

Science and Mathematics Education Centre

**The Changing Role of Teachers in Embedding
ICTs into the Curriculum:
A Case Study in a Tasmanian School**

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ABSTRACT

Information Communication Technology (ICT) can provide innovative learning experiences, but in all cases a great deal depends upon the teacher to provide the context to make this possible. This study focuses on the role of teachers and their needs in embedding Information Communication Technologies into the curriculum in a Tasmanian Government Senior Secondary College.

The purpose of the study was to explore what support and encouragement teachers need to successfully incorporate ICTs into the curriculum. In particular, it looks at what motivates teachers to change their practice, in what ways their practice changes and what support is essential for that change to be lasting and worthwhile.

Three learning areas were selected for the study, LOTE, English, and Mathematics. There were a total of eleven teachers plus the researcher and eight classes of students. The majority of data collected was qualitative in the form of documents, interview and observations. Quantitative data was collected mainly through surveys.

The study focused on the following key elements required for teachers to embed ICTs into the curriculum:

- 1) The role of management;
- 2) The role of teachers (pedagogical, technical);
- 3) Requirements for technical assistance;
- 4) Time allocation; and
- 5) Professional development.

Resulting from the study are a series of recommendations for education departments, Principals, ICT managers and teachers to assist them in implement the embedding of ICTs into the curriculum.

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GLOSSARY OF TERMINOLOGY

ABBREVIATIONS & ACRONYMS

ACOT	Apple Classrooms of Tomorrow
AST3	Advanced Skills Teacher 3
CDs	Compact Discs
DETCCD	Department of Education, Training, Community and Cultural Development in Tasmania
DOE	Department of Education
ECPD	Educational Computing Professional Development
IT	Information Technology
ICTs	Information Communication Technologies
LOTE	Languages Other than English
PCs	Personal Computers
PD	Professional Development
ITPD	Information Technology Professional Development

DEFINITIONS

A qualitative case study: is an intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit.

IT: Information Technology: IT refers to the processes, applications and equipment by which we access, create, organise, analyse, present and communicate information in a range of formats including text, images and sound.

ICTs: Information Communication Technologies: As IT definition above except a more modern terminology to emphasise the importance the technologies play in communication.

Learning Area: A subdivision of the curriculum offered in schools. The 8 learning areas are HPOR (Health, Physical Outdoor Recreation), LOTE (Languages Other than English), English, Maths, Science, SOSE (Studies of Society and Environment), Technology and the Arts.

Chapter 1 Introduction and Overview

1.1 WHY ENCOURAGE THE USE OF ICTs IN THE CLASSROOM?

Computing in education has emerged rapidly during the past 15 to 20 years (Schools Curriculum and Assessment Authority {SCAA}, 1993) and it will continue to have a high profile resulting from technological advances, education department directives, and the perceived educational benefits. The successful implementation of information technology in classrooms, particularly computing, changes the whole learning environment. It changes what is being learned, why it is learned, how it is learned, how learning resources are accessed, and the communication between students, teachers, and the outside world.

Information Communication Technology (ICT) can provide innovative learning experiences, but in all cases a great deal depends upon the teacher to provide the context to make this possible. In many cases, teachers need to learn how to set up equipment, remember software commands, and troubleshoot system problems. The teacher must be able to manage multiple groups of students, each learning at their own pace, intervene at critical points, diagnose individual learning problems, and provide feedback. Teachers need the skills to organise the classroom and to structure learning tasks so that ICT becomes a necessary and integral part of learning rather than an additional technical aid. This study focuses on the role of the teacher in managing learning in a technology-rich classroom.

There have been many studies investigating the educational value of ICTs, but interpreting the research literature is made difficult by a variety of problems. These include:

- the questionable research methods used in earlier research making conclusions invalid as many studies only considered short-term rather than long term effects of the use of ICTs;
- the fact that cause and effect relationships may not be solely the result of the use of ICTs, i.e. ICT is not a single independent variable: the effect depends

on numerous other factors, such as the teacher, the way the technology is used, the purpose for which the technology is used, etc; and

- the enormous technological change taking place on a daily basis of both hardware and software makes valid comparisons of studies in the use of ICTs over the last two decades very difficult to achieve.

However, if more recent studies are examined, they show a positive impact of computers on learning outcomes (Becker 1992; Dwyer 1994; Fitzgerald et al 1996; Geisert & Futrell 1990; Kulik & Kulik 1991; Ryan 1991). In a report for the Ministry of Education, British Columbia, Wellburn (1996) concluded that the current literature is overwhelmingly positive about the potential of technologies as powerful components in accomplishing educational visions.

Sheingold and Hadley (1990) conducted a survey of teachers noted for incorporating technology into their practice. These teachers reported that they were able to present more complex material, that students proceeded more independently, and that their role as teachers had shifted from providing information to coaching. In addition, computer software can affect a teacher's practice by providing them with models for the kinds of complex, interdisciplinary tasks that could be taught.

Anecdotal evidence suggests that students in technology-rich classrooms are reaping benefits that are not apparent on standardised achievement tests. They write more, finish units of study more quickly, show more self-motivation, work cooperatively, express positive attitudes about the future, and are better able to understand and represent information in a variety of forms (Viadero, 1997).

1.2 TASMANIAN RESPONSE

This study focuses on the role of teachers and their needs in embedding Information Communication Technologies into the curriculum in a Tasmanian Government Senior Secondary College. Tasmania is an island state of Australia with a population of 470,000. In Tasmania students go to Primary School for kindergarten to grade six and then to Secondary School for grades seven to ten. Tasmania is the only state in

Australia to have a separate institution for years eleven and twelve. (Senior Secondary Colleges). In a Senior Secondary College, students do pre-tertiary subjects (which can lead on to University), non-pre-tertiary and vocational courses (Certificate II). Schools within Tasmania fall into different management areas called Districts based on geographic location. The school in this study fell into Hartz District (see Figure 1.1). The Hartz District has two Senior Secondary Colleges, nine High Schools and 23 Primary Schools.

