below:

Debbie on the floor with 8 children.

One mum working with 4 children reading a story.

One mum working with a group of 8 children.

One mum working out in foyer with 4 children on the computer.

Order of components to be completed when students work on the computer:

- 1. Read aloud.*
- 2. Read.*
- 3. Write.*
- 4. Magnetic Board.*
- 5. My Book.*

(Debbie, Observation Notes, November)

g) Were there any changes in teacher programming of lessons and units throughout the project?

Teacher programming, in the area of reading, changed markedly for Debbie when Wiggleworks came into use. The use of the software component of the program on-computer became one group that the students completed each day. Debbie produced a small work booklet to assist them in focusing their attention on certain details when working on the computer. In the third interview she stated:

As part of that day that I was programming, we set up a learning booklet for the kids to understand what the screens of Wiggleworks were about, which buttons to press and the order of the things that I wanted them to do - so it wasn't just go out to the computer and do whatever you feel like - they had a set book to read and they had to go through the process of the 'Read button', 'Read Aloud' and then they had to do writing before they went on to the fun colouring in 'MyBbook' and the 'Magnet Board'. So they knew that they had to get through reading and writing before they got to do anything else.

(Debbie, Interview 3, December)

(See Appendix 8)

h) Was the collaboratively designed professional development program in the area of computer technology effective in supporting program preparation and class learning environments?

Debbie was not flattering towards syllabus documentation or conventional professional development courses when asked about ideas, inspiration and assistance regarding the integration of computers into her lessons.

"The only time I have really noticed anything about computers education is when I have had to study the document for university. When you have to go through the separate sub-headings, and I've always found the area to do with computers to be very small. A couple of paragraphs and that doesn't give you any motivation or indication of how to use it in the classroom really."

(Debbie, Interview 3, December)

In her journal in August she wrote:

In my five years of classroom teaching I had never successfully used computers in the classroom. Even after attending short workshops as part of staff development days, I often came away feeling as ignorant as when I went in. Sometimes I felt as though these were aimed more at those who had some basic computer skills (like how to turn the computer on and double-click the mouse!). They tended to teach about software which was terrific if you knew how to put it in and access it.

(Debbie, Journal, August)

The advent of a cooperatively planned professional development program, for Debbie during this project, was exactly what she had been seeking for the last five years; professional development that was at her level looking at classroom issues that interested her was of great benefit.

Debbie's ability to discuss classroom issues with others in the project was of great assistance, as was her ability to watch others struggling with issues of pedagogy and computer usage. She wrote in her journal:

I tried this twice (whole class option with one computer), with two different groups and realised that I had chosen the wrong option. One mouse to 8 students was not a practical ratio and students quickly became restless and switched off. Being such a wonderful program, and one which the teachers and I had built the kids up for, the last thing I wanted to do was turn the kids off Wiggleworks, so I quickly changed strategies and joined the others in the foyer.

(Debbie, Journal, August)

Debbie was very satisfied with this option by the end of the year. Not only was she pleased with her decision to modify her approach, but she was also impressed by what the program allowed her children to achieve. In her third interview I asked her to comment on the relative success of the program.

Extremely valuable and successful, this term. I can't see that it will be that valuable next year with an older grade. I think that it has been really beneficial to Year One, they've been enjoying what they're doing. And it has been far more successful this term, because I've had a chance to actually program properly and organise each activity for each week. Having a day off to do that was just brilliant. Prior to that it was very difficult to set up. Each group now has an area of Wiggleworks that they work on. For example, one group will work with small readers with me on guided reading; another group will work with the listening post with the small readers and will listen to the story being read, which has been very successful, and they set that up totally by themselves and work independently; the other group do the sound stencil related to our literacy for that week and the other group, of course, work on the computers.

(Debbie, Interview 3, December)

Improvements to the project

Debbie made no really negative evaluative comments in relation to the project. She did mention on regular intervals the importance of others doing the project with her and her use of them to gain ideas and strategies, and to clarify her thinking.

The value of a group of teachers all engaged in a similar project in close proximity to each other cannot be understated. Debbie mentioned as early as her second interview the benefit of being able to talk to others on an informal basis and the impact that this had in providing new ideas.

Just sitting in the photocopy room doing your work during release time... other teachers might say I tried this ... or you might see some work that their kids have produced. You might say, well how did you do that? And then they explain the process they have gone through. Like storyboarding on the computer - is one that I really want to try. Just from seeing what other kids have produced on the computers in their rooms. And this has been of a benefit.

(Debbie, Interview 2, October)

i) Was there any development in the teacher's skill in using computer technology?

Expertise across the school, not only in the teaching staff, but also the ancillary staff, was noted as an advantage by Debbie:

After sneakily watching some of the staff and ladies in our stencil room using Claris Works and seeing some of the stencils they were producing, I finally plucked up the courage to ask one of them to help with a permission note I wanted to type and send home. Well! That was it! Once I discovered how to manipulate the mouse and the cursor, I was hooked. I started to use the photocopy room computers a little more and to experiment a bit, (always within the safe confines of Claris Works, mind you) but it was certainly a start ... In February, 1996, my fiance and I bought an Apple Mac Performa with a printer and now I am very confident in the use of computers and software. I still don't know the ins and outs of all the jargon and I do tend to use the computer mainly for word processing, but I'm certainly leaps and bounds ahead of where I was eighteen months ago.

(Debbie, Journal, August)

Debbie made comment that she believed it wasn't her improved personal computer skills that enabled Wiggleworks to work effectively in the classroom. She stated:

"I haven't really been using the computer. It's the kids who have been using it. Using the computers was a change to my philosophy. I have always been teacher centred in my teaching and I guess Wiggleworks has really amplified that."

(Debbie, Interview 3, December)

5.3.6 Summary

Debbie and Amber were the two teachers who pushed for the purchase of Wiggeworks. It was Debbie who showed the most marked change in teaching practice in the area of reading. There was an observable move from teacher-centred whole-group instruction to smaller-group work. These groups rotated through station activities each day, beginning a new set of activities each week.

Whilst there was an improvement in Debbie's personal skills in computer usage, she was adamant that this had little to do with the changes that took place in her classroom. She strongly believed that the catalysts for change in her room was a fundamental change in her philosophy in relation to the teaching of reading, and students' ability to work with some degree of independence. The introduction of computers into her reading program and the use of the Wiggeworks program as the major resource made a teacher-centred whole-class approach to reading impossible.

The advent of a cooperatively planned professional development program, for Debbie during this project, was exactly what she had been seeking for the last five years. Professional development that was at her level, looking at classroom issues that interested her was of great benefit. She was quite scathing of previous professional development courses that she had attended believing them to be irrelevant to her needs as a young teacher who was refining her teaching practice.

Furthermore, syllabus document proved little help to teachers when attempting to integrate the computer into lessons. Insufficient information or ideas were provided, leaving young teachers with no option other than to seek assistance and guidance from elsewhere.

Like the other participants in the study, Debbie spoke highly of the collegial support that developed among the teachers engaged in the study. She also spoke of climate of support that existed in the school, a climate where sharing of ideas and resources was open and considered to be "second nature". This support was critical as Debbie grappled with changes in teaching philosophy in her classroom.

5.4 JOSEPHINE

5.4.1 Background Information

Teaching Experience and Educational Setting

Josephine was a teacher of four year's experience. She was a "targeted graduate" and was employed straight out of university. A mature-age student with experience in the banking sector, Josephine brought a number of skills to her school based position.

Her present school was not her first as she had been placed at a neighbouring school for six months until her first permanent placement at the start of a new school year. Josephine taught a lower primary class in her first year at her present school, and then worked as a Release-From-Face-to-Face teacher. During this time she also had another child, giving her a young family of three children.

Josephine's interest and personal skills in the use of computers led to a number of staff asking her to take their classes to the computer room during one hour of their class's release time. This was generally done on the premise of increasing students' computer literacy skills. In addition, during the year in which the study took place, Josephine was involved in the implementation of the whole-school computer education program with staff. The program was two-fold. Josephine not only provided one-on-one tuition for teachers as they learnt about the technology, but was involved in the teaching of demonstration lessons for teachers in the computer room with their own classes. These lessons were generally on uses of specific software packages. Josephine was released from normal face-to-face lessons during this time.

During the year of the study, Josephine also conducted a parent-tutor program on the use of computers in the classroom and at home. The previous year, a similar

course had been run for parents by me and another staff member. The major component of these courses was familiarisation of the parents with the various software programs that the students used in class, and tuition of how to use word processing, graphics programs and the Internet at home. These sessions were offered once or twice a year and were fully booked and well received by the parents. Each of the training sessions was conducted over two hours and were run in four or five parts.

5.4.2 Teaching Philosophy in Practice

During the first interview Josephine was able to articulate how she believed students learnt best. She said:

"I believe children learn best through doing and watching and having the teachers modelling and you know what I mean. Without going into too much detail, through playing and doing it more than sitting and listening."

(Josephine, Interview 1, May)

When asked to describe her teaching style to enable this to take place, Josephine commented:

"Still talk to them but do it and show them ... mainly modelling. I suppose it all comes down to modelling, model it all to them but talk to them while you do it and they can see and hear and understand what you want them to do."

(Josephine, Interview 1, May)

Josephine acknowledged the success that she was having in the computer room in her second interview and was able to articulate her beliefs with the use of concrete examples. When asked about how students learn best she said:

"through modelling and demonstrating and getting the kids learning through that way. Because on the computers in the computer room I show them on the teacher's computer on the big screen...and they watch and they'll do something and then they'll watch again and then they'll do it , so they are learning in that way."

(Josephine, Interview 2, October)

Observations in Josephine's room reflected some of the elements of her views on teaching style or how students learnt best. However, children were not actively engaged at all times and Josephine was having some classroom management problems. A number of these problems dissipated in August when there was a noticeable change in how Josephine delivered her lessons. Gone was a sort of "lock step" teaching of tasks in word processing and in came a different focus. I wrote in my observation diary at this time:

"Josephine begins with a story. It appears students using storyboarding.

Students "eating out of her hands".

Josephine explains activity - some students were away because of swimming.

Students working individually on storyboarding.

Teacher asks to check example for text size.

Students watch through example.

Teacher talks them through text size and colour.

Teacher completes demonstration - students on task.

Josephine circulates looking at students work, helping students individually.

Josephine able to talk to me for a few moments.

Teacher lets students know what is expected of them - work to be completed by end of session.

Hands are raised when students require help.

Students walk from computer to computer at times to help others.

Students have a prepared sheet to work from.

Wow what a change! Students engaged actively in own learning.

Josephine well organised, students responding well.

(Josephine, Observation Notes, August)

Josephine herself noted this change in her journal. This corresponded with the change I noted in my observation notes.

I have been using Kids Pix Studio to do storyboarding with most of the classes I have. They are starting to create their own version of a book I have read to them and will eventually make it into a slide show. The children have responded really well to this format and are trying to listen more carefully and are asking questions relating to the book so they get a better understanding.

(Josephine, Journal, August)

I responded to Josephine in her journal by asking her why she believed the children were responding more positively.

Josephine responded with:

I have a new perspective on English and am finding it more enjoyable and certainly more fulfilling. I need to rethink and replan my programming as it does not completely reflect the work we are doing. This form of teaching is helping children with a variety of skills including keyboarding, writing, comprehension, talking and listening and creativity. The idea of their story becoming a slide show is very motivational and had them all excited. My lesson planning has become even easier as all the classes are doing the same story and putting their own interpretations to it. It has been a good week.

(Josephine, Journal, August)

5.4.3 First Observations

One of my first visits to watch Josephine teach was in the computer room. As she was a R.F.F. teacher, she did not really have a room of her own. This is just one of the problems that a Release teacher grapples with. When I arrived, Josephine was seated at the computer at the front of the computer room. The students were seated on the floor and watching the big screen television that was connected to Josephine's computer.

The computer room looked a little drab. Work was still in progress, with the whiteboard at the front of classroom not in place. Temporary tables were in place in the middle of the classroom and cables from the computers hung over the back of them. Little students' work was hung in the room, but this was not surprising as the room was only just opened for use. The decision was made by the school

executive to let the students begin to use the room while the aesthetic finishing touches were being made.

Josephine typed information from the board onto her computer. She then asked students how to increase the size of the text. After gaining the correct response she asked the students how to save. It became obvious that the students knew the process. The students were then paired off and typed the two sentences from the board onto their computer. Josephine then circulated getting students to increase size of writing. The students were on task quite well.

While Josephine was following what she had suggested as the best way to teach children, the activities they were engaged in appeared very artificial and not motivating in their own right. The fact that the students were working on the computer appeared to be the main motivation, with lessons being primarily involved with the mastery of set skills involved in the manipulation of onscreen text.

5.4.4 Initial Computer Usage

Josephine was already confident in her own use of computers. In the first lesson in which I observed her she was already integrating computers into her teaching. This was a lesson where she was teaching an Infants class about how to use a word processor. Josephine's major reason for being involved in the project was to see "where else she could go", what else she could do with children.

Her own teaching program was on computer and Josephine was able to produce professional-looking word processing documents. She was not a computer novice, and some of the participants in the project used her as a mentor to gain technical knowledge about computer usage in their classrooms. Josephine's role

in the school was quite different to the other mainstream teachers involved in the project.

5.4.5 Josephine Case Analysis

Josephine was a teacher who was developing strategies in managing students and determining what teaching strategies were appropriate in what situations. She possessed some high level computer skills but had yet come to a good understanding what stage she was at as a classroom practitioner. All the lessons at the beginning of the study in the computer room revolved around the students mastering some skill that she had set down. This was generally in the area of word processing and differed little among classes that she taught on a set day. Little reference was made to curriculum or syllabus documentation and Josephine was taking the children through “fairly dry” and relatively uninteresting tasks in a lock step manner. The behaviour of the children, whilst better than for lessons in a regular classroom, was still not ideal.

As Josephine began to modify the way in which she used the computers in her lessons and gave them a greater curriculum focus, her interest as well as that of the students improved. This also had a spin-off effect of Josephine being more organised before lessons and in turn experiencing less behaviour problems from the students. This cycle began to feed itself.

Josephine was a classroom practitioner who knew what needed to be done in the classroom but was having trouble achieving it. She had the computer skills necessary to fulfil her training role but was still coming to a better understanding of her role as a teacher. Josephine was a mirror reverse of others in the project such as Galletea and Maree. These two experienced teachers were grappling with the technological components of the study having sound classroom practice strategies.

As the year progressed this was the area of greatest development for Josephine. The beliefs that she articulated at the first interview of the year were starting to be seen in her classroom by August.

a) Were there any changes to teacher's views about how children learn?

When first interviewed in May, Josephine was quite definite in her ability to articulate the inner workings of her classroom. She was able to describe how students learnt best, the role of the teacher and how this was taking place in her classroom. Early observations of Josephine's classroom and teaching practice noted her classroom did not reflect her ideals. There was lots of "sitting, watching and listening" and not much "doing". Her October interview saw little or no change in her beliefs.

However, it was in the time between these two interviews that I had noted a major shift in Josephine's classroom practice. The early observations that had noted children not actively engaged in their learning, and a teacher who was doing "lots of chalk and talk" in a lock step manner, had been replaced by a more student centred and interactive classroom.

In August I noted that Josephine's teaching style had changed. The students from the Intellectually Moderate (I.M) class, using Kid Pix Studio, were quickly engaged in the lesson and a degree of independent work within minutes of entering the computer room. Josephine now was circulating around the room giving more individual assistance to students.

By December, information that Josephine supplied at interview appeared to be a more accurate reflection of classroom practice. Her beliefs about how students learnt best and the role that the teacher needed to play were being reflected in her

classroom. Not only was Josephine able to “talk the talk”, she was able to “walk the talk”.

As mentioned previously Josephine was a mature-aged student who was in her first three years of teaching. She had been a targeted graduate from a local university and had achieved the position at her present school through interview. She was well versed in educational theory and its purpose in the classroom. It would appear that during the project she was able to come to a better understanding of the application of the educational theory that she learnt at university.

In our interview in December at the end of the project our conversation flowed as follows:

Glen: Back at the start you talked about the teaching strategy that you most used was a modelling type of one. Was a modelling type strategy in the computer room? Do you still believe that modelling is the best way to teach children? The reason I ask is that back at the start I asked how do you believe children learn best, and you spoke about modelling.

Josephine: Yes, but for the initial learning process. Like I modelled how to use Kid Pix Studios - the basics of it, anyway - and from then on it was all independent learning. So the initial modelling is really important, or they would still be at the stage of 'where do I turn it on?' But once they've got the idea of how to use the basics, then it's up to them to go further into it and use their own inquiring minds, because they're the ones who found out how to do half the stuff on Kid Pix that I didn't know.

(Josephine, Interview 3, December)

Josephine was now able to identify instances where some practices were of more benefit than others. She was articulating students' need for a different relationship with the class teacher, dependent upon the phase of the learning process in which they were engaged. At times, direct instruction was appropriate, at others modelling; and a new phase that was entering her teaching style whereby students took a more responsible and independent role in their own learning.

Glen: For how long did that modelling role take place?

Josephine: Well the modelling would have only been maybe 4/5 weeks depending on the class that I had, but just concentrating on learning one thing one week and the next week move on to something different - perhaps something another child had picked up the week before. So probably for about 4/5 weeks, and from then on I basically just walked the room and watched them. If they needed help - not all of them got to the stage of being able to save and shutdown properly (that was probably only the IM's) but if they needed help I was free to walk around and help.

(Josephine, Interview 3, December)

Josephine's modeling was actually teaching the children transferable and specific skills in using the computer to achieve the curriculum outcome. It was as the year developed that the focus of Josephine's lessons began to change.

b) Were there any changes in the learning environment?

i) Physical Environment

Minimal change took place in the physical environment for Josephine throughout the year. This could be attributed to the fact that almost all her lessons were held in the computer room. This room had a set structure with mounted benches, power and network cabling restricting the flexibility of the physical environment of the room.

The only change noted was an increase in the amount of student work hanging in the room as the year progressed. Whilst this was not as much as in other rooms in the study, it must also be taken into account that Josephine was not the only teacher using the room. Whilst other teachers spent all their time in their own classroom Josephine's role as a R.F.F. teacher necessitated her taking parts of her day in other teachers' rooms. This meant she was, in fact, a visitor in that room. Her other lessons were conducted in the school computer room – a room that was a shared facility for the twenty-one classes that had access to it. Josephine was the most prolific user of this room as it was part of her role to up-skill staff and students on computer usage.

Classroom Climate

The class climate in May of the project year was hard to ascertain. Josephine had a number of classes to teach. My observation visits usually occurred in the Year One/Two or the school I.M. class (a class for students with mild intellectual disabilities).

In May I noted:

Busy noise within room.

Child comes to me because a boy is teasing him.

Children ask me to help with spelling.

(Josephine, Observation Notes, May)

There appeared to be what could only be called an uneasy calm in the classroom. The IM students were basically tolerant, but appeared to enjoy antagonising each other when possible. My only real comment on classroom climate in June was in relation to the students being on task.

In August I noticed a marked change in classroom climate. The students appeared to be “getting on” much better. This included hands being raised when students required help.

c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment?

Josephine was able to notice a change in her classroom taking place between May and October. In her second interview in October she stated:

From earlier in the year it has progressed a lot. The kids have progressed a lot so the computers have become a lot easier for them to use. I sort of instead of being there teaching them exactly what to do I am sort of now ... what is the word they use on the tape ... like facilitator, that sort of thing, they're doing it. I am just telling them what I want and they do it. So I don't have to tell them how to do it or how to get started they do it all themselves now, even the preschool. They know to go to "T" for teacher so I tend to facilitate them more than teach it to them. So they do more independent work now, so there's a big change from the beginning, cause from the beginning it was press this button fold your arms, do this fold your arms. So it was very structured, now it's, they're more independent workers.

(Josephine, Interview 2, October)

It was evident that Josephine was planning not only the content of her lessons but also how she was going to deliver them. By October she knew what her role needed to be at the commencement of the next term so that she could achieve the outcomes that she had set.

Well it will go back to a little more teacher orientated because they have been working on Kid Pix and doing their storyboarding and that sort of thing... now we have to go back to Slideshow so it will be a little more teacher-orientated while I start to show them Slideshow, how to get it on and get their voice on and you know cutting between pages and it will be more teacher-orientated. again.

(Josephine, Interview 2, October)

In Interview Three I questioned Josephine about her role in each of the classrooms and if she noted many differences between classes she took in the computer room and those that she took back in the teacher's own classroom. Josephine had noted that she had far more behaviour management problems when she attempted to teach outside the computer room than the lessons that she taught in the room.

Josephine: But even when I took the 1 / 2's to the computer room I had less behaviour problems than I did with this Year One class, because we were doing very unstructured Human Society / Sci Tech. type activity and they just weren't ready for it. But the term I did take them to the computers, their behaviour was a lot better, for me - only having them an hour a week.

Glen: Any ideas as to why?

Josephine: Why it was better in the computer room? Because they were interested. They had something that they didn't do on a regular basis. They were out of their own classroom, they were away from that atmosphere and it was also something I could use. OK if you don't do the right thing today, then you can't go on the computer. And that really upset them. So it was a change for them, but also a more structured lesson in the computer room.

Glen: If you had to reflect on your teaching style, tell me what role did you take on when you were in the computer room as compared to out of the computer room?

Josephine: Yes there's a big difference. Once I showed the kids how to use a particular program in the computer room, I then wandered around and watched them and helped them if they needed it.

(Josephine, Interview 3, December)

Photographs from September depict a change in teaching practice. Gone were students seated on the carpet at the front of the classroom at each lesson. This was replaced by students moving almost instantly to the computers in the computer room. The teacher then moved around the group offering assistance as was required. Occasionally, the teacher would stop the group and draw their attention to the large screen television in the corner of the room. The teacher would teach a small snippet of a skill or draw their attention to a specific instruction that the students were struggling with as a group.

d) Were there any changes to teacher attitudes towards the use of computers and related technologies in their classroom?

From the outset of the project, Josephine had a positive attitude towards the use of computers and related technologies in her classroom. Her view on the merit of computer usage in the classroom was well aligned with current departmental policy.

Basically that they are used as a tool in the classroom like a pen or a pencil. Same as going to the library and looking up a book. Just as a tool not the be all and end all but to be able to get and find the information that you want. To be able to type up the information that they want, type up and print off. To present their work nicely, I think it's a tool to be used just as much as you would use a pen and pencil.

(Josephine, Interview 1, May)

Josephine had displayed interest and personal skill in computer usage. This when complemented by her R.F.F. role led to her providing training courses for teachers, parents and students in computer usage. Her roles were many and varied in the classrooms around the school. Journal entries for June to August included:

**June*

Pre School Red came up for their first computer lesson. It was very rushed in setting everything up for them but they enjoyed every minute. Some of the children's drawings were better than what they usually do with paint and pencil. Jodie (Teacher's Aide) noted that some children who previously would not use the computer in the classroom, used one in the computer lab and were very excited ...

I had Year 1/2 class this afternoon. When I asked them how to open up Claris Works, type, save and quit, they could give me the answers. I was really impressed. They did their story writing with minimal fuss. A great afternoon.

**July*

Began setting up Wiggle Works for Year 1/2 class. Set up Amber's four computers. The initial set up was quick and straight forward. The pre setting of the program, e.g. class lists, recording teachers messages etc. is time consuming. We have also found that on the top end computers the record facility will work but the playback wont. I rang Ashton's and am waiting for a reply.

**August*

I have been using Kid Pix Studio to do storyboarding with most of the classes I have. They are starting to create their own version of a book I have read to them and will eventually make it into a slide show. The children have responded really well to this format and are trying to listen more carefully and are asking questions relating to the book so they get a better understanding.

(Josephine, Journal , June, July, August)

e) Were there any changes to student-teacher and student-student interaction in classroom activities?

Student-Student Interaction

A change in student-student interaction was noted with the I.M. students in August. Observation notes from this time commented that students were beginning to move from computer to computer to help each other. Photographic evidence in September further supported this, with one of the students assisting a fellow student while his computer was empty beside him. This was an interesting twist to the interaction between students who generally did not help each other in most settings.



Figure 5.4.1 *Photographic evidence of student-student interaction during one of Josephine's lessons*

Student-Teacher Interaction

Josephine noted a change in her own teaching style and interaction with students when comparing lessons held within and outside the computer room. Her role was more of a facilitator in the computer room whereas she stated:

Josephine: But in the classroom I was back to full-on teaching and giving one instruction, getting them to do it, then stopping, then another instruction ... They were more independent in the computer room with less problems. Whereas back in the classroom it was back to full on teacher, being dependent on the teacher and any unstructured lessons in those classrooms were a waste of time.

(Josephine, Interview 3, December)

Observation notes from August make comment on changes in Josephine's interaction with the students, from what could be said to be a teacher-centred environment; an environment that was characterised predominantly by teacher talk and passive student learning. I noted:

Students engaged actively in own learning.

Josephine well organised, students responding well.

(Josephine, Observation Notes, August)

A genuine interest in the activity could be seen in the children. Students were interested in the activity. Josephine was having no or minimal behaviour problems. She was no longer engaged in classroom management issues and had time to spend with each of the students.

Josephine was aware of the change in her classroom and this was described in interviews and her journal.

They do more independent work now, so there's a big change from the beginning, cause from the beginning it was press this button fold your arms, do this fold your arms. So it was very structured. Now they're more independent workers.

(Josephine, Interview 2, October)

Her journal in May had mentioned such things as:

Tuesday 13/5/97

I had major difficulties with Year 1 class typing stories due to their lack of keyboard skills.

Monday 19/5/97

Year 2 / 3 class - very disruptive as class is being changed around with the introduction of a new teacher. Children did not settle and not much was achieved.

Tuesday 20/5/97

Children were still unsettled from yesterday and the changes to their class.

(Josephine, Journal , May)

This was compared to the comments listed in the latter half of the year:

August

4/8/97 - 8/8/97

I have been using Kid Pix Studio to do storyboarding with most of the classes I have. They are starting to create their own version of a book I have read to them and will eventually make it into a slide show. The children have responded really well to this format and are trying to listen more carefully and are asking questions relating to the book so they get a better understanding.

**December*

11/11/97-11/12/97

These are the last few weeks of term. Everything has been hectic but I have finished all the videos. I felt a real sense of achievement when I finally got all the kids work onto video.

I am really impressed with the quality of work that the children produced and I think their parents will be equally impressed.

(Josephine, Journal , August & December)

Of interest was Josephine's own feeling of satisfaction and achievement as the year progressed. She was keen to try new ideas. To work in areas that provided new, exciting and different opportunities for students. She wrote in early August:

I have a new perspective on English and am finding it more enjoyable and certainly more fulfilling.

(Josephine, Journal , August)

My observation notes also made comment of a change in Josephine's interaction with the students, not only giving them some autonomy in their learning but giving them expectations to be completed by the end of sessions.

f) Was there an increased use of computer technology to achieve curriculum outcomes?

By Term Three there was a definite increase in the use of the computer to achieve curriculum outcomes. This coincided with a more curriculum-driven focus in Josephine's lessons.

Term 3 Report on Josephine's Program:

Josephine is using the English syllabus as the basis for her lessons in RFF. This is a change as originally she was coming at lessons from purely a computing angle. This shows a change in focus back to curriculum-driven lessons.

(Josephine, Program Notes, August)

This was further confirmed in Interview Three.

Glen: What about the outcomes the children were achieving? Do you think they were achieving as much in the computer room as they were in the classroom?

Josephine: I think they achieved a lot more, a lot more. Because when I actually went through and wrote up my outcomes for my program, what I was doing with them in Term 3 and 4 was basically all the English outcomes. In one hour a week they were getting a full page of outcomes. From talking and listening, reading and writing and all the different sections inside that. So whereas in the classroom one hour a week I would be lucky to get through 2 or 3 outcomes in a term. With the Human Society and Sci. Tech in the classroom I hardly got through half of what I planned to do because half the time was spent getting them back on the floor or getting them back in their seat or stopping them throwing pencils at each other and things like that. My discipline strategies in the classroom were a lot different than in the computer room. The computer room was just off the computer. They knew that that would happen so they behaved.

(Josephine, Interview 3, December)

Josephine was also aware of the change in focus and the ease with which the students responded.

My program for the last two terms has been really easy, as I have been doing the same thing with most classes and have had to write only one program. I found it easy to relate the English outcomes to what I wanted to do on the computer and the children met most of these outcomes without realising it.

It has been a good year and my outlook on how to use computers as an effective learning tool has grown. I can see many ways in which we can expand our use of the computer room for classroom work. It will be interesting to see how we can allocate the time so that everyone has their fair share. I also want to continue upskilling the teachers who did not have a chance this year. It has been a learning year for me and has been very beneficial.

(Josephine, Journal, December)

g) Were there any changes in teacher programming of lessons and units throughout the project?

The initial change in July was when Josephine began to take classes to the computer room as part of her R.F.F. lessons. This was reflected in a change in content in her program.

By August (Term Three), I noted in a report on Josephine's program that her program was reflecting a curriculum-outcome focus. Josephine wrote of her new perspective on English as a result of computer usage in her classroom.

I need to rethink and replan my programming as it does not completely reflect the work we are doing. This form of teaching is helping children with a variety of skills including keyboarding, writing, comprehension, talking and listening and creativity. The idea of their story becoming a slide show is very motivational and had them all excited. My lesson planning has become even easier as all the classes are doing the same story and putting their own interpretations to it. It has been a good week.

(Josephine, Journal, August)

h) Was the collaboratively designed professional development program in the area of computer technology effective in supporting program preparation and class learning environments?

Improvements to the project

In the last interview I asked Josephine to make some evaluative comments on components of the project and in particular her collaboratively designed professional development program.

Glen: Your professional development plan. That we were looking at early on in the piece. One of your goals you were after was to try and make sure that the children are computer literate in Kid Pix Studio. Did you get there?

Josephine: Yeah, even preschool.

Glen: *Even Preschool?*

Josephine: *Yeah, they know press the button, find the "T" for teacher. Try to look for the number on the board for the password. Not all of them would get their numbers right of course, they're only 4 or 5 years old. But once it was on desktop they knew how to open it. So yes, I would say there wasn't any classroom that doesn't know how to use Kid Pix Studio now. And use it well!*

(Josephine, Interview 3, December)

Josephine was asked to comment on improvements if the project was to be replicated in another setting. Her only response was:

I don't think I would ...Well, I didn't have any problem. But then I was spending a lot of time in the computer room as it was anyway. Classroom teachers, I don't know how they went. They didn't have access as much to the computer room or the computers as much as I did or they didn't always use it quite as much. - I know they were doing the Wiggleworks, but that still took a couple of terms to get up and running and everybody working on it. More time would never go astray, but I don't think it is necessary.

Glen: *What about length of the project? It's been more than 6 months.*

Josephine: *I really haven't noticed the length, so it must have been all right. I haven't noticed how long we've been doing it for, I've just been doing it.*

(Josephine, Interview 3, December)

When asked to focus on specific components of the project Josephine made a number of interesting comments.

Glen: *Was it handy having someone coming in occasionally and giving ideas and that sort of thing?*

Josephine: Yes, when you came in. And that it always helps to have an extra set of hands anyway, for some of those kids who say Miss I don't know how to do this or I want the same picture as he's got - because you were mainly in with the IM students, so they were a little bit more demanding. I don't think I'd change it. Having someone come once a fortnight to see how those kids can actually behave, when often in the playground you see they don't.

And having the one hour off in the fortnight (not that I always did my journal in that hour) but ...

Glen: The journal. Did it help focus thinking at all? Did you see any real role for it? Or was it just a written conversation between us?

Josephine: It was like a written conversation between us, but, it was good to be able get down on paper what had happened. Obviously I wasn't doing it every week, and then to sit down and think about what had happened over the last few weeks and get it down on paper it was really good, because then I'd think well I've done all that but I've forgotten to do this.

Sometimes you just don't remember whether you've done everything you wanted to do. So it was good to get it down on paper and then think did that one really work or didn't it?

(Josephine, Interview 3, December)

Josephine also had strong views on the relative worth of professional development courses offered outside the school setting.

Glen: You went off to a number of separate little courses outside of the school. Do you believe your knowledge has increased at all this year?

Josephine: Yes, but I don't think it's necessarily because of the courses outside. I mean, yes, it was great to be able to do the Internet Course but I must admit for the first two sessions I was bored stupid, because it was basically what you had already showed us upstairs on the Internet anyway.

The third session was how to create a web page, and I don't think we actually needed to pay the money that we did. I think that if someone had just said to me go and find Netscape Editor and here's the manual, I would have been able to work it out myself very easily, it's not difficult at all.

(Josephine, Interview 3, December)

When questioned on a more beneficial model for her development and what type of activities impacted most upon her, Josephine stated:

I think that it was just working with the kids and working with the teachers. Like some of the teachers asking me things like 'I want to learn about this...' then I had to go and find out how that worked if I hadn't used that program before. Like Claris Works, as a word processing program, I just don't use it at home or anything, so I had to actually go and open up Claris Works and work out how to do boxes and the borders and that sort of thing. And so I was doing what I asked the kids to do - play around with it and work it out. And obviously when I had problems I came and saw you. Or rang up "Glen it doesn't work. Why isn't Claris Works working at home?"

(Josephine, Interview 3, December)

The need for a mentor close by was stressed as being of great importance to Josephine.

Glen: How important is it to have someone close and handy that you can actually grab hold of to help?

Josephine: I think it's really important. Really important. Because when something goes wrong up there and I'm in the middle of doing something with the kids, all riot breaks out if they can't do what they want to do. And it's as if with a lot of them "it's your fault fix it right now- you know what to do with computers, fix it. Well I don't know everything and you can't fix every problem. But being able to send someone "Glen I need you up here in five minutes. Come fix it or something." I think that is really important, I think it's important especially for a lot of the teachers who aren't as computer literate. If something goes wrong. They just sort of freak.

(Josephine, Interview 3, December)

Use of Wiggleworks

Josephine played a mentoring role with some of the staff involved in the integration of Wiggleworks into their classroom practice. She assisted with its setup and provided technical help with Debbie and Amber. She commented in her journal:

Wiggle Works seems to be working well. The children enjoy it. I only see it for 2 hours per week and they seem to be progressing well.

(Josephine, Journal , July)

Josephine had an additional role in the whole-school training and development program to improve computer usage and skills of staff, parents and students in the school.

As for the computer training of staff, I can see an increase in skills. There are less problems in the computer room and the time is booked out.

The staff are starting to realise the benefits of using the computer room for whole class activities and are becoming more independent. I really believe we need Claris Works for Kids to make it easier to have all children, K-6, independent on a word processor.

The parent course has also nearly finished and the evaluations have been good. A lot of parents didn't realise how easy it is to use the computer and produce quality work. It has been enjoyable and enlightening. This will be a good program to continue for parents.

It has been a good year and my outlook on how to use computers as an effective learning tool has grown. I can see many ways in which we can expand our use of the computer room for classroom work. It will be interesting to see how we can allocate the time so that everyone has their fair share. I also want to continue upskilling the teachers who did not have a chance this year. It has been a learning year for me and has been very beneficial.

(Josephine, Journal, December)

i) Was there any development in teacher's skill in using computer technology?

There were no coded instances that intersected or were found near nodes incorporating development of personal skills for Josephine. As a teacher being groomed to assume the computer co-ordinator's role in the school Josephine possessed a number of technical skills in computer usage before the project had even begun. In addition to this she had great enthusiasm to do her best in the role. It was a chance for her to assume a leadership role in the school. The major area

of development for Josephine as a classroom practitioner was the refinement of her teaching practice. The use of computers allowed her to develop her skills in other areas whilst working in an area of interest for her.

What was noted was a reduction in classroom management problems, increased job satisfaction, greater student interest and engagement in lessons. In addition there was a raising of Josephine's profile in the school, not only as a teacher with skills in technology education, but a teacher who was able to design interesting and challenging lessons. She demonstrated her ability to impart her knowledge not only to students and teachers but also to parents.

5.4.6 Summary

Josephine grew as a teacher throughout the year. Her standing with her peers also grew as she was able to take some degree of leadership in the area of technology. Her technical expertise was in demand by staff, and parents were complimentary about her training sessions.

The presence of a mentor close at hand was important to Josephine. As with others in the study, an issue, small or large, that has the potential to derail a lesson with students could cause damage that would take the teacher many weeks to overcome. It was interesting to note that, as the year progressed, urgent calls from Josephine decreased in frequency.

Josephine was complimentary about a model of training and development that focused on the ability to watch others in their classrooms and having a trusted colleague or mentor watch her. Added to this was the value of the journal as an ongoing conversation between us both. Josephine was keen to succeed and was demonstrating a readiness to accept advice and act upon it.

Whilst the classroom climate was not conducive to change with her students, student-student and teacher-student interaction did change as Josephine's classroom practice modified. The students became more tolerant of each other and more willing to assist each other when they were challenged and interested in the content that was put before them.

As the year progressed, Josephine found teaching more fulfilling. A new role in the classroom breathed new life into her classroom practice. Students showed greater interest in lessons, as did Josephine in her preparation. The "sameness" in content in her lessons was still of some concern as all students, regardless of age, appeared to be working on storyboarding by the end of the year. This was an area for further development. However, it was easy to see how far she had come during the year.

5.5 AMBER

5.5.1 Background Information

Teaching Experience and Educational Setting

Amber's first appointment as a permanent teacher was three years ago, to her present school. She had been working as a relief teacher for two years before this time. To gain her present position she competed at interview with over one hundred and fifty other applicants. Senior executive at the school were very pleased with her work in the classroom and it was believed she had the potential for a promising career in the teaching profession. Amber worked hard to refine her teaching skills and within a relatively short time was acknowledged by her peers as a talented classroom practitioner. Her ability to articulate processes that took place in her classroom was demonstrated in the interviews that were conducted for this study.

In preparation for her initial interview to gain her job at the school Amber had completed a "Curriculum Vitae and Interview Skills" course. This had increased her familiarity with articulating educational issues.

1997 had a turbulent start for Amber. She agreed to be involved in this project and was to be teaching a Year One and Year Two composite class. This changed within the first five weeks of the school year with an influx of Year One, Two and Three children. This necessitated a change for Amber to taking a Year Two-Three composite class. This also meant that within a ten-week time frame she had over forty-five different children in her class before her group of twenty-six was settled.

5.5.2 Teaching Philosophy in Practice

For a teacher who had relatively little classroom teaching experience, Amber was able to accurately articulate how she did things in her classroom and why. This was a marked contrast to the more experienced members in the project who took longer to analyse and then verbalise the workings of their classrooms.

Amber was one of the new breed of teachers who was required to articulate educational theory to gain accelerated employment in the teaching service. This was something that neither Maree or Galletea had ever encountered at a classroom teacher level.

Not only did Amber “talk the talk”, it was obvious after only a short few visits to her classroom that it was not just rhetoric. How she said she taught was a true reflection of her classroom practice.

When asked about her teaching style she said:

I try to use a variety (of methods) , I guess I'm pretty strong on modelling and joint constructions, and then going and letting the children get into it once they have had the basic knowledge ... But I do try and do a little bit of problem solving at times just to vary it... group work ...and (I) try to get the kids to help each other and work with each other occasionally as well.

(Amber, Interview 1, May)

Her views changed little with questions regarding how do students learn best, three months later, being met with:

I would probably have to say modelled demonstration, joint construction, working in pairs then individually. I still like to give them the guidelines...the rules because they're not too good at listening. So they need that sort of information to start with. And a demonstration blurb then I find they are better in their groups lately and work well in groups so I try to incorporate that a lot.

(Amber, Interview 2, October)

Amber had a strong conviction that what she was doing with the children was the "right way to do it". Whether this is an advantage or disadvantage when attempting to implement computer technology into the classroom it was hard to tell. As fate had it, Amber became pregnant not long into the year and left the project in September. It was in the October to December period that most significant changes in other classes took place.

5.5.3 First Observations

As I came into the classroom I noticed that the students were seated on the carpet at the front of the classroom, at forty-five degrees to the blackboard. There was a teacher demonstration being conducted at the computer. Amber was explaining to the class some basic instructions to enable them to use the computer as a word processor. At the completion of the demonstration, that lasted for another three to four minutes, Amber selected two students to stay and work on the computer. It was located in the front right corner of the classroom, about two metres to the side of the blackboard.

Amber then moved into a whole class demonstration (minus the two at the computer) of a "mindmap" about a platypus. She questioned the students regarding information they could supply. As they answered each question Amber added to the information which she was writing in texta on butchers' paper. This paper was attached to the middle of the blackboard with Bluetac. (see Figure 5.5.1)

Hands waved excitedly for a chance to answer questions. The class appeared totally oblivious to the two students on the computer. Amber requested the students to make their mindmaps colourful. One student at the computer asked for the spelling of a word. He verbalised an attempt and the teacher quickly affirmed his response and continued with the lesson.

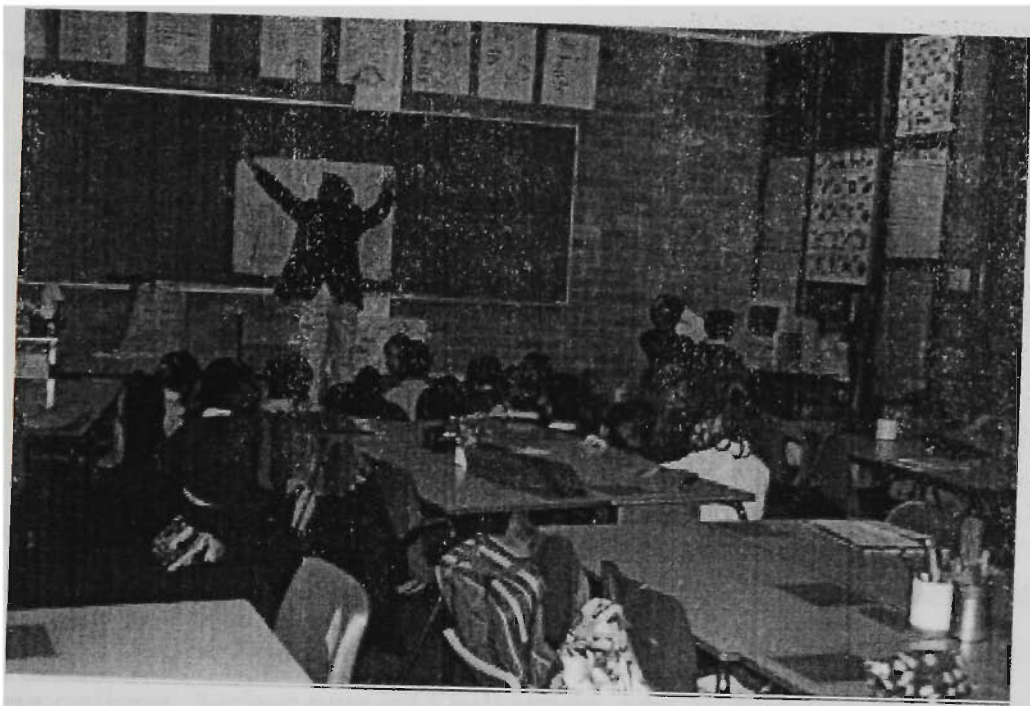


Figure 5.5.1 Amber's classroom during a whole-class demonstration

The students started to become a little restless and Amber used an "arm movement" copying routine to gain back their attention. The I.M. teacher was away and her children were split across the school as an available relief teacher could not be found. The visitor from the I.M. class in Amber's room was 'teary'. The other students around showed a small amount of concern, but remained on task. As Amber turned to the board some students began to chat. She used body movement copying again to bring them back on task.

Stephen called to the teacher that Craig was finished on the computer and Amber asked Stephen to have his turn. Betty, one of the Year Two students, almost lost her finger up her nose - then moved to collect a tissue from the teacher's desk. The lesson continued as if she hadn't moved. Students took no notice of her movement. The three girls around the I.M. student were now not paying full attention to the lesson. They were more concerned that the little girl was upset that her teacher was away.

One of the Year Three boys was inattentive and was sent to his seat. The General Assistant interrupted about using his ladder to check a light that was leaking water after recent rain. This caused some disruption. Amber then sent the students back to their seats to complete their own "mindmaps". It was at this stage that I left the room.

5.5.4 Initial Computer Usage

It was on my first visit to Amber's room that I noticed that she was immediately attempting to use the computer in the classroom. Whereas others were still considering options, Amber was into full stride, and attempting for the students to work on some word processing.

In her first interview she was very frank about her perceived lack of personal knowledge when questioned about what function computers and related technologies may fulfil in her room. Amber commented:

I don't really know enough to say what role. The only thing that I would think at the moment is that they need to learn the skills to survive when they leave school. It's all technology, computer-related now. Ah, I think it would help them I guess start with their reading in the classroom. But I think it's more the fact that they have the skills of how to use them, to access information, to be able to survive in the work force.

(Amber, Interview 1, May)

Amber appeared to have a strong commitment to integrating computers into her teaching practice. She later added in Interview One:

I think they (the children) have to be taught literacy and numeracy skills. Information skills, because the world is full of information and we need to be able to access information, rather than remembering things. I guess they have to, both teachers and children have to know what is happening with technology and computers because that's the way the world is going.

(Amber, Interview 1, May)

5.5.5 Amber Case Analysis

Whilst being relatively inexperienced as a teacher, Amber had well constructed beliefs on how students learnt best and why things were organised in her room in certain ways. She was a confident teacher who had shown great enthusiasm and readiness to implement computers into her classroom practice. Amber was the major force behind the purchase of Wiggleworks and was committed to its use in her classroom. After viewing it at a demonstration session she convinced Debbie and Maree of its benefits as an early reading program. Her drive and enthusiasm paid off with the school purchasing sufficient copies for the use of all classes in her foyer.

The speed with which Amber was able to begin integrating the computer into the area of literacy suggested that she had spent time analysing its usage before the project had begun. She was by far the first to begin computer usage in her classroom and also showed interest in gaining personal skills to assist the presentation of work to her students and parents.

Like Maree, little change in classroom practice was required for Amber to integrate the computer into her reading lessons. She was well versed in the use of

groups in her classroom and her students possessed the necessary skills to work with a degree of independence. The introduction of Wiggleworks was seamless with the major change being increased enthusiasm among her students.

a) Were there any changes to teacher's views about how children learn?

Amber showed great confidence throughout the first interview. She was able to articulate her belief that students learn best when a teacher models, demonstrates and then facilitates joint construction.

From the first observation visit to Amber's room it could be noticed that Amber's view on how students learnt best was reflected in her teaching practice. Whole-class demonstration was taking place before students moved back to their seats to complete their work. On visit two it was noted that group work was in place. The teacher was teaching components of lessons to a small group and then circulating around the room checking on all other students.

The same philosophy was evident in the second interview when Amber was asked again about how students learn best. A more detailed response was given on this occasion.

I think sometimes it depends on the kids and sometimes on what you are actually teaching. I like to still give a demonstration first and let them run through things and then experiment and try and work together in groups and come up with some answers.

... But it depends on what I am doing. I try to use a variety and not just one strategy. I still tend to do a demonstration then perhaps group work for some things ... if ... usually group work first but then when I assess I tend to get them to do it individually. But it depends on what I am assessing too.

(Amber, Interview 2, October)

Observations of Amber's lessons confirmed that this was an honest and insightful characterisation of what was taking place in her classroom. Amber possessed the ability to self-evaluate, with information supplied at interview being supported by classroom observations.

Amber's involvement in the project was cut short due to the birth of her first child. This resulted in the second interview being her last. Throughout her involvement in the project Amber showed little if any change in her beliefs on how students learn best. Her use of the computers in her classroom, complemented her present teaching practice and correlated with goals that had been set in her personal professional development program.

b) Were there any changes in the learning environment?

Physical Environment

Before the commencement of the study Amber was beginning to incorporate the computer into her classroom. In my first observation visit, I noted two students at a time were using the computer in a withdrawal mode. This necessitated them being excluded from mainstream lessons while using the computer. This was organised through a "roster type" system. It appeared that this work was focused on word processing of stories on the computer.

The only change in the physical environment noted was when Amber, Debbie and Maree agreed to share their computers from their classrooms by placing all four computers at their disposal in the foyer. They then timetabled each class's reading sessions at different times so that all could maximise the use of Wiggleworks. Wiggleworks was the computer-based literacy program that was to become the focus of each class's reading program for the year.

I noted that it was July before the program was in full operation in Amber's classroom.

Classroom Climate

There was no change in Amber's classroom climate noted at any stage in the project. The classroom had a "warmth" about it that I noted in the first observation visit. This continued throughout the study. The classroom appeared to be one where learning was valued and the students knew and responded positively to rules that were set in place. The children worked well in groups and were developing independent work habits.

c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment?

The only change noted in teaching practice was when the computers were initially introduced in Amber's reading lessons. This required some changes in organisational structure in the classroom. Amber was a keen supporter of the staggered reading times, as were the others, so that four to eight children at a time could be working on-computer with the Wiggleworks CD-ROMs. The four computers were housed in the foyer of the four classrooms which brought some other issues of supervision to the fore. These were dealt with as the project progressed and led to some recommendations for the sharing of limited computing resources amongst classrooms.

The model of teaching used by the teachers when Wiggleworks was in use necessitated little if any change for Amber and her children. Reading lessons were normally carried out in groups, with children completing discrete activities. The computer activities now became one of these groups. This group was highly motivational for the children.

I noted in my observation notes in July:

I got into class a little late this morning, after installing Wiggle Works for Amber.

The students were working in groups.

Dinosaurs group: Story Plan.

Bees group: Story Plan

(Both of these groups were using prepared sheets).

Ants group: Oral reading with Ms. Graff.

Cats group: on computer.

An explanation of what was to take place in each group took 20 minutes at the start of the session.

Students then moved to their assigned groups.

Amber spent time with the students at the computer.

The students were engaged in an explanation - two students per computer.

Four computers were in use in the foyer area.

The teacher was circulating and explaining some of the features of the program.

(Amber, Observation notes, July)

This was a model that continued throughout the time that Amber was involved in the program. Monday's reading session was slightly longer as this was the day that activities were explained to the students. Children then rotated through the activities completing a different lesson each day. By the end of the week, all children had spent one lesson on the computer.

d) Were there any changes to teacher attitudes towards the use of computers and related technologies in their classroom?

Amber had a positive attitude to the use of computers in her classroom from the outset. She quickly implemented ideas and constantly evaluated not only her teaching practice but also student skill development. Evidence that this was taking place could be seen as early as June in Amber's journal when she wrote:

June

THINGS I LEARNT

I have just learnt how to put a box around text using Claris Works.

I have learnt how to save and locate a file again.

How to clean a mouse ball and have experienced the frustration of not having it cleaned regularly.

To encourage children to save their work in their own name especially when using the Computer Room.

FRUSTRATIONS

Having difficulty with unclean mouse balls.

Difficulty when printing out children's work. I deleted their work after printing it but it kept printing out again - much to my annoyance. ...

CHILDREN'S SUCCESSES

Children are able to word process a simple text, using shift, space bar, return and delete keys.

I'm encouraging them to use the arrow keys when they want to back track rather than totally relying on the 'delete' key.

Glen - The mouse can also be used - click where you want to be.

Learning how to shut down, open up and save a file with Josephine.

(Amber, Journal, June)

During July, observation notes recorded that Amber had more time to rotate around groups. Even though group-work had taken place in the classroom, the group working on the computer "freed up" the teacher. This was, of course, when the parent helpers remembered to attend the sessions. Amber, as with the other teachers using Wiggleworks, enlisted the help of parents (or support teachers or aides) to take some of the groups. This enabled a smaller adult/child ratio.

e) Were there any changes to student-teacher and student-student interaction in classroom activities?

Student-Student Interaction

Student-student interaction in the classroom appeared positive. There was a mixture of teaching strategies employed which enabled students to work individually, in small groups or as part of whole-class instruction. This enabled students to interact on a number of levels. Amber was conscious of the need for co-operative work in the classroom. After viewing the staff development CD-ROM from the Apple Classroom of Tomorrow (ACOT) Project she stated in her journal:

After watching the videos and reading the information on the CD-Roms I felt I needed greater emphasis on Co-operative Team work in my class.

My class has done quite a bit this last term, but more work will be needed next term.

My class has begun to use Wiggleworks. The children will have the opportunity to play around on it this week. Next week I'll commence using it in a more systematic way.

(Amber, Journal, July)

Observation notes supported the picture of a class skilled in co-operative learning strategies and the roles and skills necessary to make group work effective in a classroom situation. In late May, observation notes recorded such strategies in use. This was in addition to examples of interaction between students and the roles they played in the classroom.

When I came into the classroom students were working in groups.

A group of four students were reading in the back corner.

A line of five students were in front of Amber.

Amber asked students to complete activity and come to the floor.

Teacher spoke to the students about a ripped book. She spoke about the "spine" of the book and the importance of looking after it.

Bruce spoke of seeing something through the book near the shelf. Amber spoke about looking after books at school and also when taking books home for home reading.

Teacher explains that the activity is a retelling one today. "What is a retelling?" "Do we say all the story?"

An example from The Ugly Duckling was put up onto the board as a sequencing activity.

Students asked to read the six parts of the story silently as they are put up.

Teacher takes students through reading (choral) each of the parts.

Teacher explains 'story ladder' - students to sequence information on board.

Teacher asks for a student to tell which will be first. Do they all agree? - choral "Yes" Which will be number two?

Bertadene gives number two answer. Class choral read it.

Teacher refers to text in big book - then asks for number three and four.

Seve notices they have left out one section before they do the last question.

James is sent to his desk for annoying others around him.

Teacher asks students to complete the activity.

Teacher circulates around the room checking on student's work.

Students fussing around looking for something lost. Asked to go back to their seat to work - will look at recess.

Dennis moves to board to check spelling of some words.

Teacher spends time at each desk.

(Amber, Observation Notes, May)

It was noted in July that the organisational structure that had been designed by Amber necessitated two students working with each other at the computers. It was evident from the outset that these students were engaged in meaningful dialogue whilst at the computer.