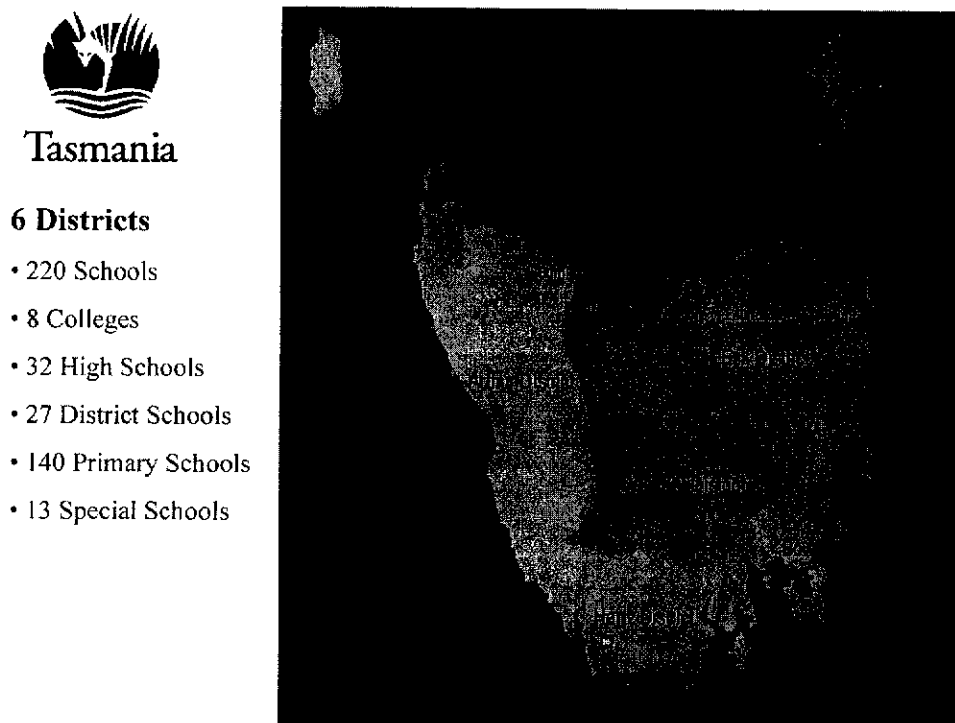


Figure 1.1 School Districts in Tasmania
(Sigrist, 2000. pg 1)

In 1997, the Tasmanian Government developed a vision for school education in Tasmania called *Directions for Education*. The vision contained six Directions:

1. Learning outcomes will be measured, monitored and reported with schools being accountable for improving these outcomes;
2. Schools and their communities, in partnership with the Government, will determine the learning outcomes that schools will deliver, through formal agreements (Partnership Agreements);

3. There will be more opportunities for local decision-making and flexibility in school operations and more 'funds through the school gate';
4. There will be improved school leadership through principal accreditation and performance-based contract;
5. School staff will be better equipped and empowered to do the job required of them, through improved professional development opportunities; and
6. Schools will have access to modern information technology to facilitate teaching, learning processes as well as accountability and administrative arrangements.

The aim of Direction 6 was to give Tasmanian state school students the opportunity to compete on an even footing with students from other countries, states, or school systems, through better access to information technology. Therefore the government was committed to providing schools with access to modern information technology and consequently invested \$48 million over three years to provide the following:

- approximately 14,000 modern computers to ensure every school has at least one modern computer for every five students;
- a laptop computer with software for every full time teacher;
- cabling to provide high speed local networks for every school;
- links to high speed communications services to deliver internet services;
- better technical support for schools; and
- access to professional development for staff to learn to use new technologies.

As part of the *Directions for Education* initiative the department designated seven schools (one from each district) throughout the state as "Lighthouse Schools". Lighthouse schools were selected to demonstrate how *Directions for Education* would work in schools and how computers and information technology could be used in the classrooms. Lighthouse schools endeavoured to embrace all aspects of Directions including partnership agreements, 10% staffing flexibility, and professional development activities (Direction 5). The College in the case study was designated a Lighthouse School.

The importance placed on staff development in the use of technology was evidenced by the percentage of the budget allocated. This included staff to run the Educational

Computing Professional Development (ECPD) unit to support teachers, schools, and districts to develop their skills in the use of IT and its incorporation into their teaching practice, further staff to run benchmark courses in the use of computers and staff to support teachers in the use of technology for teaching and learning.

Therefore, the research in this case study was very timely and relevant to the needs of the Tasmanian education environment and had the support of the DETCCD (Department of Education, Training, Community and Cultural Development in Tasmania), since renamed the DOE (Department of Education).

1.3 BACKGROUND AND SIGNIFICANCE OF THE STUDY

My interest in the integration of computers into student learning began when as a computing teacher I moved to teaching natural science subjects and wanted to incorporate computers into the teaching program. In doing this, I had to overcome the barriers of access to hardware, technical support and finding appropriate software. Despite the difficulties encountered, I saw that the effort required was worth it due to the benefits students gained when using computers.

I was an Information Technology (IT) Co-ordinator in a Tasmanian Senior Secondary College with responsibilities including the development of ICTs in the curriculum. Therefore setting up a small pilot program to explore the perceptions of teachers and their changing role as they adapt to the use of technology in the classroom was a timely and worthwhile project for me. Results from this research will provide a basis for future ICT planning for hardware and software purchases, technical support requirements and for providing appropriate PD. It will also give a greater insight into the associated issues from the practitioner's point of view as well as for IT leaders and principals.

Part way through the study, there was a change of Government and hence priorities, with subsequent budgeting for technology being greatly reduced. One of the few initiatives to remain was the ECPD Unit with two main objectives:

1. Ensure all teachers (of which there are approximately 5,675) have competent skills in the use of computers in four pre-requisite courses/modules (see below).
2. Facilitate and support teachers, schools and districts (groups of schools) in the use and application of computers and information technology within education programs for their students.

The modules were:

Module 1: Introduction to Computing Learning Outcomes

1. Create and save a new document
2. Select, manipulate and format text for specified needs
3. Manage and manipulate files
4. Produce documents for personal and/or classroom use
5. Explore some possibilities for the application of computers in classrooms

Module 2: Word Processing and Publishing Learning Outcomes

1. Use a wide range of word processing features
2. Incorporate tables into a document
3. Add Word Art and graphics to a document
4. Create drawing objects and include them in a document
5. Apply word processing and publishing to classroom practice

Module 3: E-mail and Internet Learning Outcomes

1. Use the basic functions of an Internet browser
2. Search for information on the World Wide Web
3. Examine the ethical and etiquette issues involved in the use of the Internet and Intranet
4. Develop skills in the use of E-mail
5. Incorporate the use of E-mail and World Wide Web resources into classroom practices

Module 4: Multimedia and Web Publishing Learning Outcomes

1. Publish web pages for personal and school use
2. Combine visual, sound and textual material
3. Develop local Internet resources
4. Use the World Wide Web as an information resource

Five forms of support were available to schools:

1. District Resource Teachers devoted an increased proportion of their time to assist staff with embedding ICTs into their teaching programs as the demand for training in basic skills (modules) decreased. The role of the District Resource Teacher was to:
 - coordinate all aspects of educational computing across all schools in their district in consultation with District Office and the Educational Computing Support Unit;
 - assist in the development and the implementation of school PD plans;
 - provide a process for recognition of current competence as required;
 - support school based Resource Teachers;
 - deliver courses in educational computing as and when necessary;
 - establish and foster networks of good practice within their districts;
 - work as a member of the statewide Educational Computing Support team; and
 - undertake support programs provided by the Educational Computing Support Unit.
2. District support services, Equity Branch and Teacher and School Development Branch officers were trained to use ICTs in the context of their support for schools.
3. The Good Practice Network providing access to support and advice from schools already involved in effective use of information technology. The Network's aims were to include all teachers and all schools over time.