Student-Teacher Interaction

In June, I made some detailed observations of a regular lesson in Amber's classroom. This typified the activities that took place there.

Teacher explains what a pelican is.

Teacher works through example of a plan of retelling.

Student example put on board - ran through it. Praise given.

Teacher shows some of Year 3's work - praising their effort.

Class is told they will try something similar.

James is sent back to place his teddy bear at his desk. Comes back sensibly.

Teacher runs through a plan for students to set out their recount.

Teacher uses a pre-prepared sheet.

Teacher reinforces students not to call out.

James begins calling out, teacher tells him not to.

James continues to call out. Teacher says she won't listen while he calls out.

Teacher comments on similar kind of activity to a mindmap.

Teacher models four events that could be used in recount.

Teacher asks Bruce to give information - corrects language positively as he answers.

Dennis appears to be the only student not paying full attention to the teacher.

Teacher models concluding statement..

Asks for two people to give a concluding statement.

Students stand to give their example.

Teacher models the starting "My favourite part of the day was ..."

Teacher probes "why? what?"

Another person asked to give answer - Betty confused hers.

Another three examples given - Karen had trouble answering as well. Ended up copying an earlier example.

Teacher models quickly again what is expected in each of the sections of the prepared sheet.

Teacher explains that the story plan doesn't need to be in sentences.

Teacher models again onto blackboard for students to see what is expected.

Teacher questions students again on who, where, what, when.

Teacher chastises Dennis for not listening.

Students begin to get restless - have been on the floor for 40 minutes.

Teacher says students fussing enough to know what to do.

Teacher hands out sheets.

At this stage I leave.

(Amber, Observation Notes, June)

Whilst this session contained a large percentage of time engaged in direct instruction, Amber's questioning techniques involved a number of students. The lesson viewed was actually the initial stages of introducing a specific text type to the students. During another visit only a matter of weeks later, I was able to view group work in action. In these and other reading lessons there were four groups in action in the classroom.

Two students per computer. Four computers in use in foyer area.

Teacher circulating and explaining some of the features of the program to students.

Back in classroom, students are on task working on story plan and oral reading with Ms. Graff.

Students exploring different components.

After about 20 minutes, the teacher swapped a group - Bees group came out to the computers, Cats back inside.

Students who were coming out, cheered.

Ms. Graff swaps a group as well.

Two groups per session with teacher or computer.

Students were active and appeared excited with activities. Teacher asked whether students enjoyed Wiggleworks - all did. Teacher spoke to class about sharing problems - children dominated the keyboard or mouse.

Teacher gave some possible options - a page each, one does reading aloud, other does writing.

(Amber, Observation Notes, July)

f) Was there an increased use of computer technology to achieve curriculum outcomes?

Specific evidence of students using computers to achieve curriculum outcomes was demonstrated in the area of English. It was in this key learning area that Amber concentrated her efforts and used the computer as a major resource in one of her reading groups. However, there was no systematic effort by Amber to focus on the technology to achieve these outcomes. She viewed the use of Wiggleworks as a possible means to achieve regular reading outcomes in an easier, more efficient and interesting manner. Curriculum focus, as it related to technology usage, did not appear to be her central theme in the classroom or in programming of units of work. When this was discussed in her first interview the following comments were recorded:

Glen: Curriculum documentation that has come out over time, have you spotted much in relation to using computers?

Amber: Mainly in the English curriculum where it is another aspect of handwriting, how to use the word processor. The Maths and the problem solving but I haven't really done much in that area.

(Amber, Interview 1, May)

g) Were there any changes in teacher programming of lessons and units throughout the project?

There was little or no evidence a change in programming of units of work by Amber throughout the study. This may also have related to her early departure from the project as a result of her pregnancy. This resulted in less data being collected from Amber. It was noted that Amber was listing the use of computers in the resources for the teaching of reading and that there was increased focus on the use of Wiggleworks.

h) Was the collaboratively designed professional development program in the area of computer technology effective in supporting program preparation and class learning environments?

Amber had no data coded at the node related to ineffective professional development (see node list Appendix 6.2). However, a number of text units were coded to the node that housed text units related to effective professional development.

In Amber's second and last interview, held in October, she was asked to comment upon some of the strategies that were put into place to assist the professional sharing of information throughout the study and about the value of mentoring.

Amber: For the organisation with the foyer for sharing we had to get together and talk, what time suited everyone best. And also talking with the support teacher what day she was coming in, so what day she would be there to help you. There was that.

As far as me learning things ... It's sort of been good having Josephine floating around in the morning to say quick what is wrong here? It's also with the secretaries having some time with them, getting them to go through columns for assessment books and what ever. That's been really good. Being able to ask people quick questions while you are sort of in the middle of something as they walk past has been good.

Glen: So are there any particular places in the school that you have been more likely to get hold of someone to have a chat or is just passing in the corridors when you do it. Or ...

Amber: Um the secretaries out in the staffroom because they are out on the computers all day. They are very helpful. And basically I suppose our foyer because Debbie knows a bit next door, and Josephine comes in and out ... and you ... sorry. Left you out didn't I!

(Amber, Interview 2, October)

Amber's comments were reflective of the school's culture. This school was one where teachers readily assisted each other and shared resources and ideas. This seemed to flow not only from the teachers but also from the ancillary and support staff.

Improvements to the project

Due to Amber's premature departure from the study no direct data were forthcoming on how to assist with improvements in the project.

Use of Wiggleworks

The evaluative nature of Amber's writing style in her journal made it relatively easy to find evaluative comments in most areas. In relation to the Wiggleworks program she commented:

CHILDREN'S SUCCESSES

The children are beginning to use Wiggleworks independently.

The "Dinosaurs" need a specific lesson on using "My Words".

All the children need to be shown how to shut down and be reminded to drag the disk to the trash.

AIMS FOR NEXT WEEK

Set up the Wiggleworks listening post.

Save the children's word processing on one disk and print out.

Improve the children's competency on Wiggleworks.

(Amber, Journal, August)

These comments suggest that in a relatively short time (four to six weeks), the students were able to use the on-computer component of the Wiggleworks program independently. Once they, and Amber, had mastered the use of the CD-Roms in the classroom, she was keen to use some of the other resources that came with the kit. An example of this was her desire to use the Wiggleworks audio-tapes as a listening post station.

In her last interview that year I questioned Amber directly regarding the integration of the computers into her reading program and specifically her role when the Wiggleworks program was in use.

Glen: I know you have been integrating the Wiggleworks into your reading program, what's your role in reading?

Amber: Well because of all the interruption I sort of haven't ... I use Wiggleworks at the moment...cause the kids are independent with it now it works really well and because my reading mother has fallen pregnant she was not helping me any more...On one day I sort of had five reading groups on my own. It was more "right you kids go onto Wiggleworks today." And I know that was one group taken care of.

They know what to do out there... and I don't have to go out to check. Most of them even know how to drag their disk out now and swap disks which was a real problem when we first got started. Because every group was on different disks and we had a big major drama about getting the disks out without shutting down three times. But that has fixed itself (through the purchased of 4 copies of each CD-Rom) so it has been more of an independent work station. I would have liked to have freed myself up and give the reading mother a reading group and work with the writing

(Amber, Interview 2, October)

Of concern from Amber's comments, and for the other two staff using Wiggleworks in their reading program, was the use of Wiggleworks in the foyer. This meant that the on-computer group were not within the confines of the classroom. Each teacher involved did not find this an ideal situation, but could not come up with another workable alternative that gave the required number of computers per student during reading time. The practice of having a reading group in the foyer was something that did take place in other classrooms, as well as with these teachers before the use of Wiggleworks. In these other situations, the group in the foyer may have been with a parent or support teacher and were engaged in oral reading activities that required a degree of free space around them so that others were not distracted.

f) Was there any development in the teacher's skill in using computer technology?

Work samples collected after June showed a change in their presentation. Samples of work that were included in student portfolios that were created by

Amber in May were totally hand written. By June, Amber had begun to computerise the sections that pertained to the attainment of student outcomes. This also coincided with her comments about the office staff showing her how to “complete tables” using Microsoft Word. (See Work Samples in Appendix 5)

When Amber was asked what her direction would have been in the last term of the year if she would have been returning she commented:

I think with Wiggleworks I wanted to get more into using the listening post and matching up with the books. So getting that down to a finer art. I would have taken the kids up myself to the computer room. ... and done a bit of storyboarding.

(Amber, Interview 2, October)

5.5.6 Summary

Amber had demonstrated a growing confidence in the use of computers both on a personal level and in the area of reading in her classroom. She was willing to seek advice from a number of areas, not only from myself and Josephine, but also to utilise the desktop publishing expertise of the ancillary staff at the school. This was something that other teachers in the study did not begin until much later.

She appeared self-assured in the classroom and from the outset of the project was looking at the use of computers at a curriculum level. Most other teachers appeared concerned with hardware and software issues and necessary computer skills required by students. Amber from the first instance was looking at a curriculum focus. This showed little change as the project progressed. Unfortunately, her premature departure from the project robbed us of the chance to view where she would have been at the conclusion of the year.

Like others in the project Amber was very positive to the idea of people engaged in the study being housed near each other. This enabled the chance for interaction at any stage during the day. The environment led to further sharing and to my knowledge there was no professional disharmony at any stage throughout the

year among those involved in the study. They acted as a team working together helping each other as they grappled with issues as they arose.

Amber displayed a readiness for change. She embraced new ideas, trialed and evaluated their relative worth. Her personal professional development program enabled her to focus on her goals and allowed her to reflect on the successes that she encountered in a short time period. Amber was ready for change and she had created a classroom environment whereby the students responded well to her teaching practices. When these practices involved the use of computers, the students responded with even greater enthusiasm. Here was a teacher who was articulate, knew what she wanted and why, and had developed a rapport with the students that enabled learning to take place in her classroom in a genuine and positive atmosphere. Wiggleworks and the use of computers in her literacy lessons enabled her to take her students to a new level and provide them with opportunities that were previously unattainable.

5.6 OVERVIEW OF CASE STUDIES

The table below sets out a summary of the major findings as related to each research question and cross-referenced against each of the individual participants in the study.

Table 5.1 Overview of Case Studies

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|--|--|---|--|--|---|
| a) Were there any changes to teachers' views about how children learn? | <ul style="list-style-type: none">* Had strong conviction about what should take place in her classroom.* Ability to articulate these beliefs improved throughout the project.* Children with disabilities need a certain amount of structure.* Moved away from teacher-centred lessons when the computer was used.* Students responded well to new model. | <ul style="list-style-type: none">* View of how students learnt best stayed constant throughout project.* Would only agree to include computers if she could be convinced of their benefit.* Believed she was mainly a "chalk and talk" teacher.* Maree's expressed views not accurate. There was use of group work and independent study. | <ul style="list-style-type: none">* Was able to articulate how students learn best (and teachers role). Initial observations did not reflect these ideals.* By end of project teacher's role changed dependent upon the phase of learning.* Moved from more teacher-directed to child-centred. | <ul style="list-style-type: none">* Students learnt through varied experiences from whole-class to individual study.* Had difficulty articulating view to begin with. | <ul style="list-style-type: none">* Able to articulate views from outset.* Teacher's role included modelling, demonstration and joint construction.* Little if any change throughout project. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|---|---|--|--|--|---|
| b) Were there any changes in the learning environments? | <ul style="list-style-type: none"> * Little change. * Nine children in class - two computers (space not an issue). * Made use of computer room later in project. * Dramatic change in interaction between peers - (a growing independence). * More sharing and interaction in classroom. | <ul style="list-style-type: none"> * No discernible change throughout project. * Stimulating environment. * Group work in most areas of the curriculum. * Wanted four computers in room. | <ul style="list-style-type: none"> * Minimal change due to most lessons being in the computer room. Physical layout unable to be changed. * Classroom climate hard to determine due to multiple classes being taught. * "Uneasy calm" in room early in project. * By August "better feel" in room - more interaction between students. | <ul style="list-style-type: none"> * Initially wanted one computer in her room. * Didn't work as whole-class instruction. * Moved to group work with computer usage in one group. * Preferred to have six computers by the end of the project for reading lessons. * Class climate positive throughout. | <ul style="list-style-type: none"> * Was beginning to integrate computers into the classroom before the study began. (Roster system) * Made use of foyer and computer located there for reading. * Positive climate throughout project. * Students worked well in groups. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|---|---|--|---|---|--|
| c) Were there any changes in teaching practice when computers were integrated into the teaching/learning environment? | <ul style="list-style-type: none"> * Curriculum focus not present in initial stages of use. * By December more relaxed in letting students take control of some of their learning. * Significant change in the way lessons were taught - less teacher-centred. | <ul style="list-style-type: none"> * Little change throughout the project. * Computer group replaced paper-based group. * With parents involved Maree freed up to play "roving" role a little more. | <ul style="list-style-type: none"> * Originally very teacher-centred. Students spent a lot of time sitting and listening. * Moved towards a more student-centred active classroom. * Less behaviour problems when teaching in the computer room. | <ul style="list-style-type: none"> * Was teacher-centred. * Changed to more group work with some independent study. * By the end of the project was looking to integrate the computer into more areas. | <ul style="list-style-type: none"> * Some changes in organisational structures when computers were initially included in reading lessons. * Group work in reading already in place. * Students highly motivated when at the computer. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|---|---|---|---|---|--|
| d) Were there any changes to teacher attitudes towards the use of computers and related technologies in their classrooms? | <ul style="list-style-type: none"> * At the beginning of the project little or no computer expertise. * Computer use led to a less rigid structure in the room. * Teacher impressed by the computers effect on her children. | <ul style="list-style-type: none"> * Slow progress to begin. * Had to see the value of computer use. * When convinced of its benefits changes were made quickly. | <ul style="list-style-type: none"> * Positive attitude from outset of the project. * Displayed interest and a high level of personal computer skills. | <ul style="list-style-type: none"> * Positive attitude. * Bought home computer at start of project. * Increased use of computer for administrative purposes. | <ul style="list-style-type: none"> * Positive attitude. * Quickly implemented ideas and constantly evaluated teaching practice and also student skill development. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|--|--|---|--|---|---|
| e) Were there any changes to student-teacher and student-student interactions in classroom activities? | <ul style="list-style-type: none"> * Major area of change. * Computer use led to genuine student/student interaction. * Previously teacher had to manufacture artificial situations. * Students were not threatened by experimentation when using the computer (usually threatened). * Teacher quote: "The freedom that the computer gives them away from me is lovely to watch". | <ul style="list-style-type: none"> * Students already worked well with each other. * Increased enthusiasm noted in a group when they were at the computer. * Sharing and turn-taking noted. * Little or no change noted in teacher / student interaction. (A little more "floating" between groups by teacher - Maree not comfortable with this). | <ul style="list-style-type: none"> * Change in student/student interaction noted in August. (students helping each other). * Noted a change in teachers role and interaction with students (more a facilitator). * Students genuinely interested in activities. | <ul style="list-style-type: none"> * Change noted in student/teacher interaction. (No longer teacher centred). * Student/ student interaction similar as children were use to group work from other Key Learning Areas (not previously in reading). * Students noted assisting each other at the computer. | <ul style="list-style-type: none"> * Student/ student interaction positive from outset. * Students work individually, in small groups and whole class at different times. * Teacher conscious of the need for students to have co-operative skills if the use of the computer is to be effective. * Little change in student/ teacher interaction. * Noted that the teacher had more time to move around and monitor groups when the computer was used in the classroom. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|---|--|--|--|--|---|
| f) Was there an increased use of computer technology to achieve curriculum outcomes? | <ul style="list-style-type: none"> * Curriculum focus came later in the project. | <ul style="list-style-type: none"> * Increase noted. Computer based group replaced paper based group. * Computer used in reading. | <ul style="list-style-type: none"> * By August noted changes and a curriculum focus for computer usage. * Majority of work linked directly to English syllabus outcomes. | <ul style="list-style-type: none"> * The computer and Wiggleworks became a major resource in reading. | <ul style="list-style-type: none"> * Specific outcomes in reading matched the area in which the computer was used. * Wiggleworks used as resource to achieve "regular" reading outcomes. |
| g) Were there any changes in teacher programming of lessons and units throughout the project? | <ul style="list-style-type: none"> * Changes minor. (noted computer use in timetable and as resource used in classroom). * Students skills increased and there was a modification in the way lessons were conducted. More autonomy for the students. | <ul style="list-style-type: none"> * Computer use became a component of reading lessons. * Wiggleworks was used as a part of a rotational group process. | <ul style="list-style-type: none"> * By July most classes taught in the computer room. This marked a change in programming of lessons. | <ul style="list-style-type: none"> * There was a noted change in the reading program. * Initially one computer and whole class lessons used. * Later group work noted. * Produced a booklet to assist the on-computer group. | <ul style="list-style-type: none"> * Computers and software listed as a resource in the teaching of reading. * After 4-6 weeks students able to use Wiggleworks independently. * Left project early due to birth of child - less data collected. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|--|---|---|--|---|--|
| h) Was the collaboratively designed professional development program, in the area of computer technology, effective in supporting program preparation and class learning environments? | <ul style="list-style-type: none"> * Student gains led to even more enthusiasm. * Professional development plan had a definite effect on her classroom. * Collaborative design had assisted her. * Use of journal important. * Mentor must be at hand immediately. | <ul style="list-style-type: none"> * Goal was to implement Wiggleworks. * Used computers in class reading and also took her own class to the computer room. * Was happy with the attainment of goals. * Valued informal professional development. | <ul style="list-style-type: none"> * Achieved goals set. * In school training and development had supplied most of what was needed. * Use of mentor close at hand important. * Josephine played mentor role for others in relation to Wiggleworks set-up. * Had additional role in whole-school training and development for staff, students and parents. | <ul style="list-style-type: none"> * Curriculum documents were of no use at all. * Personal professional development program was exactly what was needed. * Interaction with others who were trialing new ideas was of value. * Close proximity to others in project important. * Informal talk important. | <ul style="list-style-type: none"> * School culture was conducive to development of staff. * Sought assistance from ancillary staff for desktop publishing help. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|---|---|---|---|--|---|
| i) Was there any development in teachers' skill in using computer technology? | <ul style="list-style-type: none"> * Personal confidence and skill increased. * Initially could not even turn a computer on. * Could now operate programs, (open/close), type own notes and print them. * Teacher's aide skills also increased. | <ul style="list-style-type: none"> * Beginning to show development. * Student portfolio documents now word processed. | <ul style="list-style-type: none"> * Already possessed a number of skills. * No major developments. | <ul style="list-style-type: none"> * Beginning to use the computer for worksheets and portfolio tasks. * Program still handwritten. * Expertise by other staff sought. * Believed her personal skill development did not impact on Wiggeworks - it was her change in philosophy. | <ul style="list-style-type: none"> * In May all student work sample sheets were handwritten. * By June sheets were being desktop published. |

| Question | Galletea | Maree | Josephine | Debbie | Amber |
|----------|--|---|---|--|---|
| Summary | <ul style="list-style-type: none"> * Increased skills of teacher and teachers aide noted. * A growth in general confidence evident. * Increase in natural verbal interaction between students. * Teachers role moved away from teacher-dominated when the computers were in use. | <ul style="list-style-type: none"> * Original change necessitated little change. * Major hurdle was seeing the value of computer use. * Key components: <ul style="list-style-type: none"> - personal professional development program. - mentor at hand. - available resources. - willingness to try new ideas. * Maree and her students developed a new set of skills related to computer usage. | <ul style="list-style-type: none"> * Grew as a teacher throughout the year. * Standing grew with peers and took a degree of leadership in the area of technology at the school. * Keen to succeed. | <ul style="list-style-type: none"> * Originally agitated for the purchase of Wiggleworks. * Catalyst for change was change in philosophy. * Personal professional development plan was what was needed (at her level specific for her needs). * Collegial support was excellent. | <ul style="list-style-type: none"> * Growth in confidence and skill in personal and classroom use of computers. * Looked at curriculum focus from the beginning of project. * Sought advice from various areas and individuals. * Premature end to project as left on maturity leave. |

5.6.1 Conclusion

These tables represent the rich set of data collected. The individual finding listed above will be addressed and analysed by theme in the next chapter. This will allow the aggregation of data from different research question as it relates directly to the major themes identified during the study.

CHAPTER 6 FINDINGS - THEMES

6.1 How do Students Learn Best?

There was sufficient data collected to confirm the occurrence of a change in the way that lessons were conducted in all the classrooms engaged in the study. With some teachers there was a modification of the style in which they presented curriculum. With others, there was a much more fundamental change in their expectation of students and the notion of how students learn best.

At the completion of the data collection phase of the study, all teachers utilised computers as part of group work within the classroom and were giving the children some degree of autonomy over their own learning. With Amber, Debbie and Maree, the computer became an integral component of their reading programs that utilised a computer-focused early-reading program called Wiggleworks.

The use of Wiggleworks necessitated little change for Maree or Amber, who were already running reading groups, with six to eight students in each group. Debbie was required to modify some of her current practices. She was challenged to rethink her entire notion of the teaching of literacy in her classroom. In her third interview at the conclusion of the project she stated:

Using the computers was a change to my philosophy. I have always been teacher-centred in my teaching(of reading) and I guess Wiggleworks has really amplified that.

(Debbie, Interview 3, December)

This was later supported by her comments in her third interview when she spoke of her success when giving students more responsibility for their learning. This responsibility was reflected by more group work in the classroom and some

students working independently on tasks whilst Debbie worked with specific small groups.

A more fundamental change was evident for Galletea, who was a very experienced teacher of students with learning disabilities. When discussing the growing independence of the students in her room and her changing belief about how they learnt best, she commented that the use of computers had opened up a whole new area for her. Her belief that students with special needs require heavy structure with little of no change was being challenged.

Initial observation in Amber's classroom demonstrated a withdrawal mode when computers were in operation. This required one or two children using the computer, which was placed in the front corner of the classroom, whilst the rest of the class was engaged in some form of whole-class instruction. By July, a classroom characterised by group work and a degree of independent learning replaced this when computers were in operation in reading groups. This new format was very similar to that of Maree's reading lessons in her classroom.

By August, Josephine had also moved to a comparable mode of lesson delivery in the computer room. The students spent far less time seated at the front of the room watching demonstrations on the large screen and more time working hands-on on the computer. Her role in her lessons in the computer room was taking on a marked similarity to the reading lessons that were conducted using Wiggeworks in Amber's, Debbie's and Maree's classrooms. Review of Josephine's program noted a move towards a correspondingly greater curriculum focus at this time. Lessons were less computer-skill oriented and more directly related to curriculum outcomes from relevant syllabus documents.

A greater curriculum focus to lessons that incorporated computer usage also developed in Galletea’s classroom. At the commencement of the study any lessons that involved computer usage were listed on the blackboard as “Computers”, or “Computers, Mr Patterson will visit us”.

On December 5th this changed; the focus was now, “Christmas Story. Write our own Christmas story. Computers. Mr Patterson will visit us”.

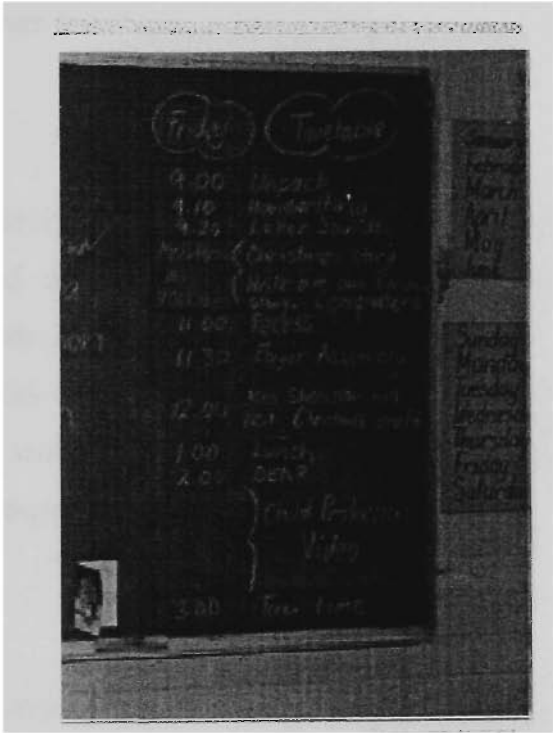


Figure 6.1 *Photograph of Galletea’s blackboard - December 5th*

Due to the nature of students' disabilities in Galletea’s classroom, she was convinced that a detailed timetable must be on the board each day. This timetable minimised tantrums from some of the children if routine was changed and gave some reassurance of what would happen next in the classroom. There was also a pictorial representation of each child’s computer usage on a chart at the back of the classroom. This was another management strategy that Galletea instigated to assist with the computers integration into her classroom. It was evident that Galletea was not only integrating the use of computers into her classroom, but she was also thoughtfully doing it in such a way that it did not compromise some of

her strong beliefs. These beliefs were directly related to the best way of teaching students with disabilities and managing their (at times) difficult behaviours.

Debbie's change in approach to using computers in her classroom, and in a mode that incorporated group work, was necessitated through her efforts to maximise student possibilities for hands-on work. She had begun using one computer in the classroom with whole-class lessons using Wiggleworks. By her own admission this was not successful. In July she decided to move to the same organisational structure to that of the other teachers in her foyer.

Debbie had been frustrated in her belief that the Wiggleworks program would enthuse her children and actively engage and interest them in reading. Her method of whole class instruction did not bring this about. She was proposing to move towards the model being used by Maree and Amber, but was not comfortable in doing this until she had thoroughly planned out the organisational strategies that would be required for its success.

Her Journal entry in November noted:

Wiggleworks is running brilliantly. The kids are loving the book-activities and are feeling more confident in their reading (especially my less able kids). I think having the one book per group per week with all of the related activities has proven more successful than having a new reader each day / week (as with the original reading groups).

I would like to start sending the children out in groups to work on the computers for other activities totally unrelated to the Wiggleworks program. Maybe some Kids Pix work. I think I'll try it next week and see how it goes.

(Debbie, Journal, November)

The use of Wiggleworks, and the ultimate integration of computers into Debbie's lessons had made her look more closely at her actual teaching practice, than she ever had before. Figure 6.2 demonstrates the organisational structure of her classroom when reading was taking place.