4. Lighthouse schools were given additional staff to allow them to take a leading role in supporting other schools.
5. The DETCCD web site organised to provide a dynamic forum for the sharing of good practice and the delivery of Professional Development.

1.4 THE PROBLEM

The recognition of the advantages of using technology for teaching and learning is evidenced by the enthusiasm with which schools have embraced technologies through hardware and software purchases, with computers being found in almost every school in Tasmania; certainly in every public school. Despite this massive expenditure on technology the question we need to ask is why then is the research telling us that the integration of technology into teaching and learning is minimal, with schools struggling to incorporate new technologies into their classroom curricula?

A 1995 report from the Office of Technology Assessment, *Making the Connection* estimated that less than a quarter of American teachers had managed to integrate technologies into regular classroom programs.

The CEO Forum School Technology and Readiness Report (Year Two) (1999) stated that only 20% of teachers reported feeling very well prepared to integrate educational technology into classroom instruction.

Peck and Dorricott (1994, p. 15) described schools as “rumbling along, virtually unchanged by the presence of computers.” Since the education system has typically used technology in a rather non-systematic manner and in some cases has been quite resistant to the implementation of technology (Hodas, 1993; Kerr, 1991), it should not be surprising to find that there is still some controversy surrounding the quantification of the impact of technology use (Swan & Mitrani, 1993).

The persistent dream of technology driving school and classroom changes has continually foundered in transforming teaching

practices. Although teachers have slowly added a few technologies to their repertoires, techno-reformers have seldom been pleased with either the pace of classroom change or the ways that teachers have used new machines. (Cuban, 1996, p.1)

Becker (1991) found that computer use by teachers increased an estimated twofold from 1985-1989, however this still only accounted for a very small fraction of the total class time. Becker also found that about 60% of the secondary teachers surveyed in math, science, and English never used a computer in their teaching.

In a recent study of 80,000 US schools (Sherman, 1998), only 3% earned top marks for effectively using emerging technologies. The schools in the top 3% had at least one computer (many of them multimedia) for every three students, onsite technical support, high-speed Internet access, and teachers who had received many hours of training in technology use.

The initial enthusiasm for technology included rosy predictions about making teachers' jobs easier, giving them more time for face-to-face and one-to-one teaching. Experience has shown these early predictions to be naïve with teachers finding that in the early stages of technology implementation, at least, their job becomes harder. The technical demands posed by technology use are just the tip of the iceberg. Teachers must be able to select, adapt, or design technology-enhanced materials that meet the needs of their particular students. (Cohen, 2000; Pazzi & Johnson, 2001)

Many teachers contemplating the use of ICT ask themselves whether their involvement with technology will be worth the trouble. The thousands of software packages on the market, together with unreliable equipment and budget shortages overwhelm them. Even those staff eager to embrace new technologies are deterred by the steep learning curve that confronts them.

Fully integrating technology into the curriculum in order to make the most of new technologies in education requires overcoming the many barriers that exist. A summary of these barriers from the literature (Braun, 1990; Hannafin & Savenye,

1993; Plomp, Pelgrum, & Steerneman, 1990; Sheingold & Hadley, 1990; Somekh, 1989) include:

- resistance from teachers who feel threatened and disempowered by new technologies and the changes they bring to their role;
- lack of teacher expertise with new technologies;
- difficulties in transferring teaching and learning processes into technology-based approaches;
- costs of new technology, particularly as it becomes quickly outdated;
- costs involved to train teachers in the use of new technologies;
- lack of technical support in schools; and
- lack of leadership in IT.

The good news is that the response from thousands of teachers who have used IT is very positive with many finding a new sense of mission and professionalism. These teachers stick with technology, despite the growing pains it causes, because they sense that their students are learning more and approaching their classroom activities with a heightened level of motivation. One example of this as quoted by a teacher in this case study is:

Even though I have had frustrations IT is worth the effort. These skills are moving us into the 21st century, this is the way of the future. We must learn or be left behind. Problems need working through in a positive way, it will get better and you will feel a great deal of self worth for doing it. There appears to be a threshold of knowledge, once gained then life becomes much better, unfortunately it takes a while to get to that threshold.

Sheingold (1991) emphasised the importance of the teacher's role in the successful implementation of ICTs. He stated that the challenge of integrating technology into schools and classrooms is much more human than it is technological. It is much more than just helping people to operate machines, rather it is about helping people, primarily teachers, integrate these technologies into their teaching as tools of their profession.

Gardner, Morrison, and Jarman (1993) in a study in which 235 students were provided with laptop computers in Ireland, found that the impact of access to personal computers was not significant. However, when access to computers was

combined with teachers who were experienced users of information technology, and with appropriate support, the effect was more positive.

To use the technologies well, teachers need more than just access to these resources, they also need opportunities to discover what the technologies can do, to learn how to operate them, and to experiment with ways to apply them in their classrooms. (Gardner, 1995, p.17)

Certainly, the need to concentrate on the role of the teacher is now well supported. Probably the most often repeated finding in the literature about the use of information technology in the classroom is that it will only change learning if teachers change teaching. (Department of Education, Community and Cultural Development, 1997, p. 51)

1.5 OBJECTIVES OF THE STUDY

The purpose of this study was to explore what support and encouragement teachers need to successfully incorporate ICTs into the curriculum. In particular, to look at what motivates teachers to change their practice, in what ways their practice changes and what support is essential for that change to be lasting and worthwhile. The objectives of the study then are to investigate the following two key research questions:

1. In what ways does the role of the teacher change in a computer integrated classroom?
2. What support is needed by teachers to develop strategies and teaching activities to successfully use computers in their teaching programs (i.e. technical support, information technology professional development, teaching and learning professional development and time)?

1.6 LIMITATIONS OF THE STUDY

Although the study has looked at more than one learning area and 11 teachers this is still a fairly small sample size. Another limitation of the study is that it occurred in only one setting, i.e. the College in which the study took place. Hence whilst the study reports on the pedagogical changes and support needs of these staff to embed

ICTs into the curriculum, the results may not be applicable to other Senior Secondary Colleges let alone other educational institutions.

1.7 ORGANISATION OF THE THESIS

Following this introductory chapter there are five additional chapters. Chapter 2 begins with a literature review about educational innovation and change. Applying the lessons from the literature on educational change, a focused review of the literature relating to those factors that influence the effective use of ICTs in the classroom is presented. Deliberate emphasis was placed on more recent literature (1990 onwards) due to the massive changes that have occurred in educational technology, making earlier studies irrelevant to current uses of ICTs.

Chapter 3 presents the methodology used in the study, including the rationale for using a case study, an explanation of what data were collected and how the data were organised and analysed.

Chapter 4 details the results of the case study. It presents a descriptive narrative of the experiences of the staff involved in the case study as they implemented change in their classroom practice by embedding ICTs into their teaching and learning programs.