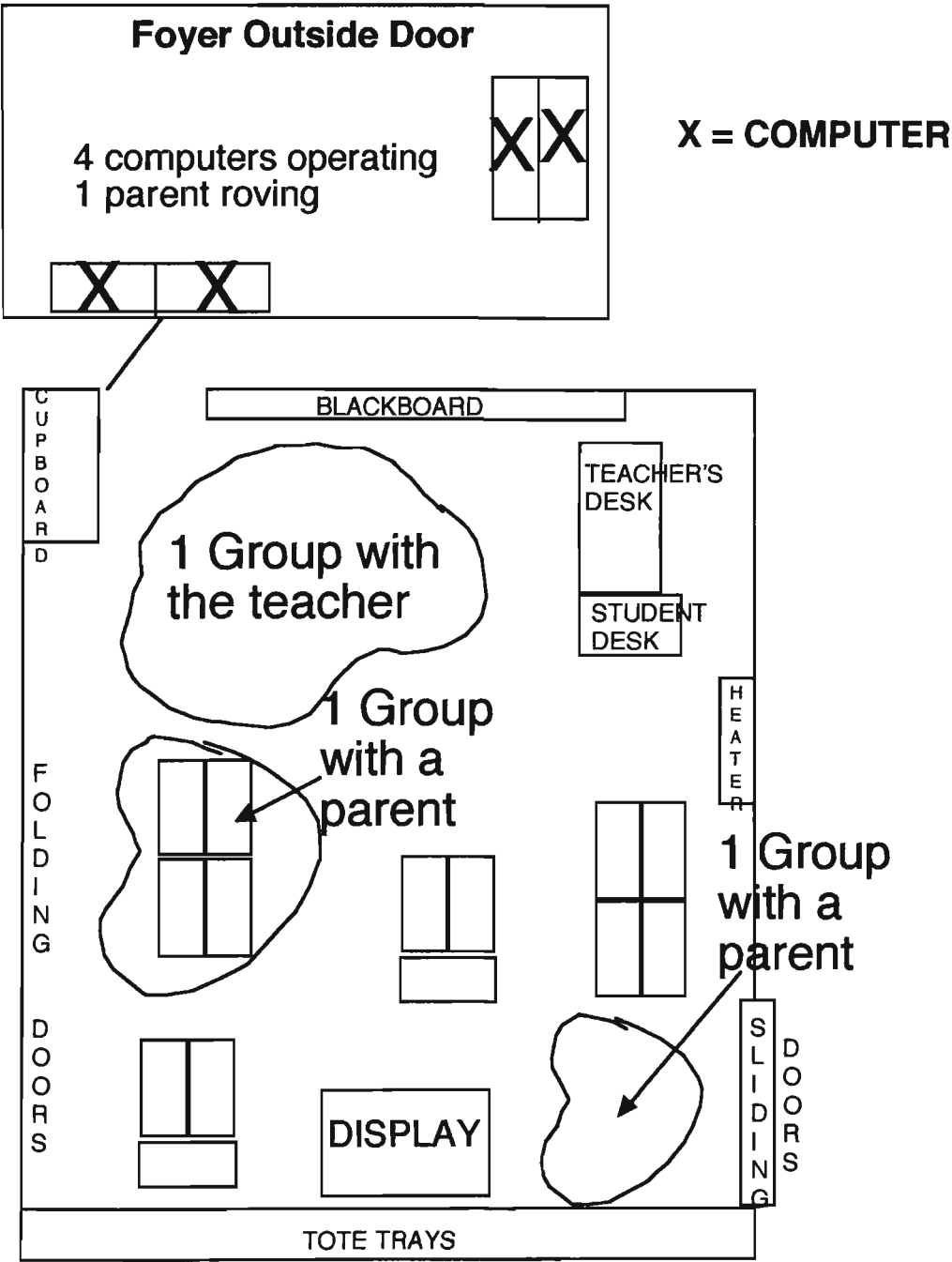


Figure 6.2 Classroom Layout Debbie's Room
Taken From Observation Notes

13/11/97

6.2 Changes in the Learning Environment

Physical Environment

The physical environments in the classrooms in the study had similarities that would be expected in any school in New South Wales. Each of the rooms was approximately seven by eight metres, with enough tables for each of the children in the class (25-30). The two major differences were in Galletea's classroom and Josephine's learning environment. Galletea had a maximum of nine students in a room of the same size, and thus had space for a reading corner and other different activities. Josephine worked predominantly in the computer room. This room was a converted classroom again of the same size as the other rooms, but had a bench that ran around the outside of the classroom in addition to a centre island. This room also had a large screen television hooked up to one of the computers and large whiteboard replacing the regular blackboard. In total there were eighteen computers in the computer room.

Maree, Amber and Debbie each had classrooms that were characterised by clusters of tables which allowed six to ten students in each group and a section of the classroom free for floor activities. This can be seen in Figure 6.2. When the project was under way each of the teachers also utilised a common area in the foyer outside the classrooms that housed four computers. This location was decided on by the teachers in preference to moving the computers from one classroom to another. The feeling was that if the computers had to be moved after each group had used them in their own room, it would cause too much of an inconvenience and they would be left with whoever had them. The problem of sufficient power outlets and movement of tables with classes so young was also raised. Maree expressed concern at the outset that the foyer was not the most optimal spot for her, but agreed that, with a limited resource of four or five computers across the three classes, the foyer was the only workable location.

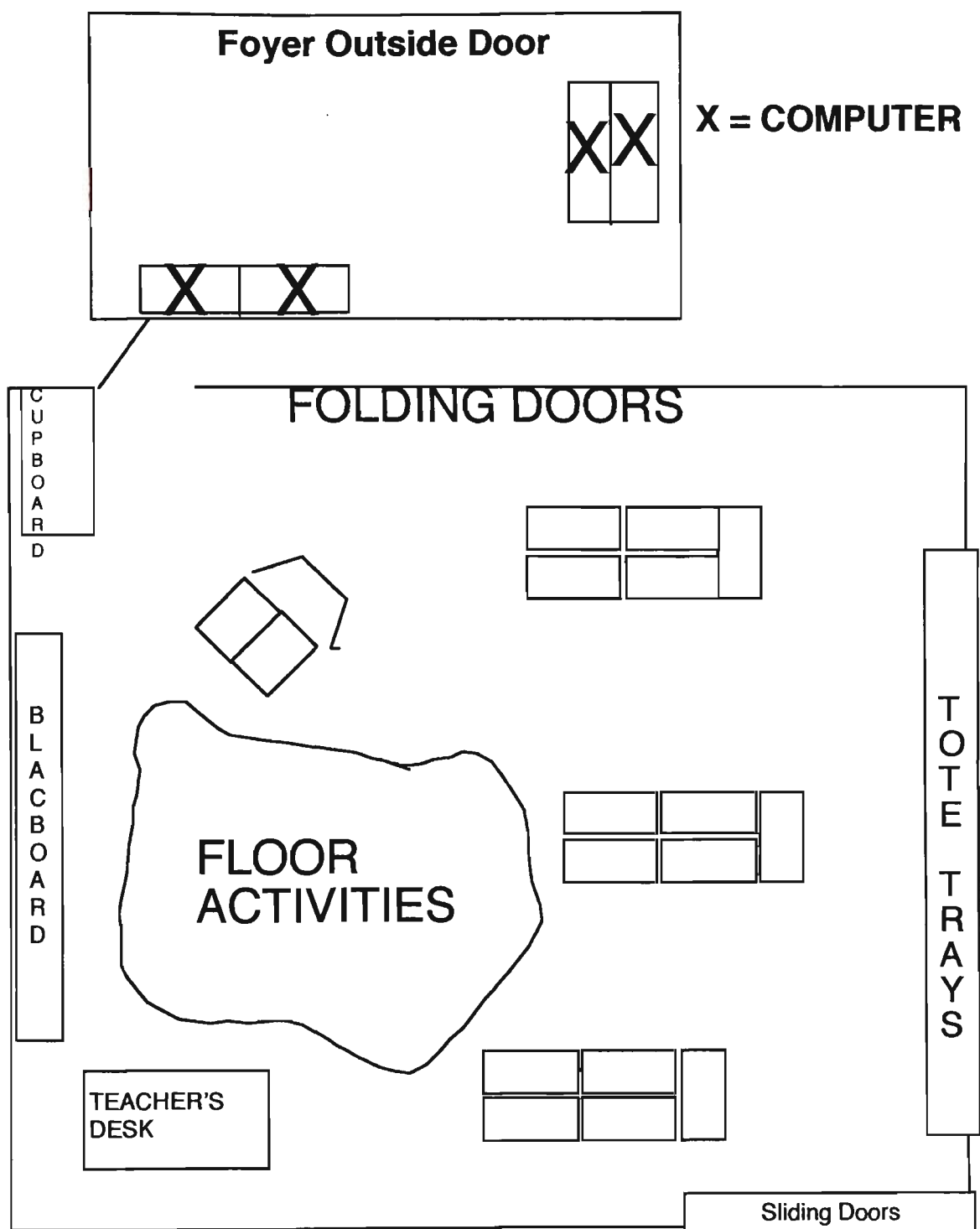


Figure 6.3 *Classroom Layout Maree's Room 30/6/97
Taken From Observation Notes*

For the initial few weeks Debbie did not use the computers in the foyer and kept one computer in her room. My first observation in Galletea's room showed a

“warm” classroom - but with an obvious lack of computer usage. This was very evident as the computers were still in their boxes at the back of the room.

The learning environment in each of the classrooms looked vibrant and was filled with students’ work hanging from the roof and walls. This was with the exception of the computer room, where Josephine conducted most of her classes. By half-way through the year, this area still looked rather bare and unattractive. In her defence, having a number of different classes for an hour at a time did not allow for sufficient continuity for activities such as art, which generally increase the aesthetic appeal of classrooms.

Classroom Climate

Galletea noted a great change in the climate of her classroom. She believed that it would be more noticeable in her room than in a mainstream class because of the nature of the students she taught. Whilst powerful data was collected to support this, changes in class climate were noted in most rooms.

After our October interview Galletea was sure that the class climate had changed. Students were more independent and willing to talk and share ideas with their peers.

A similar scene could be found in Debbie’s classroom: enthusiastic children, a little “flighty”, a little “off task”, but on the whole keen to learn. Positive reinforcement was given at all times. A phrase taken from Debbie’s program summed up both classrooms. Each teacher had successfully created “an accepting, non-threatening classroom environment”.

Galletea's classroom at the start of the project, to use her own words, was "fairly regimented". These children with special needs, "needed a certain amount of structure". As this change was taking place Galletea was able to analyse possible reasons for it. One of the major differences was that children now had skills that allowed them to work with some independence on the computer. Galletea claimed that this had a spin-off effect that made her more relaxed in letting the children take some degree of control of their own learning.

Early in the study Josephine's learning environment was not as "warm". Children did not interact with warmth or care towards each other and most of Josephine's lessons required passive responses from the children. The bulk of each lesson was spent as a whole group watching the big screen television, or working on discrete word processing skills. This changed when Josephine moved onto storyboarding using KidPix with each of the classes. The room was then characterised by active students working by themselves or in pairs at computer terminals. Gone were the long sessions on the floor. Josephine moved around the room, helping students individually and occasionally stopping the whole group if a problem appeared to be widespread. I began to note that children who earlier in the year spent time teasing others were now actually helping each other.

Maree's classroom was warm and conducive to learning. These children were academically more capable than any of the other students in the study. One of the criteria by which they were selected to enter this class was their ability to work independently. Maree's classroom was a joy to walk into and I am sure a joy to teach in. Problems appeared relatively minor but Maree handled issues quietly and quickly and defused any potentially divisive issues.

6.3 Changes in teaching practice when computers were integrated into the teaching/learning environment

Table 6.1 Matrix of Coded Text Units Intersecting at Change and Teaching Practice

| Teachers | May | June | July | August | Sept | Oct | November | December |
|-----------|-----|------|------|--------|------|-----|----------|----------|
| Amber | 0 | 1 | 11 | 0 | 0 | 0 | 0 | 0 |
| Debbie | 0 | 0 | 2 | 0 | 1 | 0 | 4 | 2 |
| Maree | 0 | 3 | 0 | 1 | 0 | 4 | 1 | 4 |
| Josephine | 0 | 0 | 0 | 14 | 5 | 8 | 0 | 7 |
| Galletea | 1 | 0 | 2 | 3 | 0 | 23 | 8 | 14 |

There was a marked change in teaching practice in Galletea’s classroom as she began to integrate the computer more into lessons. Whilst this took a number of months to occur, the change was very noticeable when it took place. This corresponded with a conscious decision by Galletea to change the way that lessons were structured in her classroom and corresponded with the high number of text units coded in the October node, above.

Galletea commented that the change in her classroom took place as she became less of a central figure in her classroom. This supported the view that a successful use of computers for each of the teachers involved in the study corresponded with a reduction in teacher dominance in the learning environment. Teachers such as Josephine and Debbie who were very teacher-oriented with little group work (in the area of literacy), had to modify this aspect of their teaching environment to enable better use of technology in the classroom. If teachers were already using group work the use of the computers in a group allowed the student more control. Students who were typically hard to motivate in the area of literacy in Amber's, Maree's and Debbie’s rooms showed greater involvement in lessons that had a computer component. Some teachers used this to advantage and as the computer usage was only one group activity, non-completion of other off-computer

activities meant the possibility of not being allowed to work on the computer component of the program. While the threat was there, I was not aware of it having to be used at any stage.

In Interview Three, Maree noted that there was a definite change in her role in the classroom when computers were in use.

Yes, my role changed. I roamed a lot more because I was out in the foyer helping the kids out there, I helped children with their independent activities, I heard two children read and then set them to their activity and I was also with the parent, to make sure they were going OK. So instead of doing one job I was actually doing four.

(Maree, Interview 3, December)

In August, Josephine moved to a similar model in the computer room where children worked on tasks independently whilst she "roamed", assisting children as required. This accounted for the increase in text units coded at the node of change in teaching practice. The changes led to fewer behaviour problems for her in the classroom and greater hands-on work for the children.

Observation notes on Amber, in July, also noted that computer usage was incorporated into her reading lessons. These lessons involved computer work at one station within the classroom.

Debbie noted her change in teaching style in her third interview when she conceded that she had not realised how teacher-centred her literacy sessions were. To make meaningful use of the computers at her disposal, she had to move to a group-work model. This model ultimately was successful.

In July, Galletea attempted to have a computer afternoon with one computer per child. While this allowed for lots of hands-on it dealt with computers in isolation. This was relatively successful so she booked time in the computer room to supplement class work. By September, Galletea was making noticeable gains in confidence when computers were in her classroom.

The student interaction is really really wonderful. And I feel (that) as I become over the next few weeks more familiar with the programs and can introduce it on a curriculum level in a stronger way ... The learning outcomes will change in my classroom.

(Galletea, Interview 2, October)

6.4 Teacher Attitude Towards Computers and Related Technologies

Almost all of the participants had a positive attitude towards the use of computers in their classrooms. This could be attributed to their conscious move to volunteer to be involved in the study. Another factor that appeared to be a positive influence was their direct input into their professional development plan; a plan that was collaboratively designed to meet their expressed needs.

Maree was the only participant who demonstrated some reticence to begin with. She was quite definite in her belief that she had to see the value of computer use through improvements in student learning. Once she believed she had seen this the integration of the computer into her classroom came quickly.

All teachers by the end of the project had integrated the computer into their regular classroom practice. Their positive feelings towards the use of computers was being fuelled by factors including the enthusiasm that it generated in their students.

6.5 Student-Teacher and Student-Student Interactions in Classroom Activities

Student-Teacher Interaction

A growing independence in students was evident across all classes. This included the entire range, from students with learning disabilities to those in the extension class. The most notable changes were in students from Galletea's classroom and when Josephine had time with the I.M. class. Not only was there an increase in student skills but also a change in how they interacted with the teacher and peers.

In Interview Three Galletea stated:

But now they can and they run to me and say "look, look at this".

(Galletea, Interview 3, December)

Amber used the term "facilitator" to describe her changing interaction with the students in her classroom. She moved from the role of teacher to facilitator depending on the needs of each of her students at any one time.

Debbie used the same term to describe her role. The movement from teacher-centred to facilitator was not a hard one according to Debbie. In Interview Three she commented:

It actually wasn't that difficult ... When I saw the kids their response to it and their motivation every morning when we started the program it didn't take long for me to trust that they were out there doing the right thing. I had a look at what they were doing, some of their work some of their writing and reading and they were doing exactly what I was hoping they would do.

(Debbie, Interview 3, December)

Galletea's initial hopes for a loosening up of her regimented routine bore a great resemblance to what took place in her room.

Well this is what I am looking for. Because I have talked about all this structure and it sort of regimented kind of routine, I'm hoping that if I have knowledge of computers and my children do, then it will free up, a sort of loosening of my of role as the teacher ... the kids will feel a little freer. They won't sort of freak out and that they will just become more independent and ... a more democratic type of learning and teaching taking place.

(Galletea, Interview 1, May)

Whilst Galletea used group work in her classroom, it was not the same as in a mainstream classroom. The group work that took place was not groups of children working on set-station type tasks, but was small-group teaching by the teacher and/or another teacher or teacher's aide. All lessons were characterised by teacher dominance. The children in this class had "Individual Education Programs" (I.E.P.) that required close monitoring and evaluation.

By Interview Two, "facilitate" was a term that Josephine was using to describe her role in the computer room. However, it was evident in Interview Three, that Josephine had not attempted a similar model when teaching lessons outside the computer room.

Glen: If you had to reflect on your teaching style, tell me what role did you take on when you were in the computer room compared to out of the computer room?

Josephine: In the classroom I was back to full-on teaching and giving one instruction, getting them to do it, then stopping, then another instruction ... They were more independent in the computer room with less problems. Whereas, back in the classroom, it was back to full-on teacher, being dependent on the teacher and any unstructured lessons in those classrooms were a waste of time.

(Josephine, Interview 3, December)

Student-Student Interaction

Data documenting a change in student-student interaction was collected in almost all classrooms. Galletea's class showed the greatest differences over the duration of the project. In her journal she spoke of classroom climate and the changing student-student interaction in her room and responded to my written notes.

Galletea: Classroom climate has changed - much more sharing and watching others use computer - more student interaction with each other. They don't need me. They discuss, assist and laugh lots more with each other. Their interaction with each other is far greater and much more relaxed. Different buddy groups have emerged because of this interaction.

Glen: Is this a regular goal for special-needs children, or just an added bonus of computer use?

Galletea: Always a goal for Special Ed. This can be difficult for these children to achieve ... So far learning outcomes may not have changed - but classroom climate and student interaction have - and as this is only the beginning, hopefully as we move further along the technology pathway as a class, learning outcomes will change ... there has been a lot more verbal interaction between the children themselves. Whereas when I had run a very structured classroom, I created a lot of the opportunities a lot of the time for verbal interaction.

(Galletea, Journal, December)

Amber recognised the need for more co-operative team work in her classroom to maximise the benefits of computer use in the room after completing some reading and viewing video footage as part of her training and development program. My observations in May noted that group work was already in use in her literacy sessions. Her view of more co-operative work was to refine students' skills in these groups and improve their ability to work more independently and interact with each other in an educational setting.

Josephine, in May, stated in her journal:

Children in Class 2/3 are introduced to Claris Works. They found this difficult as previously they had only used interactive storybooks and Kids Pix Studio. They were asked to type in a story in pairs. Children are still having difficulty working pairs. Instead of working on a story together they did separate ones.

(Josephine, Journal, May)

My observation notes from this time recorded that lessons typically included a session of being seated in front of the big screen television while Josephine showed the class some component of the Claris Works program, and then the children moved to the computers. The students possessed very few of the necessary skills to independently complete the tasks given. In addition, they did not appear motivated. Their interaction with each other was quite negative with little assistance given to each other and a greater wish to work on their own. Josephine's journal noted:

Watching the children carry out the structured instructions enables me to see which children are struggling and which ones have become independent.

The children who are struggling can be paired with a child who isn't so they can have some peer tutoring. The children seem quite good at this and accept it quite well.

(Josephine, Journal, May)

In August and September a change in interaction between the students was recorded in my observation notes. Students were no longer insular in their work.

Students walk from computer to computer at times to help others.....A number of students move from their computer to another to help someone who is stuck with a problem.

(Josephine, Observation Notes, August and September)

This development appeared once there was a change in the way that Josephine structured her lessons. By providing an opportunity for these children to interact in a meaningful and interesting way the students responded "in kind". Different children in the class also proved to have higher skill levels, using the computer,

than those who excelled on pen-and-paper work. Children such as Tom were now in demand by others. His self-esteem and confidence grew.

Furthermore in November, I recorded:

Tom is helping Stephen working at his computer. Tom and Stephen discuss task and the sequence of completing the screen - picture first / writing first. Alan goes and asks Tom for help. Tom comes across to assist him draw a circle.

(Josephine, Observation Notes, November)

There was an obvious change in the interaction between the children. This was the I.M. class at the school and, like Galletea's classroom, achieving positive interaction and peers working together was at times a difficult task. The use of the computers and appropriate software coupled with a meaningful curriculum based activity had the students moving to a new level.

Maree's classroom showed positive interaction between students from the first day of observations. Group work was in operation in literacy sessions that I viewed before the introduction of the Wiggleworks program. The use of computers in the classroom appeared to provide simply another avenue or opportunity for the students to interact with each other.

6.6 The Use of Computer Technology to Achieve Curriculum Outcomes

Debbie, Maree and Amber used the Wiggleworks Program as their major resource for the teaching of reading. This meant that there was an increase in computer usage that was related directly to the achievement of curriculum outcomes. As was noted in the teachers' programs, all outcomes in the area of reading were being achieved through the use of Wiggleworks and associated activities. Wiggleworks provided on-and-off computer tasks for the students. Each teacher structured her lessons in the same way, with rotating workstations. Where possible, parent helpers, support teachers and teacher's aides assisted the supervision of these groups.

Josephine's first direct use of computers to achieve curriculum outcomes came in August when I noted in her program that she was using the English syllabus to plan her lessons in the computer room. This was a change from the computing angle that she had previously taken.

It was this change that corresponded with the other changes in her classroom. There was an improvement in student behaviour, increased student interaction and generally a more positive atmosphere in the classroom. Josephine now appeared to be more focused and had set goals for what she wanted to achieve with the children.

6.7 Changes in Teacher Programming of Lessons and Units Throughout the Study

The introduction of computers into Maree's and Amber's lessons saw little change in programming. When I viewed their programs I noted that the use of computers was listed as a component of each. The use of the computers and the Wiggleworks program was part of a rotational group idea for reading that was taking place in their classrooms. Group work in Literacy was already taking place in their rooms before the study was started.

Debbie's program showed some more fundamental changes. This reflected the fact that she was now teaching reading in a different way. In Interview Three she stated:

As part of that day that I was programming, we set up a learning booklet for the kids to understand what the screens of Wiggleworks were about.

(Debbie, Interview 3, December)

This booklet became an important component in the way that one of the rotational groups worked in Debbie's room. Her program now reflected this new way of structuring her reading lessons.

There was little evidence of change in programming in Galletea's classroom apart from the move to a more obvious curriculum focus late in the year. Early computer usage involved computers in isolation and independent computer skills. By December there had been the shift to a curriculum focus with the computer acting as a resource to enable the lessons to take place.

Like Galletea, Josephine's major change was in a move to a greater curriculum focus. For Josephine this was reflected in her program by August (Term Three). She had a new perspective on her work in the computer room and was now directing her work towards English outcomes and not computer skills which she wished the students to attain. These skills were still listed in her program but were as a result of the work that the children were completing. The focus changed not only for the children but also for Josephine.

6.8 Professional Development

Effective Formal Professional Development

Each of the teachers involved in the study worked on her own collaboratively-designed training and development program. These plans were negotiated with me and as facilitator, it became my role to assist the teacher to achieve the goals that were set. This involved direct assistance and assistance from others involved in the project. Jointly, with each teacher, my role was also to monitor these plans to ensure the teacher's needs were being met.

As previously mentioned, three of the teachers looked specifically at the implementation of Wiggleworks into their reading programs. Debbie was very clear in her belief about the relative benefits of the program. This was clear during the timetabled visits that I had to her classroom to observe and assist.

In Interview Three, I questioned her as to the worth of Wiggleworks and she stated:

It has been far more successful this term, because I've had a chance to actually program properly and organise each activity for each week. Having a day off to do that was just brilliant. Prior to that it was very difficult to set up. Each group now has an area of Wiggleworks that they work on.

(Debbie, Interview 3, December)

Earlier in the year, Debbie was struggling to get started with Wiggleworks in the classroom, noting other pressures, and lack of time. Using some of the teacher relief that I had at my disposal meant that I was able to offer her the opportunity to be off class for one day to set herself up. This worked perfectly, with Debbie being much happier in herself and almost instantly putting the program into practice.

In November she noted in her journal *"I now look forward to Glen's observation visits rather than dread them!"* This reflected her new-found confidence in her ability to integrate computers into her classroom practice, and was a positive statement about the function of these visits as part of her professional development program.

In December, Galletea also spoke of the worth of my regular visits to the classroom. Her only criticism was that she would have liked it weekly instead of fortnightly. She believed that this would be the case for most teachers who had little experience in computer usage.

The function of a personal journal was commended by all participants. Galletea stated:

Oh absolutely. Yes, it really made me think about what was happening, what my needs were, where I was going - a pivotal part of the program for me.

(Galletea, Interview 3 December)

Josephine was supportive of its use when we spoke of it in Interview Three:

It was like a written conversation between us, but, it was good to be able get down on paper what had happened. Obviously I wasn't doing it every week, and then to sit down and think about what had happened over the last few weeks and get it down on paper it was really good, because then I'd think well I've done all that but I've forgotten to do this. Sometimes you just don't remember whether you've done everything you wanted to do. So it was good to get it down on paper and then think, did that one really work or didn't it?

(Josephine, Interview 3, December)

Maree provided her support for the journal and made comment on its function in enabling reflection on where each person had started and her progress.

Yes, it made me reflect. When I sat down to write, I realised I was doing more on the computer than I actually realised.

(Maree, Interview 3, December)

This was a commonality across each of the participants during the project. They all believed that they needed to do more. Things were not moving quickly enough. The journal was of great benefit here as it allowed them to "take stock", to look at how far they had come. The journal appeared to put many of them at ease.

In her journal toward the end of the project Galletea wrote of the importance of her personal development program and the focus that this gave her throughout the year. Her final summary comments were:

Overall, my year with Glen's program has been a great success. I have gone from computer illiteracy to some degree of being computer literate. My aide, Sarah Cousins is now a 'whizz', and she was almost too scared to even turn them on at the start. But the greatest triumph is the kids. Nine students, all with disabilities are using the computers with ease. Some have more expertise than myself. They show confidence with their knowledge. They are not afraid to experiment and they readily ask for assistance - from each other and myself and Sarah Cousins. It is a joy to see them (and myself) using the computers across the KLA's - I now may be teaching a group of five and the remaining children will work on a program on the computers. I can give instructions and away they go ... The overall change in the dynamics of this classroom has been significant. There has been growth for us all.

(Galletea, Journal, December)

Ineffective Formal Professional Development

With the exception of Josephine, to some degree, each of the participants had not been involved in the widespread use of computers in their classroom. The use of curriculum documentation as a form of professional development for this group was poorly received. Formal, traditional professional development such as staff development days and short inservice courses were not effective for most of the participants in the study. The majority had experienced negative feelings toward such activities.

Effective Informal Professional Development

"Teacher talk" and an environment in which each individual was struggling with similar issues (and was willing to share successes and failures) were integral issues raised by participants. In one foyer we had three teachers each grappling with the integration of computers in their classroom of children in Years 1-3.

Maree encapsulated what I had seen develop throughout the study.

Yes, we all seem as confused as each other, which is good. Amber and Debbie and I were getting together more and more trying to figure out Wiggleworks. Having three of us working together in the one foyer on the one project is really helpful because we are swapping ideas.

(Maree, Interview 3, December)

The collegial spirit was not confined to this group but pervaded the school. Participants in the project also spoke of ideas and help they had sought and received from administrative staff as well as teachers.