Chapter 5 follows on from Chapter 4 by analysing the results of the case study as presented by the narratives and other data collected.

Chapter 6 presents an analysis of the findings in relation to the questions posed in Chapter 1. It then presents recommendations as a result of the findings of the study to various groups of people involved in education in order to further develop the use of ICTs in education. Finally further ICT-related educational research projects are recommended.

Chapter 2 Literature Review

2.1 INTRODUCTION

Routine use of information communication technologies, by both students and teachers, represents a profound change in the daily practices of schools. The development of information technology use in education can be seen as part of the broader field of educational change. According to Cox and Rhodes (1989) many of the barriers to the adoption of microcomputers in schools are specific examples of the barriers to change in general. This implies that any study looking at effective implementation of ICTs into the teaching program must also look at general factors affecting innovation in education.

Networked computers provide easy and fast access to vast amounts of data valuable to all fields of study. According to Kook (1997), the growth of communication networks will change the image of the classroom for the twenty-first century. Networks that reach around the world and across subject areas will connect the global classroom. Simply installing equipment in classrooms does not guarantee that they will become a necessary component of an educational program.

The purpose of this literature review is to examine those factors that influence the effective use of ICTs in the classroom. Deliberate emphasis has been placed on more recent literature (1990 onwards) due to the massive change that has occurred and continues to occur in educational technology, making many of the earlier studies irrelevant to present day classroom ICT activities and expectations. These changes include the types of technologies used, the ways in which they are used and the departmental/government expectations and support that have occurred in schools over time.

The review will begin by looking at educational change in general and apply the lessons from this to the implementation of ICT as an example of educational change. This will include a discussion of the barriers that inhibit the complete integration of technology into teaching practices.

2.2 EDUCATIONAL CHANGE

Real change in schools is difficult to accomplish and can only occur under certain circumstances. There is a considerable amount of literature about educational change, which focuses on the implementation of specific curriculum, technologies, and classroom and administrative innovations. Much of the research extends far beyond the requirements of this literature review, however of interest is the use that most authors make of theoretical models, frameworks, phases, and stages to describe change characteristics and the process of change generally. One such model identified three broad perspectives on educational change, which can be summarised as:

- the rational-scientific or R & D perspective position that change is created by dissemination of innovative techniques;
- the political perspective (the top-down approach) bringing about change through legislation and other external directives; and
- the cultural perspective (the bottom-up approach) seeking to influence change through encouraging value changes within organisations.

(Sashkin & Egermeier, 1993)

Due to the complexity of change the first two perspectives have generally failed to bring about true change. Change that relies on compulsion, constraint, and contrivance to get teachers to change usually ignores the teachers' own desires for change. (Hargreaves, 1994) The cultural perspective recognises the need for teachers and educational institutions to change their beliefs and values in order to achieve meaningful, lasting change.

2.2.1. Change as a three-phase process

One of the major early contributions to the study of the implementation of innovations in schools was that of Gross et al. (1971) who conducted a case study of the introduction of an educational innovation in an elementary school (Cambire Elementary). The authors distinguished three major stages in the innovation process:

1. initiation;
2. attempted implementation; and
3. incorporation.

Since the seventies there has been a general acceptance that successful change in education passes through various stages or phases.

Canadian Michael Fullan (1982, 1985, 1991) has become one of the most widely-quoted authors in the field of planned educational change. Similar to the studies of Gross et al. (1991), Fullan (1982) talked of three broad phases to the change process:

Phase 1 – initiation, mobilisation, or adoption phase, consisting of the process that leads up to and includes a decision to adopt or proceed with a change.

Phase 2 – implementation or initial use phase, involving the first experiences of attempting to put an idea or programme into practice.

Phase 3 – continuation, incorporation, routinisation or institutionalisation phase, referring to whether the change gets built in as an ongoing part of the system or disappears by way of the decision to discard or through attrition.

The **adoption** phase involves decision-making and planning required to proceed with a change. The decision to adopt leads to the implementation. The **implementation** phase is considered to be the most difficult as it requires action from individuals as they put the reform or change into practice and is very much dependent upon the people involved and their vision and willingness to be involved with change. **Institutionalisation** has occurred when the change is no longer considered novel and has been accepted as part of the normal working environment of the institution.

Adoption of an innovation does not necessarily lead to change. For these reasons much of the literature on educational change concentrates on the implementation phase and factors that act as barriers to change. Changes to attitudes and knowledge may occur throughout the change process but if there is no accompanying behavioural change the effect of the innovation may be minimal or even lost. (Fullan, 1991)

2.2.2 Factors affecting change

Gross et al. (1971) found that the majority of the teachers at Cambire Elementary had failed to implement the innovation six months after its announcement. They attributed this outcome to the presence of five barriers:

1. the teachers' lack of clarity about the innovation;
2. the teachers' lack of the skills necessary for implementation;
3. the unavailability of required instructional materials;
4. the incompatibility of organisational arrangements; and
5. lack of staff motivation.

Heck and Wallace (1999) discussed five key elements required for successful implementation of new curriculum and new classroom projects. They are:

1. an understanding of change theory;
2. a clear vision;
3. effective leadership;
4. a personal understanding of the change and its implication for those who are directly responsible; and
5. on going support through effective staff development.

Fullan also identified a number of factors affecting the successful working of these phases. These factors are brought together in four major categories:

- (a) characteristics of the change related to need, clarity, complexity, quality of materials and other such factors;
- (b) school system characteristics, such as history of change, adoption process, administrative support, professional development approach, timeline and information, and school board/community support;
- (c) school characteristics (principal involvement, teacher/teacher relations, teacher characteristics); and
- (d) extra-local characteristics (such as the role of government agencies and of external assistance).

Fullan selected five factors whose omission will lead to substantial barriers to change:

- (a) opportunity (time) for professional development and interaction during implementation;
- (b) good program development or selection;
- (c) allowance for redefinition of change;
- (d) a minimal two- or three-year perspective; and
- (e) supportive principals.

In summary, for educational change to be effective, schools need the following:

1. supportive management/principals;
2. teachers' support and vision for change;
3. Professional Development programs to implement the change; and
4. time.

2.2.3 Supportive management/Principals

Research on effective schools indicates that the principals of effective schools include staff members in decision-making and problem-solving. Administrators of effective schools do not exercise educational leadership alone. Such leadership is often the collective task of the Principal along with other members of the organisation. (Elliot, 1998)

Fullan contended that, at the school level, an active role of the Principal has been shown as essential in "virtually every line of inquiry" (1985, p. 76) in influencing the extent of implementation.

McAdams (1997) believed that it takes five factors to initiate broad-based school reforms. One of these is leadership theory. Senge (1991) suggested that for success leaders need to have been in a position of leadership for sufficient time to inspire trust and respect from staff and so build up a culture of teamwork.