Having a mentor or trusted person near by at all times, to ask small questions and assist before issues became too big, was important. Maree stated:

Having Josephine doing what she is doing helping with the computers was really, really good because it's good to be able to call on her when you're not available. So I think the program has helped her as well as us.

(Maree, Interview 2, October)

Amber agreed, stating:

As far as me learning things, I sort of...It's sort of been good having Josephine floating around in the morning to say quick what is wrong here. It's also with the secretaries having some time with them, getting them to go through columns for assessment books and whatever. That's been really good. Being able to ask people quick questions while you are sort of in the middle of something as they walk past has been good.

(Amber, Interview 2, October)

Whilst most participants used Josephine and me as a type of mentor, Josephine generally used me as her "lifeline".

"Being able to send someone, "Glen I need you up here in five minutes. Come fix it or something." I think that is really important, I think it's important especially for a lot of the teachers who aren't as computer literate. If something goes wrong. They just sort of freak."

(Josephine, Interview 3, December)

Debbie also found help from staff not directly involved in the study.

Just sitting in the photocopy room doing your work during release time... other teachers might say I tried this ... or you might see some work that their kids have produced. You might say, well how did you do that? And then they explain the process they have gone through. Like storyboarding on the computer - is one that I really want to try. Just from seeing what other kids have produced on the computers in their rooms.

(Debbie, Interview 3, December)

Debbie’s increased confidence led to seeking out assistance and branching out not just in the area of classroom uses of computers but also in the area of administration. In her journal she wrote:

After sneakily watching some of the staff and ladies in our stencil room using Claris Works and seeing some of the stencils they were producing, I finally plucked up the courage to ask one of them to help with a permission note I wanted to type and send home. Well! That was it! Once I discovered how to manipulate the mouse and the cursor, I was hooked. I started to use the photocopy room computers a little more and to experiment a bit, (always within the safe confines of Claris Works) but it was certainly a start.

(Debbie, Journal, August)

Ineffective Informal Professional Development

No significant data was coded in relation to ineffective informal professional development.

6.9 Personal Skills

Table 6.2 Matrix of Coded Text Units Intersecting at Change and Personal Skills

| Teachers | June | July | August | September | October | November | December |
|-----------|------|------|--------|-----------|---------|----------|----------|
| Amber | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Debbie | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Maree | 0 | 1 | 4 | 0 | 2 | 9 | 1 |
| Josephine | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gallettea | 0 | 0 | 0 | 0 | 0 | 0 | 2 |

Development in the teachers' personal skills using computers was evident throughout the project. Some individuals demonstrated minimal improvement in their own skills, whilst they facilitated the use of computers by the children in their classrooms. Others felt the necessity to improve their own skills before increasing student access.

Maree was one of the teachers who showed little inclination to improve her own skills, at the same time beginning to integrate the use of computers into her lessons. The first change in Maree's classroom practice became evident in Term Two when her program reflected that the use of Wiggleworks was going to take place in one of her reading groups. She had earlier in the year been attempting to use the computers solely for the word processing of children's writing. During her second interview she stated:

I started using them more and more and I'm still not real comfortable with them. I tried word processing and I became frustrated with it and ended up doing it for the kids. They were far too slow, but that's my fault because they don't have the skills to do it quickly. So it's sort of a catch 22.

(Maree, Interview 2, October)

Maree acknowledged in her third interview that her skills in using the Wiggleworks program and basic trouble-shooting had shown improvement.

Yes, I became a quick-fix-it computer person, which was a pain in the neck. Yes, my role changed.

(Maree, Interview 3, December)

It was evident in work samples collected that Maree had begun to use the computer to assist in the presentation of work that was placed in the student portfolios. These portfolios were examples of students' work that were sent home at specific times through the year. This accounted for the nine text units that were

coded in NUDIST during November. The matrix does show regular coded text units across the year for Maree. This is a little deceiving with fifteen of the coded pieces of data relating to student work samples collected at specific times. Maree's development in skills was happening slowly and not obviously in day-to-day lessons, but was obvious in her lesson and assessment preparation.

Galletea, like Maree, was slow to show improvement in personal skills but did set up a learning environment that was conducive to computer usage for the children. As the year progressed and she saw worth in computer usage, she began to try some different things. In August my observation notes recorded:

Galletea has a computer next to her group.

Paddlepop stick activity on floor is now replicated on the screen in the program "The Computer Classroom" by Nightingale.

Each student works on a number sentence at the computers.

Perhaps level may be a bit difficult.

Galletea is having to help a lot (BUT it is the first time they have used it)

Lenny handled it very well with little problems.

Perhaps not too difficult. I'll bow to Galletea's professional judgement of what they can do and at what level.

Students spent about 10 minutes out of a 45 minute lesson at the computer.

(Galletea, Observation Notes, August)

As can be seen in the matrix regarding a change in personal skills, there was little change in this area for Debbie. Whilst she did provide a learning environment which incorporated computer usage, her own skills appeared to improve marginally as her confidence grew.

6.10 Stress and Pressures in Teaching

Each of the teachers spoke of stress and pressure at school and home as reasons that inhibited their trialing of computer-based activities with their class. Whenever the teachers were put under pressure, early in the project, computer usage stopped.

I questioned Maree in Term Two, as to why she had stopped integrating the computer into her Literacy lessons.

Production - total stress out with Production. I'd like them to do something on the computer for our Assessment Folders. I haven't figured that out yet, but I will try to link that in with their reading as well.

(Maree, Interview 2, October)

In August, Galletea wrote in her journal similar sentiments.

Back at school, however, hardly any time available to use the computer. Education Week in Week 10 and our class must prepare an item for the Primary School Production. This is, more time consuming for my children than the mainstream classes - each dance step, each movement takes hours of teaching.

(Galletea, Journal, August)

Josephine's generally positive attitude disappeared when she was also under pressure. A break-in in the computer room, and the theft of the video players, meant time was running out for her and the children to transfer the storyboarding from computer to video.

They now have to start from scratch. One of my goals for professional development is to minimise the problems in the computer room, yet, just as we seem to alleviate one problem another occurs. As a teacher this is very stressful, as deadlines for assessments are getting closer. I am starting to feel that it is all too much hard work and that I shouldn't have bothered.

(Josephine, Journal, October)

Galletea followed up the issue of lack of time to effectively trial and integrate new ideas in our second interview:

Well it has been very exciting so far. I feel as if I haven't moved as quickly as I would have liked. Lots and lots of things ... I have been sick. We have had Production and where as with a mainstream class to teach them an item might take three weeks it takes six or seven weeks and a great chunk out of my day ... Not enough time ... not enough time, for attending the little inservices that have been run. And not enough time in my classroom to really concentrate. But I am hoping this term will be different.

(Galletea, Interview 2, October)

Time was an issue from early in the project for Galletea. As early as June she wrote in her journal:

I never seem to have enough time to sit down and go through programs on my own. My biggest problem right now is TIME - NOT ENOUGH OF IT - and NOT ENOUGH SOFTWARE.

(Galletea, Journal, June)

Later in the year she appeared to find the answer in possible computer usage at home to become more familiar with software and the general workings of the computer.

Still not enough time for Sarah Cousins and self to go through programs - you really need a computer at home. Oh to live in Singapore - the government provide all teachers over there with a computer at home!!

(Galletea, Journal, September)

6.11 Changes in Organisation

As the teachers built up collegial support some changes in organisation were noted. Debbie had attempted to integrate the computers into her classroom in the area of Literacy using Wiggleworks. This was attempted using one computer with her class and a degree of whole-class instruction. The other two teachers in the

study, Amber and Maree, pooled their resource of computers and looked at staggering reading times. By July Amber had abandoned her first model and modified her organisational structure to fit in with the other teachers. This corresponded with an effort to bring more group work into her Literacy sessions.

In Interview Two, Galletea spoke of the changes in structure in her classroom. This was a major task, as a number of her “special needs” children did not respond well to change. Galletea tried to minimise difficulties by reflecting the change in structure in the class timetable that was written daily on the board.

As the project gained impetus, it was interesting to note that teachers began to experiment with different modes to integrate computer use. Galletea began to utilise the computer room with her class and also tried some specialist computer afternoons in her room. In June, Maree even began to try her class in the computer room in addition to the work that she was completing in her classroom.

First day with computer in room. Not very organised as we had a visiting excursion to school. Worked well - children busy - CD Grandma & Me, non-CD Kid Pix. Children swapped over well with Spelling Activities.

(Maree, Journal, June)

It was interesting to note that Maree utilised a type of rotating group idea even when in the computer room. Her journal noted that as some children worked on computer others worked on spelling activities. These groups then swapped.

6.12 Skills Required by Students

There was data collected from each of the classrooms to suggest that students needed certain basic computer skills before they were able to use computers in a group work situation that involved some degree of independence.

Amber noted in her journal an obvious improvement in children's skills by August. In July, I recorded in my observation notes that some of the students were struggling with issues of one child dominating when they worked in pairs.

Debbie commented on the teaching of some specific skills to the children in her third interview.

The whole class input - I think that just saved time for us, doing it all at once.

(Debbie, Interview 3, December)

In August Debbie noted that the children had picked up the necessary skills quite quickly.

My concern that the kids would not use the program properly or manage independently quickly disappeared when I saw how competent they were.

(Debbie, Journal, August)

6.13 Wiggleworks Usage

The best way to describe Wiggleworks, its introduction in the study and its relative worth to students is to read excerpts from Debbie's journal. She wrote:

**August*

Enter Wiggleworks - a comprehensive reading program-incorporating C.D's, books and tapes. A sales representative showed us briefly during one lunch time what the children could do with the program and a teaching colleague and I agreed that our students could benefit greatly from it ...

In our foyer, 3 out of the 4 teachers were involved and we had 5 computers to play around with.

Some children spend much of their time using the "My Book" option which involved colouring in and while I let it go for the first two weeks, after being told to choose the "Read Aloud", "Read", and "Write" options first, the children were guiding themselves and often doing their own troubleshooting.

Students working independently most of the time - troubleshooting by themselves or with peers.

**October*

Finally Wiggle Works is up and running the way I always imagined it would be.

(Debbie, Journal, August and October)

After setting up her reading groups and settling on her organisational strategies she wrote:

**October*

This is the first time I have felt completely positive about the program and its success... It is quite pleasing to note that, of the 4 groups, the computer group is the one which is able to run independently, without supervision, every morning. Even those few students, who have the potential to cause disruption during other reading activities supervised by parents, are sensible and completely trustworthy during their computer time.

**November*

Granted, preparation of the other activities for each new book is time consuming and must be ready prior to the lessons for them to work well, but the extra time spent is truly worth it when the program runs so well.

(Debbie, Journal, October and November)

Maree was also impressed with Wiggleworks but had some reservations. In her journal in December, she listed two of the negatives of the program as its expense to purchase and its time consuming initial set up.

She elaborated further by writing:

Teachers will need about one hour to set up class lists etc. initially. Some time, about half an hour every six weeks or so to gather information on what the children are doing.

(Maree, Journal, December)

Maree was also concerned that the program had limited use for her Year Two and Three students. As they became more independent readers the level of the text was too easy and not at their instructional level. Wiggeworks was working well in her room for Year One and early Year Two students.

Debbie mentioned similar problems in her third interview, when she spoke of the fact that it was most beneficial for her Year One students this year but would have questionable application to her Year Two/Three next year. Depending upon individual children's reading levels, the content level of the stories would be too easy for some Year Two students, but at the right level for some struggling readers in Year Three. Debbie claimed it would be something that had to be assessed depending upon student reading levels.

Debbie provided more in-depth information about the structure of her classroom, her teaching routines and ways to implement Wiggeworks successfully in the classroom during her third interview.

I think that it has been really beneficial to Year One, but mainly just for the sake that the kids have been using the computers and have been really into that and very much enjoying what they're doing. And it has been far more successful this term, because I've had a chance to actually program properly and organise each activity for each week.. Prior to that it was very difficult to set up. Each group now has an area of Wiggleworks that they work on. For example, one group will work with small readers with me on guided reading. Another group will work with the listening post with the small readers and will listen to the story being read, which has been very successful, ... and they set that up totally by themselves and work independently. The other group do the sound stencil related to our literacy for that week and the other group, of course, work on the computers ... We have a set pattern. As part of that day that I was programming, we set up a learning booklet for the kids to understand what the screens of Wiggleworks were about ... which buttons to press and the order of the things that I wanted them to do - so it wasn't just go out to the computer and do whatever you feel like. They had a set book to read and they had to go through the process of the read button, read aloud and then they had to do writing before they went on to the fun colouring in My Book and the Magnet Board. So they knew that they had to get through reading and writing before they got to do anything else.

(Debbie, Interview 3, December)

Debbie's creation of a Wiggleworks reading program booklet for each child was one of her attempts to make the on-computer activity an independent one. From observations of her lessons, comments in her journal, and responses in her interviews this was successful.

Once Debbie had spent the time to remodel the teaching of reading in her classroom, the Wiggleworks program became much more effective. This remodelling was not only needed to utilise the program in a group-work model but also to make the best use of the limited number of computers that were at the teachers' disposal. The collaborative planning that the teachers completed, the positioning of the computers and the staggering of reading lesson times made this a reading strategy package for the classes involved.

The program Wiggleworks was designed as an Early Literacy Program. To this end it was to be expected that as the student reading skills improved the relevance

of its educational content would decrease. Both Debbie and Maree supported this. Unfortunately Amber was not able to provide input on this point, as she had to leave the project due to starting a family.

Debbie had some other concerns. With an almost total dependence on Wiggleworks for an integrated reading program Debbie stated in her third interview:

I've discovered they (the children) are actually missing a reading strategy. Their fluency tends not to be improving. When I have listened to the Wiggleworks books being read on the screen it is read at a slow pace and often a little bit stilted between words. I've found my kids are really picking up on that and are reading in the same way. So rather than reading how they speak their fluency is quite poor.

(Debbie, Interview 3, December)

This was not evident in Maree's room. However, she was structuring her Literacy sessions slightly differently.

I had four (one, two three, four) four reading groups that during the week the kids moved around to each station - one was Wiggleworks, one was oral reading and questioning with a parent, one was oral reading and questioning with me, and the other group was independent-type activities. Reading activity, spelling activities. That type of thing. They just wanted to get on the computers. I don't know I didn't really put my finger on the pulse. Whether it was pure enjoyment, or the fact that it was a computer or they liked the Wiggleworks program because there were so many varying activities. I really don't know. But I know they just loved working on the computer.

(Maree, Interview 3, December)

Two of Maree's groups were addressing fluency and oral comprehension each session. This may be the reason why lack of fluency in the children's reading was not an issue in her room.

Maree was “trouble shooting” and continually evaluating her reading program and Wiggleworks' relevance to her class. As early as August, I recorded that her teaching program had modifications to cater for differences in children.

The children will be using Wiggleworks independently. They will be working in pairs. Wiggleworks is supplementary to Guided Reading whereby the children 'read books' on the computer. There are many functions on the program, which allow children to engage in a variety of activities including reading, writing, creative expression. Once the Dolphin (4 - top group), have started to read their novel, they will be engaged in on-computer activities to complete and publish activities.

(Notes from Maree's Program, August)

The major issue, which was supported by the teachers and all the students, was that Wiggleworks was motivational and enjoyable. Children could not wait for reading lessons, especially if they were working on the computer. If they weren't on the computer, they made sure all their work was completed to a high standard so they did not miss their chance on another day.

Debbie also commented that she required few if any computer skills to implement the program in the classroom. Maree, who had a slightly more hands-on approach, noted that her computer skills did increase during the project. Even to the extent she became a “quick-fix-it computer person”.

What was consistent across the three rooms was a group work model where the teachers utilised the computers in one of the groups. These groups then rotated during the week giving each child computer access.

With Debbie's children being a little less independent than Maree's students, and Maree's greater experience in running literacy groups in the classroom, Debbie relied very heavily on extra adults in the room to supervise and assist the groups through their activities.

She stated in the third interview:

The unfortunate thing about Wiggleworks was if your extra ...teacher was away, E.S.L./support ... and your parent was away it was very difficult to run with just myself. Due to the fact that two groups could run themselves but the other one couldn't.

(Debbie, Interview 3, December)

The structure of Maree's room, the independence of the children and the type of activities that she designed successfully ran whether there were extra parent helpers or not.

Amber's solution to this problem was to complete some extra lessons focusing specifically on co-operative learning skills. The reliability of parent helpers was not a real issue.

Overall as a program, that was designed for beginner readers, the Wiggleworks program was successful - successful when used as the foundation of an integrated reading program with access to at least four computers for one hour per day. In addition, four copies of each of the CD-ROMs (or as many computers) were needed to assist with grouping of students and ease of programming and tracking of student progress. The readers, big books and audiotapes supplemented the major on computer resource.

6.14 Summary

The journey that each of the five teachers took over the duration of the 1997 school year proved to be relatively successful. Each had set goals that became the focal point of their work throughout the year. Changes in the learning environment, increased teacher and student computer skills, greater student autonomy in the

learning environment, positive student-student interaction and a change in student-teacher interaction typified the classrooms.

Precursor conditions for change including, a wider valuing of work completed and whole-school climate conducive to collegial support and change were evident here. This was a school with a staff that valued each other's expertise and a principal who shared the running of the school with its executive. As the executive staff were empowered, so was each member of the staff. Both experienced and inexperienced members were given negotiated responsibility within and outside of the classroom. Whilst the environment within each classroom was ready for change, the whole school environment supported this process.

At the classroom level, the introduction of computer technology into the learning environment provided rich data across each of the five classrooms. Some of the issues that affected this process included such things as:

- * Years of teaching experience (reflected in developed teaching strategies in the classroom and an understanding of student learning).
- * An individual's pedagogy and a commitment to evaluation and continued improvement of teaching practice.
- * Issues within the learning environment (including school culture and class climate).
- * A classroom and school climate that promoted and supported learning for staff and students.
- * A teacher's involvement in a negotiated development program that met specific identified needs.

- * Engagement in a training and development program that was situated in the participants' own classrooms (with components of computer skill sessions and sessions that directly related to teaching practice).
- * The teacher's initial level of personal computing skills.

The optimal environment appears to operate when both the school level and classroom level environments accept and facilitate the integration of technology.

CHAPTER 7 DISCUSSION

7.1 Introduction

The data collected and analyzed throughout this project and its comparison and contrast to the existing body of knowledge allows for some comment and recommendations towards the enhancement of best practice in this area of study. The introduction of computers into learning environments is a process that has impacted by, and upon, many facets of the learning environment. It has implications for:

- the ways teachers look at best practice in student learning;
- the role of the teacher within the classroom;
- the type of learning environment that is conducive to change; and
- the role and type of professional development that is most likely to be successful.

Following is a summary directly linked to each component of the research questions:

7.2 The Nature of Student Learning

This study encouraged teachers to look at how students learn best and what their role was as an educator in this process. All five teachers were able to articulate to some degree what they believed took place in their classroom and why this was done. This had a direct relationship to their beliefs about the nature of student learning. Schon (1983) claimed that competent practitioners know more about why things are done in certain ways in their classrooms than they are normally able to articulate. This was true of Galletea and Maree who struggled to some extent in the first two interviews to speak in educational terms about what was taking place in their classrooms and why. These two practitioners, the most experienced in the study, took several months to articulate clearly what was evident to others in their classrooms.

The ability of educators to articulate their beliefs is discussed by Davies and Bruning (1992), who claimed, "Experimentation and evaluation also help teachers articulate an explicit teaching philosophy as a framework for their teaching practices" (Davies and Bruning, 11, 1992). This may also explain some of the delay in the teachers' ability to articulate clearly what was taking place in their classrooms.

Some of the less experienced teachers were able to articulate present educational beliefs at an earlier stage in the project, but this was not always supported by what was demonstrated in the classroom. Discussions with these teachers indicated that the issue of pedagogy had been covered in pre-employment interviews only a few years prior to the study.

The introduction of technology into the classroom environment challenged teachers to reassess their beliefs and decide if the use of computers in their lessons was an improvement to their present teaching practice. If they believed it was a resource that would benefit the children, they were then challenged to look directly at their use of this resource to ensure that it was being utilised in the most appropriate way.

Experienced educators took longer to embrace the use of technology in their classrooms, but when they did, its integration appeared seamless. They were educators who were experienced with group work and had a wholistic view of their classroom, the children and the interaction of these. Two of the more inexperienced teachers had some difficulties at the beginning of the study that necessitated a more fundamental change in teaching practice as they integrated the computer into their lessons.

Numerous authors including McNamara, Miles Grant and Davidson Wasser, (1998), Kosakowski, (1998), Yocam and Wilmore (1995) and Schiller (1992) all note a change in teaching practice with the integration of technology. In each of the studies the change was as a direct result of the teacher attempting to make improvements to the learning environment once computers were integrated into the classroom. This change was brought about as the teacher struggled with the best way to utilise this resource effectively in the classroom.

The data and analysis from the study confirms all five teachers at Meadows Primary School experienced a change in their role in the classroom. For experienced educators it was a shift of focus whilst for the more inexperienced, it was a more central change in role.

7.3 The Role of The Teacher

Challenges to Pedagogy

Whilst the movement of technology into their classroom meant little initial change in classroom organisation for most teachers, the data shows there was an ultimate change in the teacher's role for all participants when computers were in use.

Studies by Yocam and Wilmore (1995), support this need for a change in role. They showed that,

perhaps more challenging, however, was getting teachers to think about changing their role in the classroom in order to create a more collaborative, active, student-centred environment.

(Yocam & Wilmore, p5)

Further studies by Ringstaff and Yocam (1995), add support to this notion in showing that one of the most significant changes after the introduction of computers in classrooms was a change in teaching style. This change led to a less

teacher-dominated centralised learning environment to one where students became far more active in the learning process.

Relationship between curriculum and computers

Findings confirm, when technology was introduced into a more traditional setting, changes had to take place in teaching practice before technology was successfully integrated. This included a move to more frequent group work, more independent study and increased responsibility for students.

The introduction of computers into the classrooms supported Ringstaff and Yocam's assertions that "Teachers can go beyond the traditional information delivery mode where they are presenters of ready-made knowledge and become facilitators of students' learning" (Ringstaff and Yocam, 18, 1995).

For one teacher it is argued that technology was the catalyst for change to take place in the classroom. The introduction of technology into her reading groups led to a change in the way reading was taught in her classroom. There was an observable change away from a teacher-dominated environment to one that was more characterised by group work and a degree of independent study. Schiller (1992) reports similar experiences when commenting that the relative success of computer integration is dependent upon teachers restructuring their classroom schedules and practices.

Furthermore according to, research by Tierney and Dwyer:

(Researchers and teachers) also found that the technology itself is a catalyst for change—encouraging fundamentally different forms of interactions among students and between students and teachers, engaging students systematically in higher-order cognitive tasks, and prompting teachers to question old assumptions about instruction and learning.

(Tierney and Dwyer 12, 1995)

Each of the teachers involved in the present study found little assistance from the reading of relevant curriculum documentation in their endeavours to integrate computer usage into their lessons. Findings confirm that, one of the major areas of assistance, in the integration of technology into the classroom, was the support that the participants in the project received from each other as they developed a learning community engaged in similar challenges and successes. In interviews and journal entries all participants mentioned the great value that they placed on assistance from myself, others involved in the project and at times other teachers and ancillary staff throughout the school.

7.4 The Learning Environment

The presence of a positive school culture was noted during this study. This included, the collegiality between the participants and the overriding school culture that supported the sharing of ideas and a quest for improvement and excellence.

Sellars' (1996) work pays special attention to a positive culture being present in a school.

It is by sharing ideas, beliefs, and practices that a culture in which teachers can analyse and reflect on teaching, especially their own teaching is created. This then enables teachers to focus on what enhances learning for students.

(Sellars, 20, 1996).

The ability for teachers to look at their teaching practice and the effect that it had on the students was central to the success of this project.

Gelareh (1993) identified three elements for success when attempting change in a classroom. These elements were "content, context and staff development. The three are interwoven." (Gelareh, p24). The perceived success that was evident in each of the classrooms in the present study reflected an interaction between these elements. It is interesting to note that if the context at the school changed throughout the project, there was a corresponding change in the teachers' integration of computers in their classroom. This was noted here when teachers were under pressure to design and practise an item for the school "Production", (a drama and dance performance), and the innovation (use of computers), was "suspended". If the supportive environment in the school was perceived to not be in place and the work that the teacher was doing was not perceived by the individual of prime importance she temporarily withdrew to previous teaching practice.

This supports the view by Bruning and Davies (1992) who wrote:

the art of staff development is to foster the conditions for change and to maintain them over time ... (and) if we provide the proper opportunities ... (we) create a new school culture together with those with whom they interact.

(Davies and Bruning, p9)

Class Climate

In each of the classrooms there was noted an increase in meaningful student-student interaction when computers were in use in the classroom. This was most evident in classrooms where "special education" students were taught. This was a critical factor for Galletea who had previously constructed artificial situations to initiate interaction between her students. The use of computers in the classroom generated interaction in a real-life manner. Research from Tierney and Dwyer reports:

Dispelling widespread myths, the researchers found that instead of isolating students, access to technology actually encouraged them to collaborate more than in traditional classrooms. And instead of becoming boring with use, technology was even more interesting to students as they began using it for creating and communicating.

(Tierney and Dwyer, 10, 1995)

The changes in interaction in the classrooms in this study reflect those in other research reporting that, "Lines of communication ran between children and computers and between children rather than between the children and teacher" (Dwyer, Ringstaff and Haymore, 6, 1990). Specific instances were noted where children began to seek each others' assistance rather than that of the teacher. Some of the children began to be acknowledged by their peers as "experts" when using particular computer programs.

7.5 The Role of Professional Development in Initiating and Supporting Change

Cardno (1992) stated that the role of professional development was to lead to the "improvement and growth of professional people" (p16). There seems little doubt from the literature reviewed that this and similar views are universally accepted. The school environment is no different from other work places in this.

The specific question in schools is: what happens when computers are brought into the equation? Previously, professional development has had to deal with issues of teaching practice, pedagogy and how to maximise student attainment levels. The use of computers has now led to an additional variable that has added, and is adding, another layer to these issues. It appears that a number of "normal" processes employed for other educational areas are appropriate when computers are involved. However, some other beliefs are challenged by research.

Davies and Bruning (1992) claimed that the challenge for school leaders was to foster conditions for change over an extended period enabling meaningful staff development to take place. This is true in areas involving computer usage in the classroom. However, one of the main differences is that the teachers need to handle change on a number of levels. Firstly their pedagogical views will be challenged. Not only do teachers need to modify current teaching practice, they will also need to come to some basic understanding and personal skill set in the use of the computer. Whilst some teachers in the study did not believe that their own personal computing skills would improve during the project, data collected suggested the opposite. Older teachers who were quite "computer phobic" at the commencement of the study had vastly improved their own computing skills by December when the data collection component of the project was completed.

Data collected eighteen months after the completion of the project further notes improvement in these teachers' computing skills and acknowledgment from their peers has continued. Three of the five participants have taken leading roles in the area of computer education in their new schools or at Meadows Primary School.