According to Fullan (1982b), implementation will occur to the extent that each and every teacher has the opportunity to work out the meaning of the implementation in practice. He concludes teachers should not be expected to implement an innovation unneeded, unclear or unrealistic in time, resource or support. This emphasises the

importance of the management in ensuring that the needs of their staff are met, for successful implementation of the changes.

Fullan (1993) suggested some practical advice for the principal committed to building a learning organisation, namely:

- understand the culture of the school;
- value your teachers: promote their professional growth;
- extend what you value;
- express what you value;
- promote collaboration; not co-optation;
- make menus, not mandates;
- use bureaucratic means to facilitate, not to constrain;
- connect with the wider environment.

In Fullan's (1993) "The Complexity of the Change Process" he looks at eight lessons. (See Table 2.1 on page 20) Lesson One is **You Can't Mandate What Matters**. (The more complex the change, the less you can force it)

Mandates are important. Policymakers have an obligation to set policy, establish standards, and monitor performance. If there is one cardinal rule of change in human condition, it is that you cannot make people change. You cannot force them to think differently or compel them to develop new skills. All of these changes to be productive, require skills, capacity, commitment, motivation, beliefs and insights, and discretionary judgment on the spot.....

..... The only alternative that works is creating conditions that enable and press people to consider personal and shared visions, and skill development through practice over time. The more that mandates are used the more that fads prevail, the more that change is seen as superficial and marginal to the real purpose of teaching. The more that you 'tighten' mandates, the more that educational goals and means get narrowed, and consequently the less impact there is. (Fullan, 1993 p. 23)

The most important role a leader can fulfill is to help teachers to deal with the challenges and changes required to improve the teaching and learning program (Wallace, 1997)

Table 2.1
Fullan's Eight Basic Lessons of the New Paradigm of Change

Lesson	
One	You can't mandate what matters. (The more complex the change the less you can force it.)
Two	Change is a journey not a blueprint. (Change is non-linear, loaded with uncertainty and excitement and sometimes perverse.)
Three	Problems are our friends. (Problems are inevitable and you can't learn without them.)
Four	Vision and strategic planning come later. (Premature visions and planning blind.)
Five	Individualism and Collectivism must have equal power. (There are no one-sided solutions to isolation and groupthink.)
Six	Neither Centralisation nor Decentralisation works. (Both top-down and bottom-up strategies are necessary.)
Seven	Connection with the wider environment is critical for success. (The best organisations learn externally as well as internally.)
Eight	Every person is a change agent. (Change is too important to leave to the experts, personal mind set and mastery is the ultimate protection.)

Fullan (1993), pp. 21-22

2.2.4 Teachers support and vision for change

Teachers are continually being asked to make changes to their practices as their role expands to take on new problems and mandates. The irony is that very little if any of their old role is cast aside to make room for these changes.

Teachers are the key to educational change, and it is not just their capacity to change but also their desire to change that is important. The involvement of teachers in educational change is vital to its success. Change implementation that ignores, misunderstands or overrides a teacher's own desire for change relies on principles of compulsion, constraint and contrivance to get teachers to change (Hargreaves, 1994).

In recent years, there has been an effort to involve staff in the change process, to create greater ownership of the change amongst staff, to give teachers more opportunities for leadership and professional learning.

2.2.5 Professional Development programs to implement the change

Cuban (1992) described instrumental change, with aims to improve the existing school structures and fundamental changes, with the aim of transforming permanently the existing school structures. Neither can be accomplished without adequate professional development.

Every proposal to reform, restructure, or transform schools emphasises professional development as the primary vehicle in efforts to bring about needed changes (Guskey, 1994). What is important though is the need for the high quality effective professional development, which will lead to systemic change in education.

Change is a slow and evolving process. Yet often, there is pressure to “scale up” and quickly implement broad-based change without considering future ramifications. Unless educators take a thoughtful and strategic “systems approach” to reform efforts, the results will be little or no improvement. Educational change must be based on problem solving and comprehensive planning processes. Professional development must shift its emphasis from working **on** teachers to working **with** teachers toward improvement of teaching and learning for all students. (Cooke & Fine, 1996, p. 6)

Studies show that professional development activities that are undertaken in isolation of teachers’ ongoing classroom activities have little impact on teaching practices or student learning (Doyle & Ponder, 1977; Zirgami, Betz, & Jensen, 1977)

Bruder (1990) stated that we must rely more on teachers teaching teachers in preference to experts from outside the organisations giving advice.

2.2.6 Time

Fullan (1985) argued that teachers’ colleagues are a preferred source of knowledge and skill and therefore the lack of time to interact with each other is a prime obstacle to the successful implementation of change.

In studies of educational change, shortage of time is a major barrier. Shortage of time for school improvements, curriculum implementation and staff development repeatedly appear as one of the chief implementation problems in research on educational change. Time away from the classroom to work with colleagues or reflect on their own is vital for successful change (Hargreaves, 1994).

In reviewing the literature on the change process Hargreaves (1994) cited and discussed several principles. They included:

1. change is a process not an event (Fullan & Stiegelbauer, 1991);
2. practice changes before beliefs (Huberman & Miles, 1984);
3. it is better to think big, but start small (Fullan, 1988);
4. evolutionary planning works better than linear planning (Louis & Miles, 1990);
5. policy cannot mandate what matters (McLaughlin, 1990);
6. implementation strategies which integrate *bottom-up* strategies with *top-down* ones are more effective than *top-down* or *bottom-up* ones alone (Hopkins, 1992); and
7. conflict is a necessary part of change (Lieberman et al., 1991).

2.3 FACTORS AFFECTING INTEGRATION OF TECHNOLOGY INTO TEACHING PRACTICES

There are a number of factors that affect the integration of technology into the teaching and learning practices of teachers. A modified Delphi survey elicited ten key issues of IT investment effectiveness.

These indicate that the Principal is critical, other important factors include the teachers, curriculum planning, technical support, the students, the actual use of IT, training and personal development, the school council, the budget and the learning technologies committee. (Manson 2000, p. 1)

Table 2.2 shows the full findings from the above-mentioned survey.

Table 2.2
Findings from Delphi Survey

Initial Ranking	Key Issues
1	The Visionary Principal
2	The Principal – the Champion
3	The Changing Teacher’s Role
4	The Teachers – KEY to IT Effectiveness
5	The Starting Point – NOT the IT Teacher
6	The Teachers Maximising IT Investment
7	The Budget
8	Training and Personal Development
9	The Learning Technologies Committee – The Decision Makers
10	Technical Support
11	The Value of IT
12	The Students – IT’s Biggest Impact
13	Strategic Partnerships
14	Laptop Program
15	Consultant Utilisation
16	Size of School
17	Role of School Council
18	Basis of Investment
19	Objectives of Investments
20	Infrastructure vs. Non-Infrastructure Investments
21	Number of PCs
22	The Actual use of IT
23	Administration Staff – Efficiency not Effectiveness
24	The Teachers – The Luddites

(Manson 2000, p. 1)

Sheingold and Hadley (1990) discovered that it takes five to six years for teachers to master computer-based practices and approaches, provided of course, that they have access to hardware and software both in and out of school so that they can practice and experiment. Teachers also need technical support staff on site to offer support in the classroom, give workshops and contribute to the whole school technology team.