Rodriguez and Kruth (2000), citing Fatemi (1999), Office of Technology Assessment (1995), Panel on Educational Technology (1997), claim it is a lack of professional development for technology that has been the major factor that has impeded the computer's full integration into the curriculum.

Data collected and analysed from this study confirms that any successful training and development program to implement computers into classroom practice must deal with the components of a teacher's individual personal skills, as well as issues concerned with the computers integration into classroom practice. Furthermore, this program needs to be negotiated and take place both in the teacher's classroom, and on their own when appropriate. This is dependent upon the content being covered.

Jane (1992) claims that in classrooms with a heavy focus on technology, traditional forms of training and development are not effective. Teachers need instant access to assistance when problems arise; they need to observe and be observed by colleagues; they need to open dialogue with others engaged in similar areas. Further, Jane (1992) reported that teachers need opportunities to also learn outside the classroom environment.

The study undertaken at Meadows Primary School supports and reinforces Jane's (1992) findings. Each of the teachers rated these areas highly in their evaluation of the project. Instant access to assistance was crucial, being in close proximity to others engaged in the project led to participants speaking to each other more often and "feeding" off each other - trying new ideas more readily.

While little support was identified in literature reviewed, all participants here provided data to support the concept of the locating of the target group of teachers within close proximity of each other. This is in contrast to a common method of spreading expertise around a school, providing "experts" in a number of places. Centralising teaching expertise, as here, helped teachers as they struggled with similar concepts and challenges throughout the study. All participants spoke highly of the collegial nature of working in close proximity and the resultant dialogue that became "second nature" due to their physical closeness in the school environment. My role as a participant observer was also seen as crucial. The ability to obtain assistance whenever required, within a timeframe of minutes, was crucial to the successful integration of computers into the learning environment.

Mentoring and the role of the "Expert"

Whilst training and development that involves the use of computers in the classroom have marked similarities to training and development in other educational areas, there are some notable differences. It is argued that data collected from this study indicates that there was a need for "expert" assistance.

This was contrary to Davies' and Bruning's (1992) claim that, "The best staff development is not "experts" teaching "novices", but rather is an ongoing process of shared dialogue among principals, staff developers, and peers" (Davies and Bruning, 4, 1992).

The study at Meadows Primary School, looking specifically at the integration of computers in the learning environment, found corresponding data to a report by Rodriguez and Kruth (2000). They claimed that:

when teachers were trying to use technology in their classrooms and they encountered difficulties, they needed immediate help and support. Technology that is not easily accessed and implemented will not be used. Teachers will return to more traditional ways of teaching if the problems they encounter cannot be solved quickly and efficiently.

(Rodriguez and Knuth, www, 2000).

Data collected from teachers in this study regularly supported the view that, if a "perceived expert" was not at hand and available within a five-minute time period, the "innovation" of using the computer in the classroom would temporarily cease and the teacher would revert back to a traditional role. Mostly, the expert assistance required was purely technical, relating to the use of the computer or the operation of a particular software package. The term "perceived expert" applied to any colleague involved in the project that knew more than the person who was having difficulty. At the commencement of the project this role fell predominantly to me as participant researcher. As the project continued the teachers began to use each other. In particular, Josephine was called if a "quick fix" hardware or software issue arose. Her role as Release-From-Face-To-Face teacher meant she was in and out of classrooms in the foyer, targeted by this project, regularly. She was at these times far easier for the teachers to contact urgently than attempting to contact me.

As the project progressed it was interesting to note that the calls for such assistance decreased. Furthermore, the teachers began to look more to my

observation visits, to work more with the fundamental issues of teaching practice and the integration of computers into mainstream lessons. Galletea and Debbie noted in their journals this growing ease and anticipation of help in these specific structured periods that I spent in their classrooms. Data also indicate that teachers more readily approached each other for assistance. One of the major reasons continually raised was the need for immediacy.

The need for immediacy with technical issues is not confined to the study at Meadows Primary. It resulted in Miles Grant (1996), claiming:

Teachers also need on-site technical support to help them set up, trouble-shoot, and fix the machines. And because "just in time" support with the technology problems that inevitably arise is crucial to the success of a class plan, teachers need to be assured that technical assistance will be provided to them in a thorough and timely way.

(Miles Grant, www, 1996)

Whether this role is covered by a technician (if sufficient budget is available), or a member on staff, its importance cannot be understated. Data collected from this study suggest that such a person would need a solid base in educational practice, as issues also arise there, as well as purely technical matters.

Tierney and Dwyer claimed in a 1995 publication:

We observed that teachers' approach to the use of classroom technology evolves through a few orderly stages: entry, adoption, adaptation, appropriation, and invention. And we found that certain kinds of support help speed that evolution: mentors who are further along in the process, opportunities for reflection, and encouragement to question their beliefs about teaching and learning.

(Tierney and Dwyer, p16)

The development of teachers at Meadows Primary School appears to have been following a similar path to that of Apple's ACOT schools that led to the above comments. In the space of the school year most of the teachers moved to what Tierney and Dwyer would call an "appropriation" stage, with teachers focusing on cooperative or project-based work. This was most notable in Josephine's

classroom where students were creating their own multimedia presentations of story maps. The use of Wiggleworks in three rooms was similar with a focus on co-operative and independent work skills.

7.6 The Relevance of In-school Training and Development

Sellars (1996), Gelareh, (1993) and Davies and Bruning, (1992) claimed that teachers need to own their own professional development. They need to be involved in its design and implementation. Without such "ownership" a lack of commitment can "derail" the process before it has begun.

Research reviewed and data collected in this project, strongly support a commitment to training and development being situated in classrooms. The data here takes us a step further, with teachers requesting that most training and development should take place in their own classroom with their own children.

Tierney and Dwyer (1995) claimed that:

Situated professional development is a powerful agent for change...When teachers see other teachers and students in the day-to-day challenges of real school, they begin to say, "I can do this." So, for example, they are most willing to adopt new ideas about learning and technology when their observation and work is "situated" in real classrooms where students are successfully engaged in the routine use of technology.

(Tierney and Dwyer, p17)

In addition, it is argued, teachers need a "supervised practice" time whereby an "expert" or "mentor" is able to observe lessons taught in the classroom. This would be similar to the participant researcher role that I fulfilled throughout the study at Meadows Primary School. Furthermore, teachers must have access to hardware and software in their normal classroom after training sessions (Yocam & Wilmore, 1995). These ideals were used as part of the basis for the study at Meadows Primary. Data collected during the project supported them. As previously mentioned, the teachers involved here looked forward to lesson observation sessions.

Gelareh (1993), reinforces this in stating that consistent followup and support are critical elements of any training and development program. Such followup can take many forms. Bruning and Davies (1992) wrote of the need for extended dialogue between teachers. In fact, it is this dialogue that is the cornerstone of effective training and development programs.

Tierney and Dwyer (1995) claimed that time for personal reflection was needed for all teachers; time to discuss or write in a personal journal. The journal is the catalyst for them to question their own beliefs and begin the change process. Data from the Meadows Primary School study support this. Participants in their final interview spoke highly of the role of the journal in their journey throughout the year. Josephine and Debbie spoke of the journal being a written conversation. The importance of the journal could not be underplayed as a means for the teacher to reflect on how far she had progressed.

A number of times throughout the year participants were referred to their journal to review how far they had moved through their professional development program. It was obvious that the types of issues they were concerned with at the commencement of the project were vastly different from those at the end of the year. They had moved from issues such as management and organisational problems to issues that demonstrated that individuals were evaluating their teaching practice as they attempted to integrate the computer appropriately into lessons.

7.7 Conclusion

Yocam & Wilmore (1995), found professional development approaches that had the most impact did the following:

- * involved small-group collaborations between teachers;
- * took place in working classrooms;
- * built on teachers' existing knowledge about curriculum and practice;
- * provided opportunities to experiment and reflect on new experiences;
- * provided ongoing support to help implement change and innovation.

Literature reviewed and data collected from this study enhance Yocam and Wilmore's findings. The current research suggests that programs also need to:

- * be twofold, with discrete in-class (situated training and development) and individual training sessions for teachers without their class;
- * be collaboratively designed;
- * be part of a whole school program that focuses on constant improvement and evaluation;
- * take place in a school that has a climate and culture conducive and supportive of change and innovation;
- * be longitudinal with a minimum of one school year;
- * place participants in close proximity to each other to maximise the possibility of the exchange of ideas and the development of support structures.

If the integration of computers into classrooms is to be successful, current practices in professional development in some schools must change. This change must be supported from the highest level with schools being equipped to carry out meaningful change monitored over substantial time periods.

CHAPTER 8 SUMMARY AND RECOMMENDATIONS

8.1 Introduction

There was a great diversity in the teaching experience of each participant involved in this study. In addition, there were a variety of learning environments in which the computers were integrated. Three classes were in the Kindergarten to Year Three section of the school. One was a "special education" class and the last learning environment involved a teacher who taught across a number of classes, in a Release-From-Face-To-Face role within the school. A number of her lessons were conducted in the school computer room.

Data collected in the final round of interviews looked specifically at possible recommendations for any similar study. Each participant was also able to make evaluative comments on the process in which they had been involved over the school year.

8.2 Training and Development Issues

The training and development program that was conducted with each participant was a focal point of the study. Analysis of the data collected facilitated possible recommendations for training and development programs that incorporate the integration of computers into teaching practice. These recommendations can be best described in a series of "best practice" statements, with reference to possible further areas of study.

Training and development programs involving the classroom introduction of computers need to be collaboratively planned and embedded in classroom practice. They must be designed to specifically meet the requirements of individuals, taking into account their stage of development as a classroom

practitioner and their specific computing skills. A mentor or expert needs to be close at hand and available on short notice to provide technical assistance to begin with but, as the program develops, skills development in teaching practice is required. Further studies may look at the duality of this role and if there is a defined change at a specific time in the teacher's development where this "help" role changes from one of predominantly technical assistance to one of assistance with issues of pedagogy.

When dealing with the area of pedagogy, a major component of training and development programs needs to take place in the teacher's classroom, with their class present. This may include demonstration lessons by the mentor or expert, or the observation of lessons taught by the practitioner.

Opportunity for extended dialogue must be provided for teachers. This may include grouping teachers geographically near each other within the school environment to facilitate the opportunities for such discussion. It also relies upon a suitable climate in the school whereby individuals feel safe and at ease confiding in colleagues on to educational matters. A positive school culture or climate appears imperative as a pre-requisite for any change process within the school.

Further study with specific focus on the factor of geographical proximity, may provide further valuable information for educational authorities and school administrators. If such a strategy is successful and does lead to greater innovation, dialogue and increased commitment in the development of a close knit learning team, this information would be valuable to other educators. Further study may also look at the impact that this strategy has on the rest of the school as a whole and what processes may need to be put into place to ensure expertise is eventually spread throughout the school with all teachers and students benefiting.

Other distracting pressures on teachers need to be kept to a minimum or training and development programs need to be designed to take stressful times for staff into account. Whenever staff were placed under stress here the innovation was temporarily ceased and teachers returned to a more traditional role.

8.3 Implications for Teaching and Learning

There are some pre-requisites that teachers need to demonstrate to assist the successful integration of computers into classroom practice. This study highlighted a number of these issues.

One requirement is for the teacher to demonstrate a willingness to release some amount of control to the students in the classroom. All teachers in this study found that there was a change in their role in the classroom when computers were used during lessons. For some teachers this also required a change in organisational structures in their classroom. For others the structures in the room were adequate and only a modification in their role was required.

A detailed knowledge of curriculum is also required by all teachers. In addition, each practitioner must have, or develop, beliefs in how students learn best and what their role as an educator is in this process. These require that teachers evaluate their own classroom practice and where necessary commit to a refinement and modification of teaching practices as they grapple with issues related to computers and related technologies being used in their classroom.

This study provides information from each participant in mainstream classes that a minimum of four computers are required to effectively integrate the computer into reading lessons. It is also proposed, in relation to Wiggeworks, that four copies of each CD-ROM at each level are purchased, to provide sufficient resources within reading groups to maximise student access to appropriate reading material.

Teachers and students noted that learning was "more fun" when computers were introduced into lessons in the classroom. Both were highly motivated in the learning environment. Teachers had also underestimated their students' desire to stay on task when working on the computer. In addition, teachers became more confident in their own abilities as the study progressed. This was not just in the area of specific computer usage or in particular applications, but in the area of educational theory and practice. As they focused on why they were doing things in particular ways, and challenging some of their most cherished beliefs, the teachers grew in confidence.

8.4 Special Education

Data collected in relation to "special education" classrooms had sufficient depth to pose some interesting questions, and challenge some of the ideals of a very experienced and talented teacher.

As the year progressed the teacher was able to give more independence to her students. This was something that happened in mainstream classes but was not expected by the teacher with her students. These students still required the structure of what would be happening during the day but were able to be given some degree of freedom within the lessons.

Further studies with particular emphasis on the "special education" environment may be able to confirm the benefits of computer integration experienced here. Not only was there an increase in specific computer-related skills by the students but there was also an increase in "natural" verbal interaction between students and a variation in buddy or friendship groups within the class.

8.5 Further Study

Whilst this project must be considered as a unique study within a specific school over a specific period in time, issues have been raised which may provide some basis for "best practice" principles related to the training and development required for the integration of computers into Primary school classrooms. Furthermore it has provided a basis for further study in the areas of:

Special Education computer usage and the increase in "natural" verbal interaction between students and a variation in buddy or friendship groups within the class.

The location of specific staff in close proximity to each other to facilitate greater interaction and sharing of expertise among them.

The duality of the role of expert or mentor in assisting teachers with the integration of computers into classroom. Does this role change over time from computer technician to pedagogy expert or is there a need for equal expertise in both at all times?

APPENDIXES

Appendix 1 - Training and Develop Sessions Advertised for All Staff

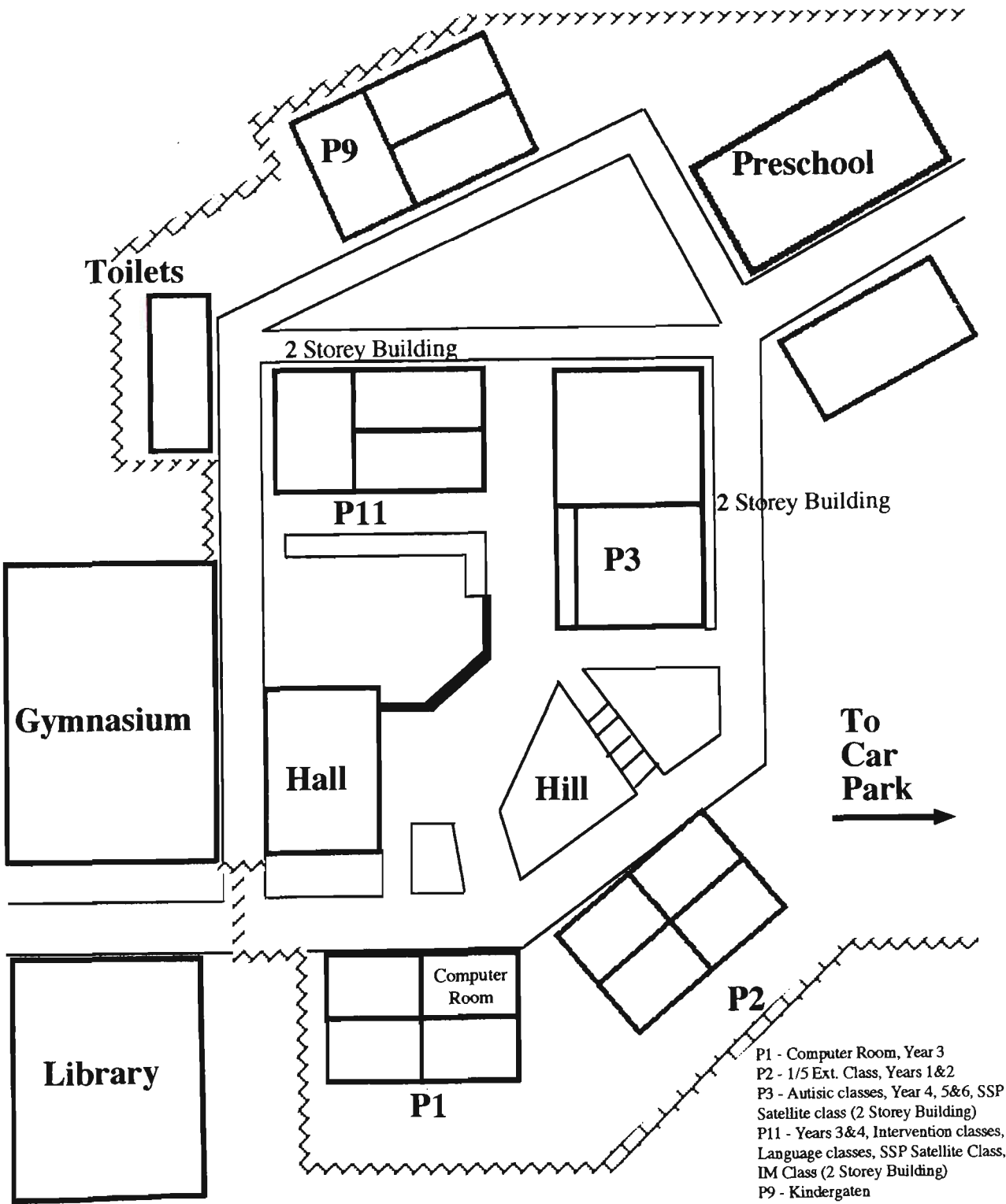
**Meadows Primary School
15 minute Computer Education
Professional Development
Program SessionsTerm 4**

| Week No. | Tuesday Topic | Thursday Topic |
|----------|---|--|
| 1 | How to load programs | How to print & hook up the large TV screen |
| 2 | How to save documents and set up folders | Sharing files |
| 3 | Educational projects on the Internet | How to use the Quicktake Camera |
| 4 | How to start Claris Works Word Processing | How to edit text amd change text characteristics |
| 5 | How to use the spell check and thesaurus | How to start a Claris Works Database |
| 6 | How to start a Claris Works Database | How to start a Claris Works Spreadsheet |
| 7 | How to start a Claris Works Spreadsheet | How to use the scanner |
| 8 | How to dump to video tape | Introduction to creating a Web Page |
| 9 | Creating a Web Page - (Ideas) | Putting a Web Page Together |

*Sessions will run from 3.15 - 3.30pm in the computer room.
Please be prompt.*

Glen Patterson

School Layout



Appendix 3 - Sample Teacher's Journal Entries

Galletea Journal October 16th to December

Thursday 16th October 1997

Had meeting with Glen Wednesday PM, and others on research - he'll come and fix computer. Teacher still away. Still have extra students in class. Nothing happening.

Friday 17th October 1997

No change. Nothing happening. Frustration high.

Monday 20th October 1997

All teachers on deck - no extra students, but my Aide is away and I'm preparing a Mexican dance for my schools Multicultural Day on Wednesday. Every spare moment is spend rehearsing the item.

Glen: Are you meant to get started, or is someone trying to tell you something?!!

Glen came to fix the computer and, voila!! A flick of the switch and it was away laughing - I'd forgotten the computer had an ON/OFF switch at the back. It's a bit like me, On and Off!

We used the computers 2 - 3 pm. Took turns, Living Books again. I have made a booking to use the Primary School Computer Room every Monday from 11.30 til 12.30.

Glen: Another milestone. Look what you said in May.

I hope Josephine or Glen can help Sarah Cousins and I for the first visit next week. I'm very frustrated though - it's always tomorrow, tomorrow, tomorrow. I'm always going to do bigger and greater things tomorrow. Well, after Wednesday and Multicultural Day, maybe we will.

Tuesday 21st October 1997

Computers are out. Still rehearsing for Multicultural Day. Living Books again today - Lost the trash somehow. Somehow found it again. Had my 2nd interview with Glen - have some clear goals for the next few weeks.

Wednesday 22nd October 1997

Multicultural Day at A School for Special Purposes in Sydney's South West. No computers out till 2.00pm. We let the children play. They chose Living Books - The Farm and Phonics 2. No supervision or guidance. Play only.

Thursday 23rd October 1997

Class used computers between recess and lunch. Unstructured - not related to KLA's - Living Books and "fun" software in use.

Friday 24th October 1997

Glen visited classroom - assisted with a more appropriate Maths software - can't remember what it's called. Sarah Cousins and I will check it out with the class next week. Looks extremely promising. Went on an excursion for the rest of the day. Missed out on my hours teacher replacement to write up all this stuff. Such is life!! Hey, the excursion was great!

Glen: Great reading, Gallettea! Keep concentrating on successes and frustrations with technology, and successes and frustrations with the children.

Thursday 30th October 1997

Lunchtime

Well, here we go again. Today we wrote our own stories on the computer using Kid Pix studio. We had the support of Rosie and Tabatha from 1/5Red. They worked with the children and some fine stories produced and printed. Sarah Cousins and I wrote everything down. This afternoon we are hoping to continue without the older students' help. The older students taught our students how to choose:

typewriter - about the space bar; stamps - how to choose, how to make their choice bigger on the page; how to save; how to print.

Children were able to take their stories to our Principal form some positive reinforcement and reading practise. All in all a most positive morning.

PM - Trevor did his story - oh what a circus! Sarah Cousins worked with him and did we meet with lots of bother. Outcome - we learnt that if you use white paint on Kid Pix picture drawing then when you go back to print something, you can't see the words.

3.40pm - we finally sorted it out and clicked the paintbox colours back to black. We had planned to type up and print three lots of stories this afternoon. We only did one!!

Friday 31st October 1997

Continued Kid Pix Studio story writing and drawing pictures with the stamp set. No problems today. All the students apart from Harry have finished their stories/pictures. Looking forward to Monday and using the Computer Room at the Primary School in collaboration with the other" Satellite class - Mrs. Shaw and Mrs. Johnson. This will be interesting, Ha, Ha!!

***November**

Monday 3rd November 1997

Computer Room booked for 11.30 - going with other satellite class from my school. The other classes students have had a lot less exposure to computers than my class. We will have four adults in the room and students.

Excellent - used Kid Pix. Children were adept - it was also a great learning experience for the four adults.

Friday 7th November 1997

We have had a great week. We are using the computers in a much greater way - everyone has written a story and drawn a picture this week. Some frustrations - had to call on Glen, and also the children in his class to help. I can't even remember now why I needed the help. Sarah Cousins and I have decided to keep a book and pen by the computers so we can write down immediately our frustrations and successes. So much happens in one day and we both forget. Glen has given me a Professional Development Program. I am already implementing some of the strategies - we are on track - feel a little frustrated about making an assessment video. Will I have the time- the end of the year is fast approaching and my diary is looking full, full, full.

***December**

End of Year 1997

Well - no video made. Wonderful idea, time ran out on me. Overall, my year with Glen's program has been a great success. I have gone from computer illiteracy to some degree of being computer literate. My Aide, Sarah Cousins is now a 'whizz', and she was almost too scared to even turn them on at the start. But the greatest triumph is the kids. Nine students, all with disabilities are using the computers with ease. Some have more expertise than myself. They show confidence with their knowledge. They are not afraid to experiment and they readily ask for assistance - from each other and myself and Sarah Cousins. It is a joy to see them (and myself) using the computers across the KLA's - I now may be teaching a group of five and the remaining children will work on a program on the computers. I can give instructions and away they go.... The overall change in the dynamics of this classroom has been significant. There has been growth for us all.

REGRETS:

Not enough time - I felt I was well on the way to becoming well educated about computers and their use in the classroom - but would have liked more time with Glen. It would have been great to have Glen in the room for two weeks or so, to enable more across curricula use -to know more about different programs available, and just how to fit it all into our timetable - management of my day and the students.

Never really got into the Training and Development CD that was given out. This was purely a time factor!

End of program - I and the students really needed another six months.

SUMMARY TERM 4 - START

Things I can do:

Open up computer;

Close down;

Living Books - programs;

Kid Pix program - parts of;

Classroom Computers - program;

Write up a note - print it out.

Things I need to do:

Go through Staff Development that Glen gave me;

Attend training and development that takes place twice weekly - talk to my boss from other school who schedules meetings at her school during this time;

Go through a lot more programs in my own time for suitable material;

Frustrations:

Sometimes find it hard - two schools, two bosses, two lots of meetings. My time is never my own to sit down quietly at the computer. I sometimes have meetings PM Monday, Tuesday, Wednesday and Thursday - but like to have drinks on Friday;

Remembering to save children's work - only stories so far - but I've saved none of them. Can't remember how to do it;

Glen: I'll give you run through next week.

Sometimes the computer keeps saying 'Re-insert disk' - such a pain. I takes me ages to fix this up. Must be a shortcut, or I, or the children, must be doing something wrong;

Dragging the computers out of the strong rooms each day and putting away. Boss wont allow them to stay in the classroom because of potential break ins.

Children's Successes:

All can turn the computer on;

All can insert disk;

Call can use Living Books;

All can shut down and remove disk and put disk away;

Some can use sections of Kid Pix.

Glen: Could they do all this before? How did they learn all this and from whom?

Galletea: No one could do this at the start. Sarah Cousins and I taught them.

Long term aims for next ten weeks:

All using Kid Pix;

All using computer room together and other software;

Writing and printing out stories;

Using Computer Classroom Program during Maths;

Using the two computers much much much more during each day;

Visit 1 / 2 Aqua and watch Wiggle Works in action;

Watch Josephine in action in computer room with whole class teaching/learning taking place;

Collect work samples for Glen;

Make an Assessment Task Video.

Have begun to use computer meaningfully and comfortably - up to a point;

Classroom management issues can be difficult - a few behaviour problems in classroom;

I need more training and development at this stage to see any real refinement or change in my teaching practice;

Have not used the CD Rom - Planning for Staff Development - have looked at it, but need to go back ASAP and look and start again. Feeling frameless - I know this would give me my framework, and help me work more quickly;

Glen: Good point, I think CD Rom may help with framework.

Classroom climate has changed - much more sharing and watching others use computer - more student interaction with each other. They need me. They discuss, assist and laugh lots more with each other. Their interaction with each other is far greater and much more relaxed. Different buddy groups have emerged because of this interaction;

Glen: Is this a regular goal for special needs children, or just an added bonus of computer use.

Galletea: Always a goal for Special Ed. This can be difficult for these children to achieve.

So far learning outcomes may not have changed - but classroom climate and student interaction have - and as this is only the beginning, hopefully as we move further along the technology pathway as a class, learning outcomes will change.

Glen: What sort of change are you hoping for?

Galletea: Always looking for 'higher order' learning outcomes for children with disabilities. Always demanding excellence - demanding more - going the extra mile - all children have the ability to learn - a disability means the teacher must look at a variety of teaching strategies to elicit the 'best' or 'more' from his/her students. I'm hoping that with the use of computer technology my students will progress further in their achievements. It is such a 'fun' way to learn. Over the years of teaching in Special Ed. I have seen my own expectations of what my students can achieve grow. The students have grown with me - as we as educators have given these students the opportunity to gain more knowledge etc. I'm hoping that with the use of computers my children can move through another learning barrier - break that 3 minute mile run. Soar, fly. Already my expectations of what these children can achieve with computers has been exceeded.