Plomp, Pelgrum, and Steerneman (1990) applied a combined case study-survey methodology to investigate the use of computers in 28 Dutch junior secondary schools. They found that in the majority of the schools ICT developments were very modest and did not show real integration of technology into the school curriculum. They identified a number of factors as barriers to a more integrated use of ICTs in teaching:

- (a) the lack of a clear school policy on what the institution wants to achieve with the new technology and how it should be achieved;
- (b) lack of hardware, software and curricular materials;
- (c) lack of time for the teachers to get acquainted with the new technology; and
- (d) lack of a continuous process of professional development. Teachers who used ICTs regularly rarely mentioned a specific educational need as a justification; in most cases they referred to more general aims such as to increase motivation, to try new technologies or to meet future needs of society.

In a study of a Victorian Primary School, Pazzi and Johnson (2000) found that staff developed negative attitudes towards ICTs as a result of many different factors. Some experienced technical problems that hindered their use, others felt too old to learn how to use them, while others were comfortable with how they taught and were hesitant to change in order to incorporate ICTs.

In line with the change management studies by researchers such as Gross and Fullen, Mardinich and Cline (1992) stated that learners move through developmental stages as they learn to embed ICTs into their teaching and learning. The stages are described in terms of mastering the use of technologies:

1. the Survival Stage: A struggle against technology. With concerns about unrealistic expectations and management problems, etc. This stage can be described as “chaos”;
2. the Mastery Stage: Coping strategies along with increased tolerance of new forms of interactions and classroom structures and more engagement through increased technological competence;
3. the Impact Stage: A move to more learner-centred instruction. Teachers establish new working relationships and structures in the classroom and feel less threatened. Technology- enhanced curriculum is implemented; and
4. the Innovation Stage: Teachers experiment with using technology to enhance their instructional processes and enhance learner outcomes. This often results in the restructuring of curriculum and learning activities. At this stage, “technology across the curriculum” is achieved.

In the next sections issues of integrating technologies into teaching are discussed under five broad category headings:

1. the role of management;
2. the role of teachers (pedagogical, technical);
3. requirements for technical assistance;
4. time allocation; and
5. professional development.

2.3.1 The role of management (Principal, school, district)

A major study of educational change with ICTs was undertaken to describe the day-to-day practice of four teachers from a Dutch secondary school who were implementing the uses of computers in their classrooms from 1989 through 1991 (Veen et al., 1991, 1992). This study emphasised the importance of the role of the Principal. The Principal in question held a positive view of ICT in education, ensured there was adequate technical support and established an ICT committee for discussion and ICT policy development. It was also the Principal who gave moral support through informal discussions with teachers showing commitment and interest in their efforts. Further the study concluded that school management must be involved both financially and through moral support, with educational innovations being the task of the entire staff and not individual teachers. This is well supported by the literature (Brummelhuis & Plomp, 1993; Chandra, 1987; Fullan, 1992a & 1992b; Vanderwilt, 1993).

The leadership that principals give their teachers is one of the most important factors affecting the effectiveness of technology in classrooms. Principals who are role models and understand the technology that is used in their schools enhance the use of technology in the classroom. These principals can provide the added support and guidance teachers are looking for. (Jones, 2001 p. 40)

2.3.1.1 Principals and the ICT vision

The Delphi Survey discussed in Manson (2000) ranked as number one Principal Leadership and Vision for effective use of ICTs. It stated that the Principal has to be a visionary leader championing ICTs, actively promoting, adequately funding and leading the push for ICTs within the school and furthermore that this role was not one that could be delegated to any other staff member.

Brennan (1997) also emphasised the key role of principals in developing the ICT vision for their school. Even if they do not understand technical aspects of ICTs they must have a vision of what ICTs can do for the students and be instrumental in communicating this to the whole school community.

Principals need to understand where technology is leading society, how it will affect their schools, and how to lead teachers to utilise ICTs in their classrooms. Superintendents and Principals as well as classroom teachers must understand where technology is going and what the ramifications will be for education.

Generally, we don't expect principals to be intimately familiar with all the curriculum and performance standards in every content area and grade level. But they should know that technology standards exist (local, state, and national), to have studied them enough to know the general areas and trends they address, and to work with teachers to develop a vision and an approach to implementing standards-based learning activities. (Eib, 2001, p.17)

2.3.1.2 Principals modeling ICT use

Before attempting to lead teachers into the technological world, school leaders should learn a substantial amount about the Internet, including HTML, search engines, browsers, protocols, connectivity, and more. They need to understand how technology is driving the world of today through E-mail, E-commerce, and E-learning.

Similarly Jones (2001) stated that according to Jon-Paul Roden, a retired department chair for Computer Science for the Vernon Public Schools in Connecticut, administrators should become familiar with instructional strategies for integrating ICTs into teaching. Principals should also be able to evaluate teaching practices and model "best practice". Teachers will not embrace the technology when their principals have not done so. He recommended that principals should use the schools web-site as a vehicle for communication, powerpoint presentations at meetings and online professional development opportunities.

In an Australian study of teachers' computer anxiety and appropriate staff development (Russell & Bradley, 1997), modeling appropriate ICT use by the Principal was emphasised by those interviewed as an important factor in successful implementation of ICTs in the school.

Brennan (1997) also discussed the important role Principals play as role models in the use of ICTs. Further he referred to “wise principals” who identify key individuals (from staff, school council and parents) to be part of a steering committee to act as a catalyst for the formulation and implementation of the ICT vision.

2.3.1.3 In reality

In a survey conducted by California’s Computer-using Group less than 40% of teachers considered that their administrators were showing active leadership in bringing technology into the classroom (Casey, 1993).

Principals have the capacity to be proactive and influence through modeling etc. the use of ICTs in the curriculum, but in reality with the many roles of a principal they are more likely to delegate to a person who is suitably qualified to take on this leadership role in IT. Heck and Wallace (1999) talked about the need for leaders to subscribe to shared leadership that inspires and empowers others.

The report, *Real Time: Computers, Change and Schooling* (2000), showed that principals rate information communication technology as extremely important and more than 60 per cent placed ICTs among their three highest budget priorities. The top demand was to provide hardware and software for students, whereas there was far less commitment to technical support and staff development.

Too often principals consider that their major role is to ensure that there is adequate acquisition of hardware and software. This alone does not guarantee that technology will be integrated into the curriculum to significantly enhance learning. Principals must also understand how technology supports learning objectives if they are to evaluate its usefulness in their schools and help teachers determine when and where it is appropriate practice (Eib, 2001).

Hall (2001) stated that most principals do not have technical backgrounds and lack the training to integrate technology into the curriculum. In his work with pre-service administrators he found that Principals were not taught how to use technology as undergraduates and that they do not have a good concept of how to integrate technology into the classroom.

To overcome some of the problems mentioned above, Schiller (2000) recommended that school Principals in nearby schools or districts form a cluster to meet regularly to focus on issues relating to ICTs. This form of networking and mutual support appears to be an important aspect of Professional Development for school leaders in their use of ICTs.

2.3.1.4 Summary

The factors identified from an investigation of a small number of primary schools in one area of New South Wales in Australia, summarises the important role the principal plays in a school with regard to successful implementation of computers (Schiller, 1999). Those factors were:

- a continuous focus on a school information technology policy development and planning for computers in schools;
- many opportunities for teachers to experiment and ‘play’ with computers in a non-threatening environment such as the staffroom or at home;
- acknowledgement by the school leaders that there are large variations in teacher computer competency and understanding of computer applications to teaching and learning;
- the recognition that competency and understanding of computer applications develops in stages and that individuals reach these stages at different times and through different ways;
- active involvement with computers by the school principal, including modeling their use; and
- provision of adequate technical support, often through the allocation of a member of staff and sometimes through employment of a part time person to maintain the hardware and software and to provide assistance. This person becomes a key resource person for staff and students.

2.3.2 The teacher’s role (pedagogical, technical)

With increases in the purchases of technologies by schools there is a much greater expectation placed on teachers to effectively use these technologies in their teaching and learning programs

Educators are urged to incorporate technology into instruction, but the effectiveness of educational technology is determined by teachers’

readiness to use it, not by its mere presence in the classroom. (Jones, 2001, p. 35)

A survey conducted by the National Centre for Education Statistics (NCES, 2000) found that less experienced teachers indicated that they felt better prepared to use technology than did their more experienced colleagues. Teachers found that the real challenge was not in learning new software but in developing lesson plans to incorporate new technologies.

The only way interactive information technologies can be used effectively in education, just as the only way the book could be used effectively, is to develop entirely new courses these courses could differ greatly in form, content and teacher role. (Bork, 1993, p. 89)

The Pupil Autonomy in Learning with Microcomputers (PALM) project (Somekh, 1989) found four main barriers preventing teachers fully embracing technology. They are:

- a) teacher's self-image may conflict with the innovation (e.g. being a 'non-technology' person);
- b) a teacher's concept of teaching may put little value on change as opposed to expertise (this is usually associated with the belief that learning is the responsibility of the teacher rather than that of the student);
- c) an anxiety felt by the teacher, based on a feeling of incompetence (which they may feel ashamed to admit to the students); and
- d) teachers often experience frustration at technological failures that jeopardise a class session.

Further, an ethnographic study of the introduction of computers in a primary school in the East Midlands of England by Blease and Cohen (1990) found that teachers "lack confidence in themselves as computer users" (p.33) was the main factor in their reluctance to consider computers as part of their professional repertoire. A major part of the confidence problem of teachers was related to the fact that they felt less competent than some students in using computers.

Russell and Bradley (1997) found that teacher apprehension and even phobia about the use of computers in the classroom resulted in ICTs remaining isolated from the mainstream of learning experiences. A report in the UK (Harris, 1999) also found

that teachers lack confidence and competence in the use of ICTs. In a 1998 Australian study of over 200 schools which examined the information technology skills of students, the findings indicated that proportionately more students than teachers had acquired advanced computing skills.

(<http://www.detya.gov.au/schools/publicat.htm>)

The skills of teachers that most influenced their use of ICTs were those skills related to their competence in managing classroom activities, to their pedagogical skills, and less importantly, to their ICT-handling technical skills. However Sandholtz, Ringstaff and Dwyer (1990) state that frustration in learning how to use ICTs causes some teachers to give up at the early stages of adoption.

In a Dutch study (Veen et al., 1991, 1992) teacher factors outweighed the school factors in explaining the teachers' uses of computers. These teacher-level factors could be grouped into two categories: teacher beliefs and teacher skills. Most important of these were teachers' beliefs regarding what should be in their curricula (content) and the way in which their subjects should be taught (pedagogy).

Hannafin and Savenye (1993) also listed some research-based explanations for teacher resistance to using IT. These include:

- poorly designed software (Reiser and Dick 1990);
- doubt that IT improves learning outcomes (Wisk et al. 1990);
- resentment of IT as a competitor for students' attention (McMahon 1990);
- unsupportive administrators (Cuban 1989);
- increased time and effort required of the teacher (Cuban 1989);
- fear of losing control of "center stage" (Wisk et al. 1990); and
- fear of "looking stupid" in front of the class. (Wisk et al. 1990).

Comparing the results of the Dutch study with other research (see, for example, Fullan, 1982; Halkes & Olson, 1984; Nespors, 1987; Olson, 1988a, 1988b; Rutherford, 1977; Timmer, 1991; Wubbels et al., 1992) some common findings can be discerned. First, teachers hold views that persist during innovations. In the majority of their uses of ICTs, the teachers in the case studies did little that could be described as exploiting the overwhelming educational possibilities of information

communication technologies. The possibilities were not even considered. They began by using computers for their own convenience, e.g. by doing word processing. They then explored the use of computers in their classrooms in ways that involved little variation to their familiar pedagogical practices. Only gradually did they experiment with pedagogical settings that were more difficult for them. The need for control over the learning process of the students was an important issue. As previously discussed (Fullan 1982a, 1982b, 1985, 1991) educational change is a slow process and teachers need time to gain experience with the change.

Davis (1997) discussed the importance of pedagogical issues, namely, that classroom use of ICTs requires a different approach to teaching and learning. Classrooms need to be organised differently, teachers' views of teaching and learning need to be reassessed and teachers need to accept that some pupils will know more about the technologies than they do.

The Apple Classrooms of Tomorrow (ACOT) project indicated that over time, effective use of technology changed the role of the teacher in the following ways:

- beliefs and attitudes about the purpose and nature of instruction;
- interaction with students (moving from lecturing to guiding and mentoring);
- use of co-operative and task-related interaction among students; and
- collegial sharing among teachers.

Hannafin and Savenye (1993) stated that the interactive nature of ICTs, and the capacity for them to enable student-centered exploration, requires a "fundamental shift" (p. 28) in the role of the teacher. The teacher can no longer be a dispenser of information to relatively passive learners. They point out that terms like "manager of information," "coach," "guide," "organiser," "initiator," and "diagnostician," appear in the literature to describe the technology-oriented teacher's new role. Kook (1997) defines five roles that teachers will assume as they become more active in their use of ICTs:

1. information consultants;
2. team collaborators;
3. facilitators;
4. course developers; and

5. academic advisors.

The following quote summarises the ways in which the role of the teacher needs to change for technology integration to occur in the classroom.