Appendix 4 - Sample Teacher Interview Transcript

*Transcript fom 2nd Interview with Debbie

Year 1/2 Teacher

21st October 1997

*Glen: First question. How do you think students learn best?

Debbie: I think students learn best by many and varied experiences.... learning experiences and ones which cater for not just one type of learning but for all types. So that you are targeting more than one type of child. They learn by working individually and by working in groups and by working as a whole class.

*Glen: First question. How do you think students learn best?

Debbie (continued): And for me... I found that with my class this year... tend to learn better when they begin the lesson as a whole class..... With my instruction and then move off into groups or into pairs or working individually after that.

*Glen: Yeah that is fine. If you had to categorise the teaching style that you have got in your classroom is there anyway that you could do that.

Debbie: Yeah I am very much chalk and talk. Umm I like to talk through what we are going to learn first to the kids as a whole class and ask lots of questions about what they already know and what they feel they can learn and what they feel they can learn and what they would like to learn..... and then go from there. So we do a lot of talking and discussing things before we get into the hands on stuff.

*Glen: Well are the children grouped in any way in the classroom when you are doing activities or...

Debbie: Well reading groups are ability based.. So the first hour of every day we spend in ability based reading groups. Which is working really really well for my kids. And this is where I wanted to bring in Wiggleworks and make it even work better.

*Glen: What role do you play in that group work situation?

Debbie: Ok I have parent helpers that come in and I also have the ESL teacher who comes into support. And each parent or teacher takes a group for reading activities which may includes include sound stencils. or games to do with the spelling list to do with that week. And during that time I take a specific group for guided reading. Where we go through books that are levelled at their level.

*Glen: What role has computers been playing in your classroom up to this stage?

Debbie: Recently it has been playing a larger role than at the beginning of the year. The children have been going to computer classes with the computer teacher as a whole grouping to a room where there are enough computers for every child to work on individually or in pairs.

*Glen: What role has computers been playing in your classroom up to this stage?

Debbie (continued): But in our classroom we have started the Wiggleworks program and the kids are able to now get into Wiggleworks and load the CDs themselves and go through and read the stories. There is still a lot that I want my children to be able to do with Wiggleworks that they are not doing at the moment because of limited time to set the program up the way I want it to run, but we are getting there.

*Glen: Do you want to mention the way that...I suppose that comes in the next question... it runs on from it. What role do you think they may play in the next term. So you might be able to run us through what your hoping to be setting up.

Debbie: At the moment with Wiggleworks the computers are the only resource that we are use as far as Wiggleworks goes. Whereas Wiggleworks is a whole package incorporating big books and small books and audio tapes. And a stack of other things that I would like to incorporate and then just use the computers as consolidation of the learning of the other resources.

*Glen: Do you want to mention the way that...I suppose that comes in the next question... it runs on from it. What role do you think they may play in the next term. So you might be able to run us through what your hoping to be setting up.

Debbie (continued): So I would really like the kids to start with the big books and the small books and the audio tapes and then once they have they have that learning to consolidate it on the computer by then going through the computer and reading the books again that way.

*Glen: Right..

Debbie: So rather than just using the computers I prefer the computers to consolidate what they have done on the other resources.

*Glen: Right... Curriculum documentation and that sort of thing. Have you recently looked at any of that sort of stuff that may .. or that computers played a part in...may be the English or Maths syllabus. Or you haven't noticed any syllabus documents.

Debbie: The only time I have really noticed anything about computers education is when I have had to study the document for university when you have to go through the separate sub headings, and I've always found the area to do with computers to be very small. A couple of paragraphs and that doesn't give you any motivation or indication of how to use it in the classroom really.

*Glen: Have you found any value in talking to other teachers about what you are doing with using the computer - or other areas?

Debbie: Yeah, I've learned a lot from our computer teacher - during that time, the T & D time, that we have been allowed to go and find out some things up in the computer room with the computer teacher. I've learnt a lot of how to use the computer and different ideas that she has tried.

*Glen: Have you found any value in talking to other teachers about what you are doing with using the computer - or other areas?

Debbie (continued): Actually trial and error, things she has trailed with the kids in the room. And this has been of a benefit. And just sitting in the photocopy room doing your work during release time... other teachers might say I tried this .. or you might see some work that their kids have produced. You might say, well how did you do that. And then they explain the process they have gone through. Like storyboarding on the computer - is one that I really want to try. Just from seeing what other kids have produced on the computers in their rooms.

*Glen: Have you found any value in talking to other teachers about what you are doing with using the computer - or other areas?

Debbie (continued): But I think, a lot of the time you are so wound up in everything else that need s to go on that it is rare that you actually stop to think and ask someone how they are working the computers in their room , or to get ideas from them. There is always so much going on.

*Glen: That's all thankyou.

Appendix 5 - Sample Students Work

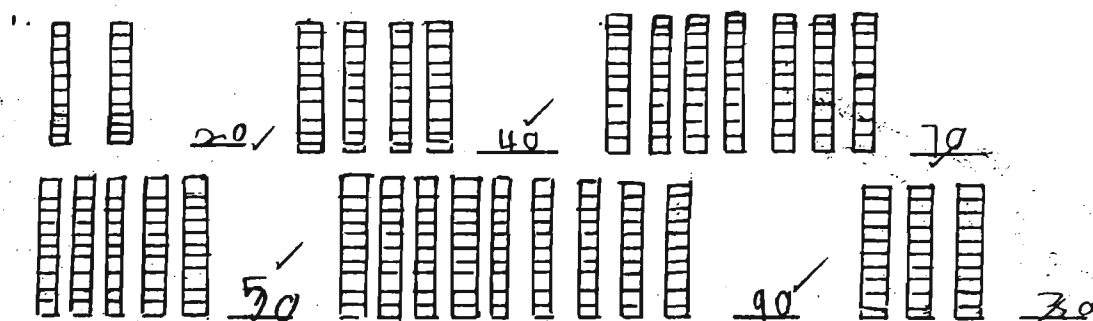
Work Sample Amber's Class - March

Numeration Assessment Name: _____

Base numerals to write these numbers

a. ten 10 ✓ fifteen 50 × nineteen 90 ×
 eleven 11 ✓ twelve 20 × seventeen 70 ×
 twenty 22 ✓ thirteen 30 × sixteen 60 ×

b. Write the number modelled by each set of blocks



Which is the smallest number? 20 ✓

Which is the biggest number? 90 ✓

Write each of these as a numeral.

3 tens 30 ✓ 4 tens 40 ✓ 8 tens 80 ✓ 9 tens 90 ✓

Fill in each box

30 = 3 ✓ tens 20 = 2 ✓ tens 60 = 6 ✓ tens

Count by tens

10 20 ✓ 30 40 ✓ 50 60 ✓ 70 80 ✓ 90 100 ✓

100 90 80 ✓ 70 ✓ 60 50 40 ✓ 30 20 ✓ 10

Tens.

Complete the sums

10 + 2 ✓ = 12 10 + 6 ✓ = 16 10 + 4 ✓ = 14 10 + 9 ✓ = 19

10 + 3 ✓ = 13 10 + 5 ✓ = 15 10 + 1 ✓ = 11 10 + 7 ✓ = 17

Order these numerals from lowest to highest

19 22 3 60 63 99 42 10 78
3 ✓ 10 ✓ 10 ✓ 22 ✓ 60 ✓ 63 ✓ 42 ✓ 78 ✓ 99 ✓

MATHS: MONEY (Group One)
ASSESSMENT

TASK: To complete the worksheet independently.

KEY: Competent - C, Developing - D, Early Stage - E.S.

OUTCOMES: Your child was able to -

| | C | D | E.S. |
|--|---|---|------|
| *Read, draw and make the amounts (using the coins) | | ✓ | |
| *Classify and draw the cent and dollar coins | ✓ | | |

72
d to buy the objects.

50c
CHIPS

50c

20c

20c

5c

5c

10c

10c

\$1.50

\$1.50

20c

\$1

20c

5c

\$1.25

Draw all the cent coins

5c

50c

5c

5c

20c

Draw the dollar coins

\$1

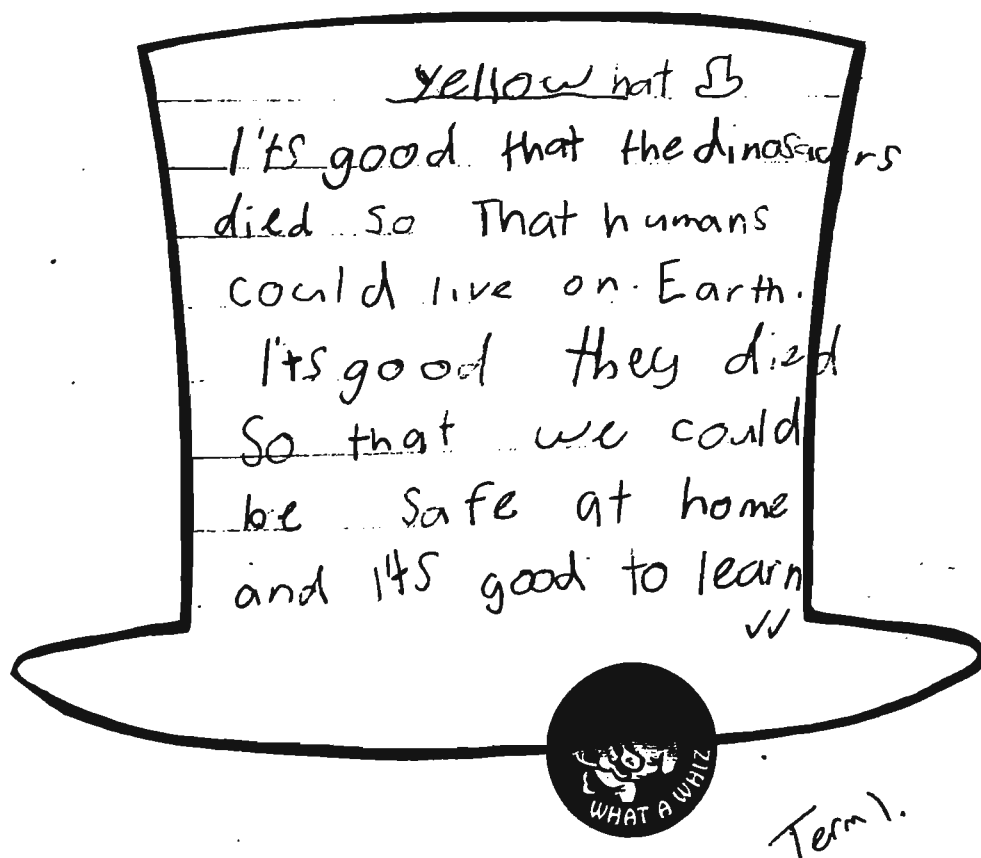
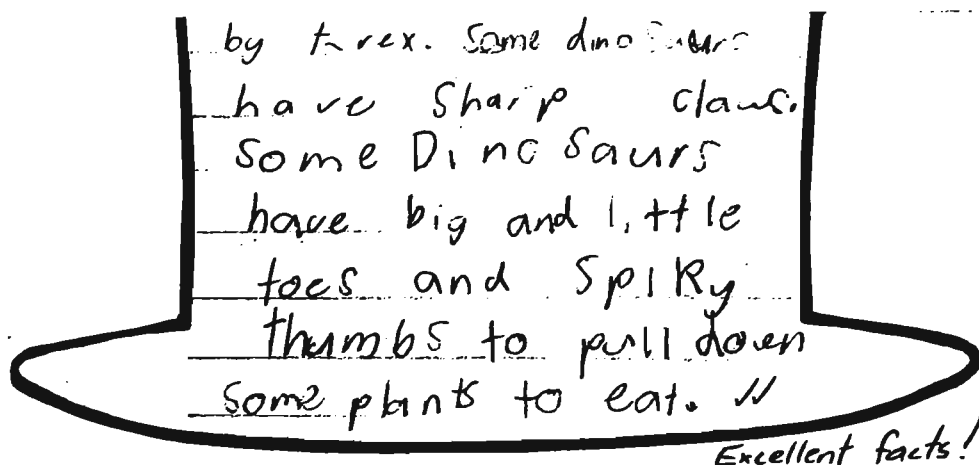
\$2

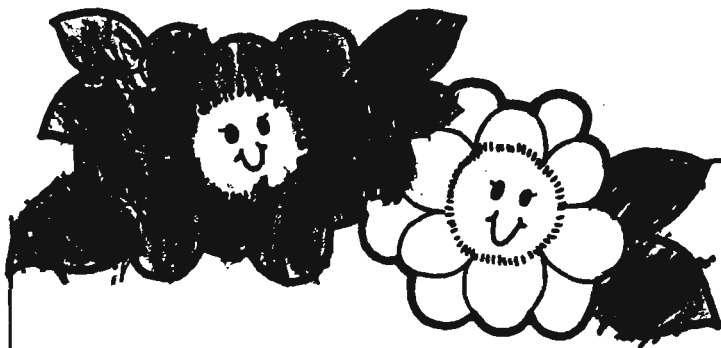


Work Sample Maree's Class - March

Writing-DeBonos' Thinking Hats.

To successfully complete this activity the students needed to record information and their opinions using the Thinking Hats to assist them. The thinking they engaged in was focusing on our dinosaur theme. DeBonos' Hats help us organise our thinking. For this task we used four of the six hats. The white hat is used to recall facts, the yellow hat is used for good points, the black for bad points and the red for personal feelings or opinion. For the new members to our class this was the first time they have used the hats and I am very impressed with the work produced.





Sunflower Report

On Tuesday, 7th May, 1997 I planted two sunflower seeds. In Week One my sunflower hadn't grown. In Week Two it was only one block high. In week Three I didn't measure my sunflower so we thought how high it was. I estimated that it was three blocks high. In Week Four it was five blocks high. In Week Five it was seven blocks high. In Week Six it was eight blocks high. In Week Six I took it home but now I don't know where it is. When I go home I am going to find my sunflower and I am going to hide it from my little sister Elisha.

By .



Terrific Work.
has written
an accurate and
descriptive report. Well
done!



Term 2/3

Year 2

Name: _____



Assessment Task:

English - Cloze

Outcome

The students will use reading strategies (including forward and backward referencing) to complete a passage, demonstrating an understanding of the meaning of the text.

Task

The students will fill in missing blanks in a body previously unsighted text on a familiar topic.

| | | |
|---------------------|--|--|
| Outcome Evaluation: | <input checked="" type="checkbox"/> Achieved stated outcomes. | <input type="checkbox"/> Working towards achievement of stated outcomes. |
| | <input type="checkbox"/> Could not achieve stated outcomes. | |
| Task Evaluation: | <input type="checkbox"/> Needed assistance in completing task. | <input checked="" type="checkbox"/> Completed the task independently. |

The Eureka Stockade.

In 1851 a gold rush began in Ballarat, Victoria. People came from Germany, England, Ireland, Italy, America and China, as well as all parts of Australia ✓.

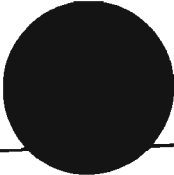
To mine, the miners had to pay 30 shillings a month ✓. Troopers made sure that everyone had licences and this caused a lot of fights between the miners and the soldiers ✓ as some of the miners had no money.

In October, 1854, a miner was murdered near the Eureka Hotel ✓. The miners felt that the hotel-keeper was guilty of the murder and when the charges were dropped, they burned ✓ down the Hotel.

Soldiers and police on horses were sent to Ballarat ✓ to make sure that people were doing the right thing.

The miners built a stockade ✓ around themselves so that the police and troopers couldn't get near them. They got guns and they burned their licences ✓.

At dawn, on Sunday December 3, the troopers attacked ✓ the stockade. At least 30 miners were killed and 128 were taken prisoner. Four soldiers died in the attack.



Team 4

Work Sample Maree's Class - November

Year 2 (1/5 Waratah)

Name: _____



Assessment Task: Mathematics
Number

Outcome

Students will be able to recognise the correct operational sign.

Task

Students will complete the worksheet using multiplication, addition, subtraction and division operations.

Outcome Evaluation: ☒ Achieved stated outcome. ☐ Working towards achievement of stated outcome.
☐ Could not achieve stated outcome.

Task Evaluation: ☐ Needed assistance in completing task. ☒ Completed the task independently.

1) $\begin{array}{r} 46 \\ - 23 \\ \hline 23 \end{array}$ ✓ 2) $\begin{array}{r} 13 \\ - 10 \\ \hline 3 \end{array}$ ✓ 3) $\begin{array}{r} 16 \\ + 24 \\ \hline 40 \end{array}$ ✓ 4) $\begin{array}{r} 15 \\ + 10 \\ \hline 25 \end{array}$ ✓ 5) $\begin{array}{r} 17 \\ + 22 \\ \hline 39 \end{array}$ ✓ 6) $\begin{array}{r} 18 \\ + 14 \\ \hline 32 \end{array}$ ✓

7) $\begin{array}{r} 39 \\ - 27 \\ \hline 12 \end{array}$ ✓ 8) $\begin{array}{r} 39 \\ + 27 \\ \hline 66 \end{array}$ ✓ 9) $\begin{array}{r} 93 \\ - 21 \\ \hline 72 \end{array}$ ✓ 10) $\begin{array}{r} 39 \\ + 10 \\ \hline 49 \end{array}$ ✓ 11) $\begin{array}{r} 65 \\ - 32 \\ \hline 33 \end{array}$ ✓ 12) $\begin{array}{r} 97 \\ - 61 \\ \hline 36 \end{array}$ ✓

13) $5 \times 3 = 15$ ✓

20) $6 \times 5 = 30$ ✓

27) $5 \times 8 = 40$ ✓

14) $4 \times 5 = 20$ ✓

21) $5 \times 10 = 50$ ✓

28) 29, 28, 27, 26, 25, 24 ✓

15) $2 \times 4 = 8$ ✓

22) $5 \times 7 = 35$ ✓

29) 2, 4, 6, 8, 10, 12, 14 ✓

16) $10 \times 2 = 20$ ✓

23) $5 \times 11 = 55$ ✓

30) 11, 13, 15, 17, 19, 21 ✓

17) $20 \div 2 = 10$ ✓

24) $5 \times 7 = 35$ ✓

31) 56, 57, 58, 59, 60, 61, 62 ✓

18) $18 \div 2 = 9$ ✓

25) $40 \div 5 = 8$ ✓

32) Even numbers between 30 and 50 ✓

19) $8 \div 4 = 2$ ✓



26) $60 \div 12 = 10$ ✓

33) Odd numbers between 31 and 51
32, 34, 36, 38, 40, 42, 44, 46, 48
35, 37, 39, 41, 43, 45, 47, 49, 51 X

Date of Task: 18/11/97

74

Work Sample Maree's Class - December

Year 1/2



Name: _____

Assessment Task: English -
(Speaking and Listening)

Outcome


Students will be able to:

- interpret and discuss some relationships between ideas, information and events in orally delivered texts with familiar content and a small range of unfamiliar words.

| | | |
|---------------------|--|---|
| Outcome Evaluation: | <input type="checkbox"/> Achieved stated outcomes. | <input checked="" type="checkbox"/> Working towards achievement of stated outcomes. |
| | <input type="checkbox"/> Could not achieve stated outcomes. | |
| Task Evaluation: | <input type="checkbox"/> Needed assistance in completing task. | <input checked="" type="checkbox"/> Completed the task independently. |

Task

The students will view a video concerning the Australian Gold Rush. The video will be discussed and the following worksheet completed.

- 1) Why didn't the Aboriginal people use gold? Because the Aborigines
didn't have any ways to find gold. X
- 2) What is alluvial gold? X Alluvial gold is when you pan &
Cradle. X
- 3) What equipment do you need to mine alluvial gold? A pan, Cradle ✓
- 4) How did the people get to the goldfields? Walking, (stagecoaches,
horse backs) riding
horses. ✓
- 5) What did you need before you were allowed to dig for gold? A licence ✓
- 6) What was another name for the goldfield police? A Troops Troopers ✓
- 7) How much did a licence cost? 30 shillings ✓
- 8) What happened if you were digging without a licence? You will get sent
back. home. ✓ 

Date of Task: 9/12/97

**Joseph and Mary go to
Bethlehem on a donkey. They
had a baby . The babys name
was Jesus.**



THE FIRESTICKS

The men are going on a journey to
the fire mountain. The men had to
go to Didmungi to get the
firesticks. They got the
firesticks and ran home.

BY



Appendix 6 List of Nodes from NUD*IST

6.1 Node List May 1998

Q.S.R. NUD*IST Power version, revision 4.0.

Licensee: Glen.

PROJECT: Computer Usage No.1, User Glen Patterson, 2:29 pm, May 14, 1998.

```
(1) /Teachers
(1 1) /Teachers/Amber
(1 2) /Teachers/Debbie
(1 3) /Teachers/Maree
(1 4) /Teachers/Josephine
(1 5) /Teachers/Gallettea
(2) /Pedagogy
(2 1) /Pedagogy/How Students Learn
(2 2) /Pedagogy/Learning Environment
(2 3) /Pedagogy/Change in Teaching Practice
(2 4) /Pedagogy/Teacher Value of Computers in
Classrooms
(2 5) /Pedagogy/Student-Teacher Interaction
(2 6) /Pedagogy/Teacher Programming
(3) /Professional Development
(3 1) /Professional Development/Learning Environment
(3 2) /Professional Development/Change in Teaching
Practice- result of T&D
(3 3) /Professional Development/T&D Effectiveness
(3 4) /Professional Development/Development of Personal
Skills
(3 5) /Professional Development/Whole School T&D
(4) /Computer Technology
(4 1) /Computer Technology/Change in Teaching Practice-
result of Computer Technology
(4 2) /Computer Technology/Comment on Computer Usage
(4 3) /Computer Technology/Comment on Personal Skills
(D) //Document Annotations
(F) //Free Nodes
(T) //Text Searches
(I) //Index Searches
(C) //Node Clipboard - 'Node Clipboard'
```

6.2 Node List June 2000

Q.S.R. NUD*IST Power version, revision 4.0.

Licensee: Glen.

PROJECT: Computer Usage 3, User Glen Patterson, 9:26 pm, Jun 4, 2000.

| | |
|---------|--|
| (1) | /Teachers |
| (1 1) | /Teachers/Amber |
| (1 2) | /Teachers/Debbie |
| (1 3) | /Teachers/Maree |
| (1 4) | /Teachers/Josephine |
| (1 5) | /Teachers/Gallettea |
| (2) | /Issues |
| (2 1) | /Issues/Pedagogy |
| (2 2) | /Issues/Professional Development |
| (2 2 1) | /Issues/Professional Development/Formal |
| (2 2 2) | /Issues/Professional Development/Informal |
| (2 3) | /Issues/Computer Technology |
| (3) | /Personal Skills |
| (4) | /Teaching Practice |
| (4 1) | /Teaching Practice/Behaviour Management |
| (4 2) | /Teaching Practice/Climate |
| (4 3) | /Teaching Practice/Student-Student Interaction |
| (4 4) | /Teaching Practice/Student-Teacher Interaction |
| (4 5) | /Teaching Practice/Teaching Style |
| (4 6) | /Teaching Practice/Physical Environment |
| (4 7) | /Teaching Practice/Organisation |
| (4 8) | /Teaching Practice/Skills Required by students |
| (5) | /Month |
| (5 1) | /Month/January |
| (5 2) | /Month/February |
| (5 3) | /Month/March |
| (5 4) | /Month/April |
| (5 5) | /Month/May |
| (5 6) | /Month/June |
| (5 7) | /Month/July |
| (5 8) | /Month/August |
| (5 9) | /Month/September |
| (5 10) | /Month/October |
| (5 11) | /Month/November |
| (5 12) | /Month/December |
| (6) | /Evaluation |
| (6 1) | /Evaluation/Effective |
| (6 2) | /Evaluation/Ineffective |
| (7) | /Changes |
| (7 7) | /Changes/Changes |
| (10) | /Data Types |
| (10 1) | /Data Types/Photos |
| (10 2) | /Data Types/Journals |
| (10 3) | /Data Types/Observations |
| (10 4) | /Data Types/Student Work Samples |
| (10 5) | /Data Types/Programs |
| (10 6) | /Data Types/Interviews |
| (D) | //Document Annotations |
| (F) | //Free Nodes |
| (T) | //Text Searches |
| (T 1) | //Text Searches/time |
| (T 2) | //Text Searches/organise |

```

(T 3) //Text Searches/Text Search
(T 4) //Text Searches/Text Search15
(T 5) //Text Searches/Text Search16
(T 6) //Text Searches/Text Search17
(T 7) //Text Searches/Wiggleworks
(I) //Index Searches
(I 1) //Index Searches/Matrix Issues X Teachers
Matrix Node.
(I 2) //Index Searches/Teach Prac X Time @ Change
Matrix Node.
(I 3) //Index Searches/Intersect Teach Prac X time
Matrix Node.
(I 4) //Index Searches/Intersect Issues & Changes
Matrix Node.
(I 5) //Index Searches/Intersect Tp & Changes
(I 6) //Index Searches/Matrix Issues X Time
Matrix Node.
(I 7) //Index Searches/Teach X Time @ Change in TP
Matrix Node.
(I 8) //Index Searches/Teach X Time @ Change
Matrix Node.
(I 9) //Index Searches/Near Prof Dev & Teaching Prac
(I 10) //Index Searches/Prof Dev followed by Teach Prac
(I 11) //Index Searches/Teach X Time @ Personal Skills
Matrix Node.
(I 12) //Index Searches/Personal Skill & Change
(I 13) //Index Searches/Teach X Time @ Change in Pers
Skill
Matrix Node.
(I 14) //Index Searches/Teach X Time @ Change in TP
Matrix Node.
(I 15) //Index Searches/Intersect Pedagogy & Change
(I 16) //Index Searches/Teach X Time @ Change in
Pedagogy
Matrix Node.
(I 17) //Index Searches/Intersect Prof Dev & Effect Evaluation
(I 18) //Index Searches/Teach X Time @ Effect Prof Dev
Matrix Node.
(I 19) //Index Searches/Intersect Prof Dev & Ineffect Evaluation
(I 20) //Index Searches/Teach X Time @ Ineffect Prof Dev
Matrix Node.
(I 21) //Index Searches/Intersect Effect Evaluation & Formal Prof Dev
(I 22) //Index Searches/Teach X Time @ Effect Formal Prof Dev
Matrix Node.
(I 23) //Index Searches/Intersect Ineffect Evalaution and formal Prof Dev
(I 24) //Index Searches/Teach X Time @ Ineffect Formal Prof Dev
Matrix Node.
(I 25) //Index Searches/Intersect Effect Eval & Informal Prof Develop
(I 26) //Index Searches/Intersect Ineffect Evaluation & Informal Prof Dev
(I 27) //Index Searches/Teach X Time @ Ineffect Informal Prof Dev
Matrix Node.
(I 28) //Index Searches/Teach X Time @ Effect Informal Prof Dev
Matrix Node.
(I 29) //Index Searches/Intersect Student-Student Interact & Change
(I 30) //Index Searches/Intersect Student-teacher Interaction & Change
(I 31) //Index Searches/Intersect Teaching Style & Change
(I 32) //Index Searches/Intersect Behaviour Management & Change
(I 33) //Index Searches/Intersect Climate & Change
(I 34) //Index Searches/Index Search
(I 34 1) //Index Searches/Index Search/NAME ME
(I 35) //Index Searches/gall change & Physical Environment

```

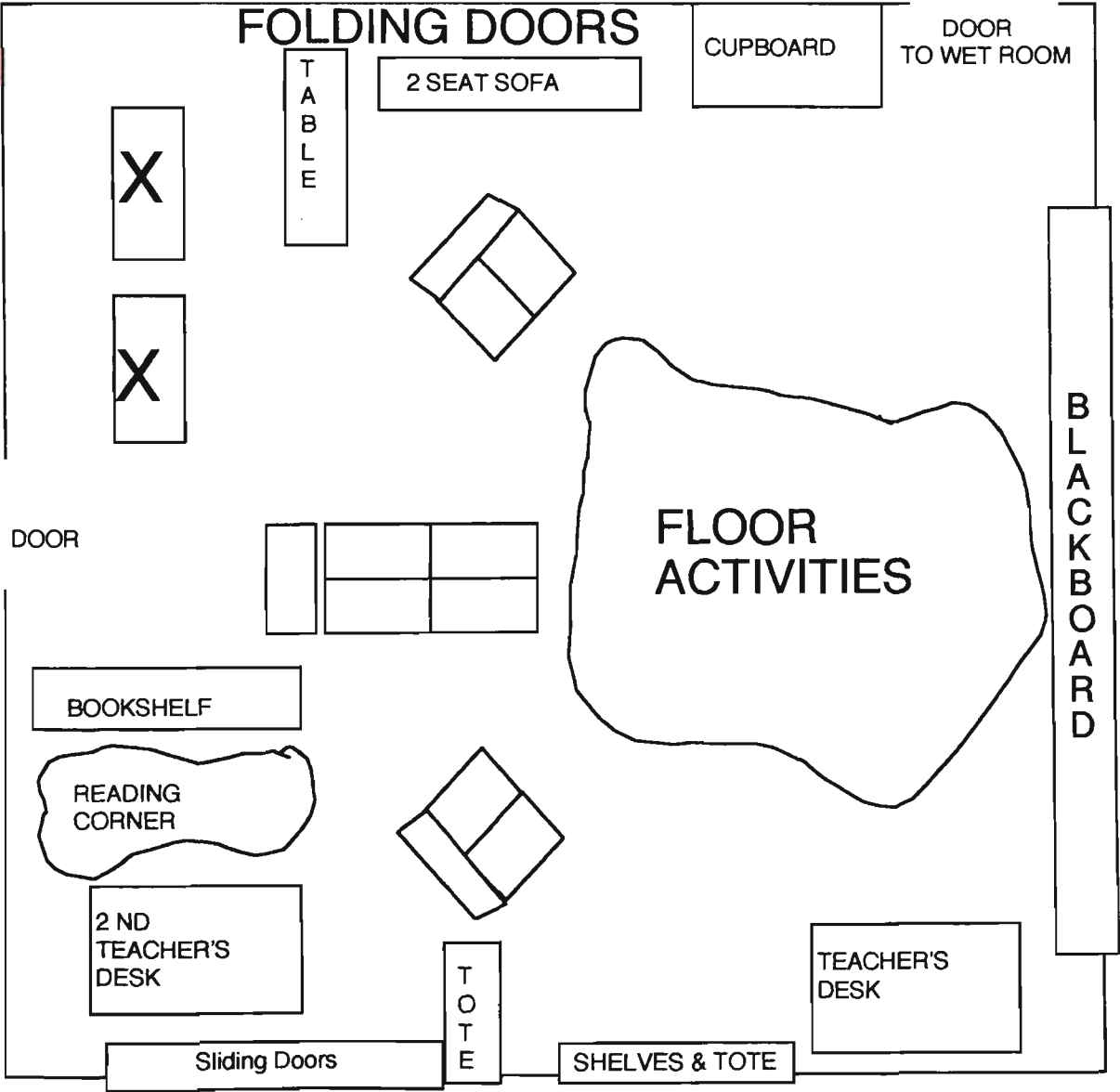
(I 36) //Index Searches/Inter 7, 4 2 @ 1 5
(I 37) //Index Searches/Inter i 29 & 1 5
(I 38) //Index Searches/Inter i 30 & 1 5
(I 39) //Index Searches/Inter 3 & 7 @ 1 5
(I 40) //Index Searches/Near 3 & 7 @ 1 5
(I 41) //Index Searches/Inter 4 & 7 @ 1 5
(I 42) //Index Searches/Inter 7 & 1 5
(I 43) //Index Searches/Joseph change & Physical Environment
(I 44) //Index Searches/Inter 4 & 7 @ 1 4
(I 45) //Index Searches/Inter i 29 & 1 4
(I 46) //Index Searches/Inter i 30 & 1 4
(I 47) //Index Searches/Inter 3 & 7 @ 1 4
(I 48) //Index Searches/Near 3 & 7 @ 1 4
(I 49) //Index Searches/Index Search28
(I 50) //Index Searches/Inter 7 & 1 4
(I 51) //Index Searches/Inter 4 2 & 1 4
(I 52) //Index Searches/Inter 2 3 & 1 4 @ 7
(I 53) //Index Searches/Inter i 29 & 1 1
(I 54) //Index Searches/Near i 29 & 1 1
(I 55) //Index Searches/Inter i 30 & 1 1
(I 56) //Index Searches/Inter i 31 & 1 1
(I 57) //Index Searches/Inter i 32 & 1 1
(I 58) //Index Searches/Inter i 33 & 1 1
(I 59) //Index Searches/Inter 3 & 7 @ 1 1
(I 60) //Index Searches/Inter 4 & 7 @ 1 1
(I 61) //Index Searches/Inter 7 & 1 1
(I 62) //Index Searches/Inter 4 6 & 1 1 @ 7
(I 63) //Index Searches/Inter i 17 & 1 1
(I 64) //Index Searches/Index Search44
(I 65) //Index Searches/Inter 7 & 4 2 @ 1 3
(I 66) //Index Searches/Inter i 19 & 1 3
(I 67) //Index Searches/Inter i 30 & 1 3
(I 68) //Index Searches/Inter 3 & 7 @ 1 3
(I 69) //Index Searches/Near 3 & 7 @ 1 3
(I 70) //Index Searches/Inter 4 & 7 @ 1 3
(I 71) //Index Searches/Inter 7 & 1 1
(I 72) //Index Searches/Inter 4 6 & 7 @ 1 3
(I 73) //Index Searches/Inter 4 6 & 1 3
(I 74) //Index Searches/Inter 4 2 & 1 3
(I 75) //Index Searches/Inter 4 5 & 7 @ 1 3
(I 76) //Index Searches/Inter i 21 & 1 3
(I 77) //Index Searches/Inter i 23 & 1 3
(I 78) //Index Searches/Inter i 25 & 1 3
(I 79) //Index Searches/Inter i 26 & 1 3
(I 80) //Index Searches/Inter i 32 & 1 3
(I 81) //Index Searches/Inter i 31 & 1 3
(I 82) //Index Searches/Inter 7 & 4 2 @ 1 2
(I 83) //Index Searches/Inter i 19 & 1 2
(I 84) //Index Searches/Inter i 30 & 1 2
(I 85) //Index Searches/Inter 3 & 7 @ 1 2
(I 86) //Index Searches/Near 3 7 @ 1 2
(I 87) //Index Searches/Inter 4 & 7 @ 1 2
(I 88) //Index Searches/Inter 4 6 & 7 @ 1 2
(I 89) //Index Searches/Inter 4 6 & 1 2
(I 90) //Index Searches/Inter 4 2 & 1 2
(I 91) //Index Searches/Inter 4 5 & 7 @ 1 2
(I 92) //Index Searches/Inter i 21 & 1 2
(I 93) //Index Searches/Inter i 23 & 1 2
(I 94) //Index Searches/Inter i 25 & 1 2
(I 95) //Index Searches/Inter i 26 & 1 2
(I 96) //Index Searches/Inter i 32 & 1 2

| | |
|--------|------------------------------------|
| (I 97) | //Index Searches/Inter i 31 & 1 2 |
| (I 98) | //Index Searches/Index Search14 |
| (C) | //Node Clipboard - 'Text Search18' |

Appendix 7 Diagram of Classroom Layout - Galletea

30/5/97
Galletea
Observation
Classroom Layout

X = COMPUTER

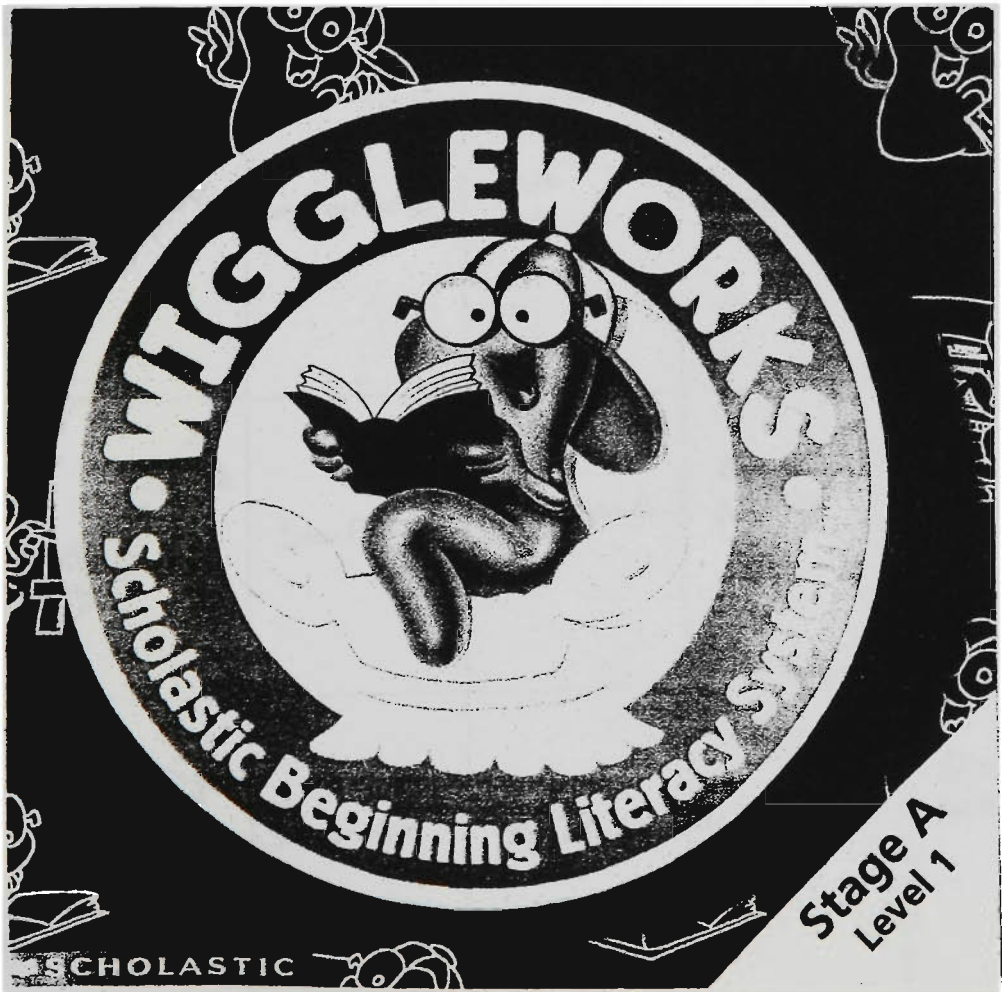


Appendix 8 Debbie's Work-booklet on Wiggleworks

WIGGLEWORKS
READING
PROGRAM

Name: -

I AQUA & MRS



READING GROUPS

Term 4

| Reading Days | GUIDED READING WIGGLEWORKS BOOKS | LISTENING POST BOOKS AND TAPES | COMPUTER PROGRAM - WIGGLEWORKS | WORDS IN CONTEXT/ SOUND STENCIL |
|--------------|-------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| MONDAY | Blue Bottles | Stingrays | Starfish | Hammerheads |
| TUESDAY | Hammerheads | Blue Bottles | Stingrays | Starfish |
| WEDNESDAY | Starfish | Hammerheads | Blue Bottles | Stingrays |
| THURSDAY | Stingrays | Starfish | Hammerheads | Blue Bottles |

★ Here are all of the Niggle Norks buttons.
★ Learn what each one is for.



Click the Read button to hear the story read to you.



Click Go to the Choice Screen to select a different activity.



Click Message of the Book to hear the Worm introduce the book.



Click Teather Message to hear a prerecorded message from the teacher.




Click the Right Arrow to go on to the next page in the book.




Click the Left Arrow to return to the previous page in the book.




Click My Words to build your own personal word list. You can copy words from the Read, Write, My Book, and Magnet Board areas into your My Words list.




Click Record to make a recording. Click Playback to hear your recording.




Click Story Words to see the concept words from the story. You can add these words to your writing.




Click Story Starter to help you begin your writing.




Click the Paint Tools to see a selection of drawing tools.




Use the Pencil to draw freehand. Use the Eraser to erase part of a drawing. Use the Grid to draw circles and ovals. Use the Square to draw squares and rectangles. Use the Bucket to color part of a drawing. Click the Stamp to see a selection of pictures from the book that you can place in your drawing. Choose from a selection of colors in the Color Palette. Click the Broom to erase your entire drawing. Click Ops! to Undo the last thing you did.




Click Fill to color specific letters black.




Click Frame to frame letters and words.




Click Scramble to scramble the letters in the word.




Click Sweep to remove all the words and letters you have placed on the Magnet Board.




Click Screen Keyboard to use the on-screen keyboard instead of the manual keyboard for typing.




Click Help at the Log On, Library, and Choice screens to hear more about these parts of the program.




Click Return to Log On so other students can log on.




Click Go to the Library at the Choice screen to select another book.



Click Preview at the Library screen to see a layout of all the pages in the book.



Click GO at the Log On and Library screens to proceed to the reading and writing activity areas.



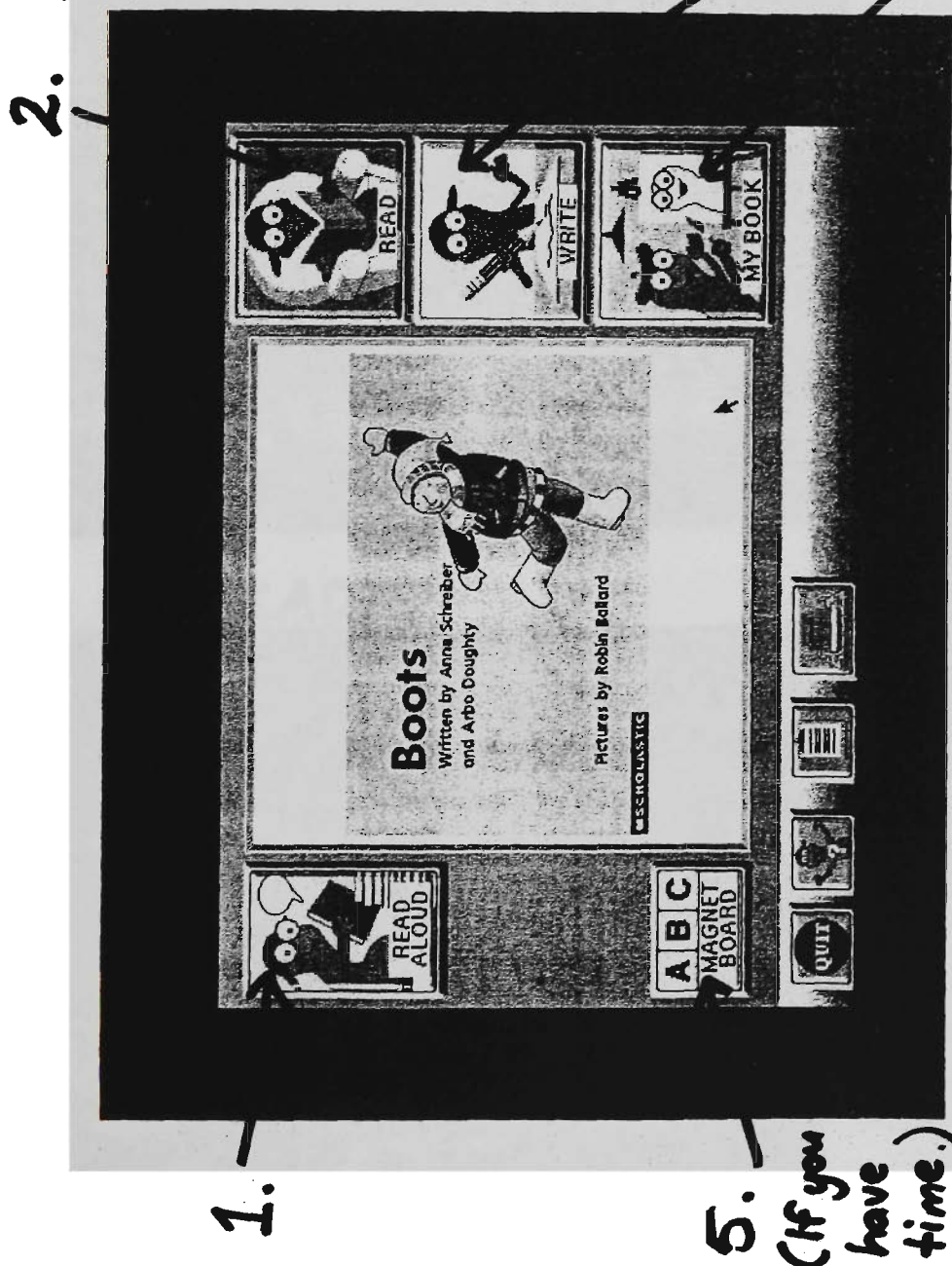
Click Quit to exit the program.

★ How to get started.....

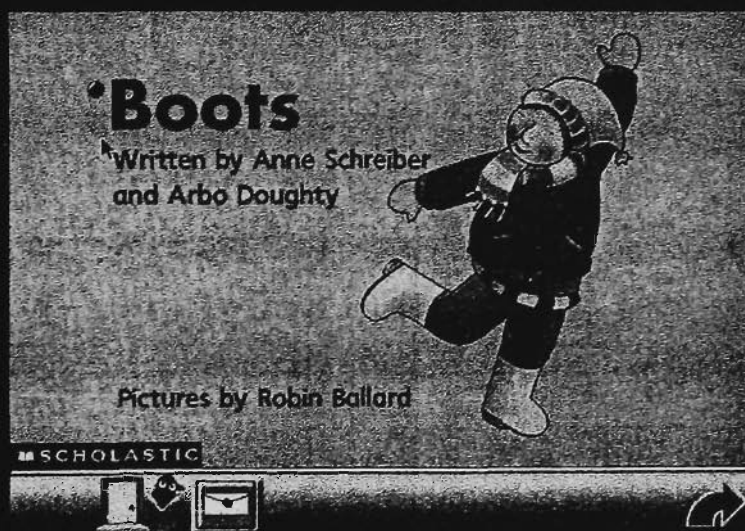
1. Carefully put your C.D into the disk drive.
2. Double-click the Wiggle Works icon.
3. Click the mouse to skip the song.
4. Click on your name and press **Go**.
5. Click on the book you should be reading for that week. Press **Go**.
6. Start working through the activities starting with **READ ALOUD**.

★ This is the order I want you to work in when it is your computer day.

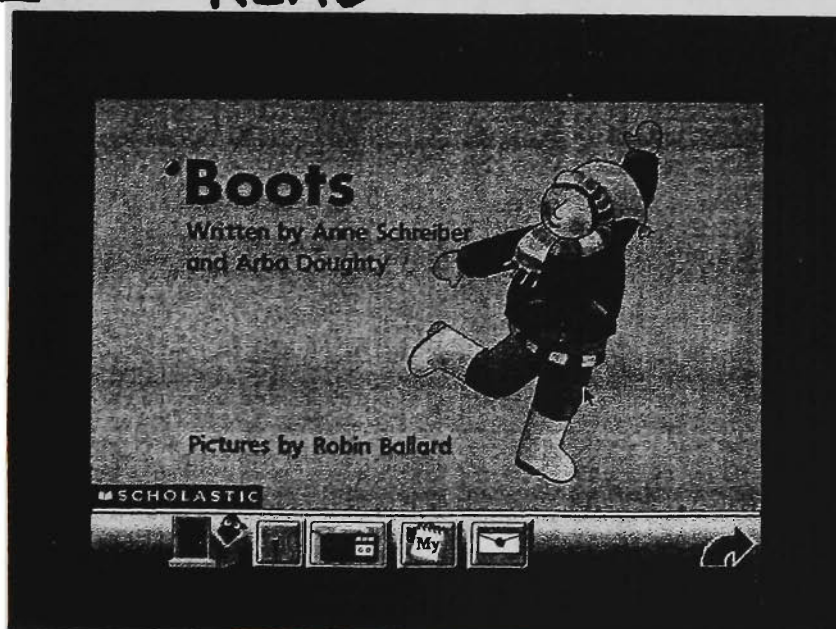
★ Follow the numbers.



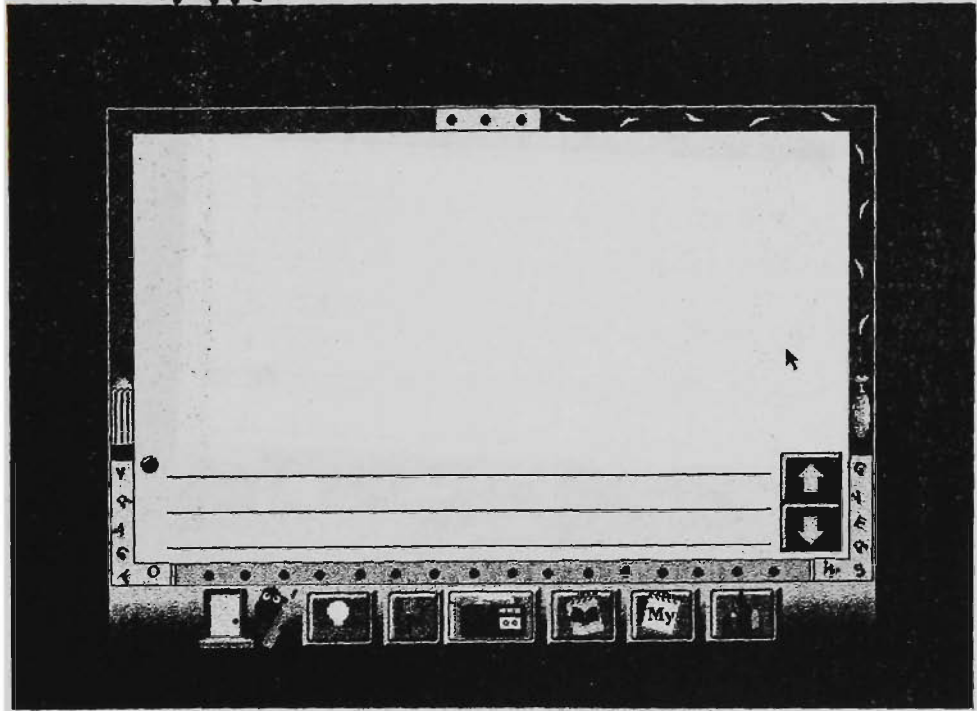
1. READ ALOUD



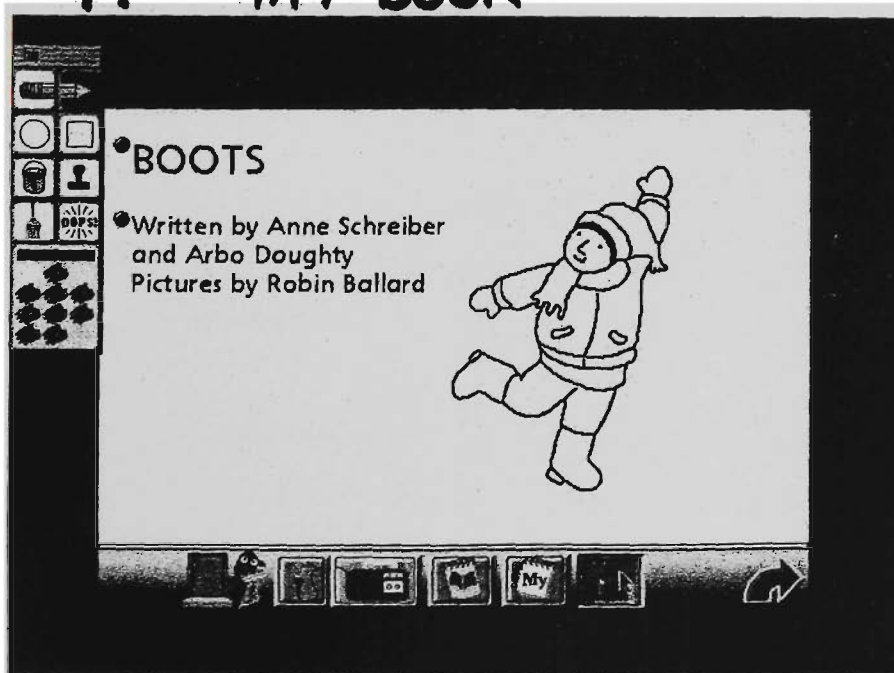
2. READ



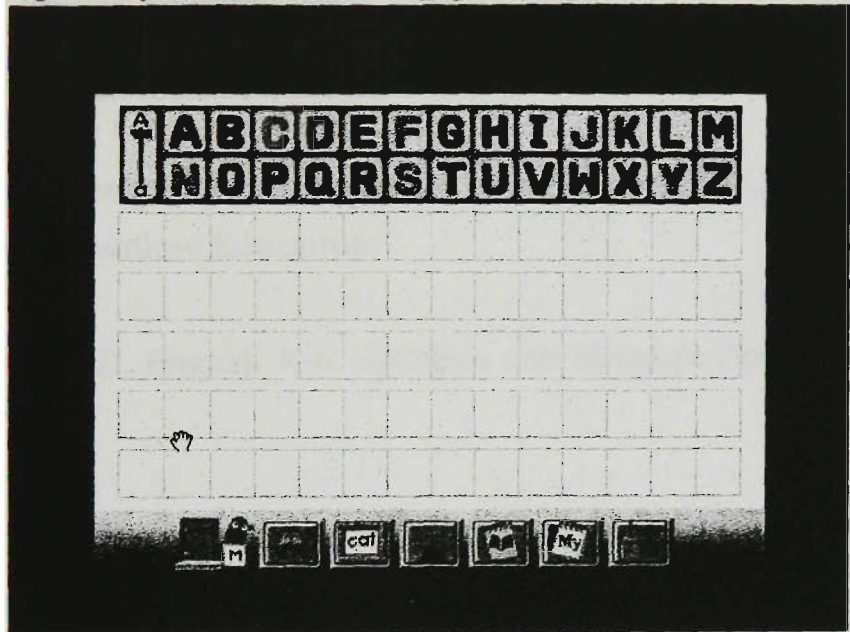
3. WRITE



4. MY BOOK



5. MAGNET BOARD



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