The major challenges to be faced in the integration of technology in the classroom will be the pedagogical implications, the impact on the structure and content of curriculum, classroom organisation and practice and the changed role of the teacher..... The role of teachers in such classrooms will become that of guides, facilitators and learners, as teachers receive instruction, assistance and guidance from students. Different classroom management skills will need to be developed, as student/teacher interaction becomes more student-centred, and as students are encouraged to view their teacher as co-learner, losing centrality in the teaching/learning process.

(Department of Training and Education Co-ordination (NSW), 1997)

2.3.3 Requirements for technical assistance

Hardware and software problems are common in the early stages of an implementation. The Dutch study (Veen et al., 1991, 1992) found that technical assistance was essential for the teachers. Not only did they count on technical support for tasks such as copying software, but more significantly for collaboration during many of their ICT-assisted lessons in the computer laboratory.

Evaluations of the Model Technology Schools in California (Stearns et al., 1991) also found that the presence of on-site assistance with the technology is critical for success. Districts found that moving technical assistance personnel from a central site out into the schools during the implementation process was important in making curricular and instructional improvements happen.

Maddin (1997) stated that teachers without trouble-shooting skills are less likely to use technology. They set up a trouble shooting station and invited staff to review routine procedures for checking connections, fixing printer jams, installing new ribbons, loading paper, etc.

Extensive studies as part of the Apple Classroom of Tomorrow (ACOT) program in the USA (Sandholts, Ringstaff & Dwyer, 1997) observed that teachers, who had been

trained at Teacher Development Centers, were impeded in implementing what they had learned due to not being able to cope with technical problems when returning to schools that did not have on-site technical support.

McKenzie (1999) states three issues that require sustained commitment:

1. replacement of obsolete equipment every 36 months;
2. development of effective information resources; and
3. technical support staff to maintain and extend the network.

It is important that technologies are maintained and kept reasonably up to date as students and teachers will not use technologies that are inadequate to achieve the required tasks.

When working with technology, there is nothing that is more discouraging to students and teachers than lack of access speed, other than broken equipment. School leaders must have the staff to keep equipment functional and maintenance agreements to keep classrooms from becoming computer graveyards. It's important that school technology is approximately up-to-date, access speed is acceptable, and equipment is functional. (Hall, 2001, p. 41)

2.3.4 Time allocation

Fullan (1982) presented time as one of the most critical factors in adopting any new initiative: time to learn, time to practice, and time to reflect. Even when provided with quality technology professional development, teachers lack the necessary preparation time to practice and implement the new ideas and techniques they have learned. John D. Bransford, a professor of psychology at Vanderbilt University said

Professional development is the biggest bottleneck to the implementation of new technology in schools, and the reason is that teachers are so busy. (Zehr, 1997, p.7).

Learning to operate technology hardware, growing comfortable with many different software applications, developing management systems for student technology use, and redesigning lesson plans to make use of technology, takes a great deal of time. When combined with frustrating hardware glitches and software bugs, the task can become daunting for even the most determined.

McKenzie (1999) recommended that each teacher be given at least one week per year of invention time; that is time to translate new ideas and strategies into practical classroom lessons. Teachers need whole days away from the classroom to take ownership, put theory into practice and develop technology-enhanced learning experiences for their students. Other strategies he recommends are to give staff access to hardware and the Internet at home in exchange for the time they put in out of school hours, or to buy staff books relevant to ICT that they can read in their own time.

Maddin (1997) found that after-school workshops provide neither the time nor the context in which to effectively examine the impact of technology on learning. Short-term professional development, even when conducted intensely during summer months or intersession, cannot, by itself, produce change. Professional development must be accompanied by a well-designed maintenance plan that provides opportunities for teachers to talk about their issues, ask questions, and get feedback. By viewing the adoption of technology as a process that takes place gradually, schools can provide both the time and the resources to help teachers implement technology effectively.

In a report to the President of the United States (Panel on Educational Technology, 1997), a 1989 survey of 600 fourth- through twelfth-grade teachers conducted by the Center for Technology in Education found that lack of sufficient time was the greatest obstacle for the development of lessons using ICTs.

On average, teachers have only ten minutes of scheduled preparation time for each hour they teach. Since this is generally insufficient to adequately prepare for their classroom responsibilities, they typically spend additional hours outside the school day preparing lessons and grading student work, resulting in an average of 47 hours of work per week. Given such schedules, most teachers find it extremely difficult to reshape their teaching on an ongoing basis around a rapid series of technological innovations. ... Estimates formulated by various researchers suggest that it will take the typical teacher between three and six years to fully integrate information technologies into his or her teaching activities. (p. 27)

The Office of Technology Assessment (OTA) calls teachers' time shortage the "biggest barrier" to technology use in

classrooms. Schools that have excelled in bringing technology to learning have provided teachers with time to attend professional development, explore software, seek help from colleagues, and plan lessons that incorporate new technologies. These teachers have time to investigate online projects, visit Web sites, search for curriculum materials, and exchange ideas with a worldwide network of educators."Unless there are significant changes to the rhythm of the school day or changed incentives for giving teachers more time to learn and experiment with new technologies, this barrier to technology use will remain immense.
(Sherman, 1998)

Hattler (1997) found that "the biggest barrier to technology use is time for training, for trying out technologies, exploring uses of technology and discussing the role of technologies in teaching instruction. Durrell (1990) also found that teachers were frustrated with their computer skill and felt constrained by the lack of available time to discuss, analyse, and develop their skills.

2.3.5 Professional Development

Most teachers have not grown up, studied, or been trained in the digital era and do not have a natural frame of reference with which to judge the suitability of learning tasks which require the use of ICTs. Therefore they set low expectations and goals in this area because they themselves find technological tasks difficult.

According to Heck and Wallace (1999) staff development for ICTs occurs in stages:- awareness, information gathering, time management, concern about the impact on students learning, collaboration with colleagues and refocusing for improvement. They also referred to these stages as survival, mastering, moving towards learner-centred instruction and innovation.

Given these different stages, support for professional development needs to occur on many levels. Teachers need to have confidence in the use of hardware and software before progressing to curriculum integration and classroom administration.

All professional development requires answers to the following:

- Will PD activities be held during regular school hours, before school, after school, weekends or holidays?
- How will teachers be compensated if PD occurs outside their regularly scheduled day?
- What incentives (or penalties) will be provided to encourage teachers to participate?

Teacher professional development and ICT was a major part of the Rhodes and Cox (1990) study. They found that short courses were not very effective in promoting uptake and that teachers need an ongoing professional development programme. A major problem was the assumption that, with courses concentrating up to 97% of the time on technical aspects, teachers would be able to use the resource effectively in the classroom having spent only 3% of the time discussing educational applications. Even teachers who used ICTs regularly felt the need for additional professional development.

The ACCE (1999) stated that teacher ICT competence involves the development of attitudes and conceptual knowledge, which helps the teacher use ICTs in curriculum programs and work practice. For this to occur teachers must not only engage in PD for developing ICT skills but also be involved in PD for professional growth and pedagogy.

Far too often, principals are finding their treasured new technology collecting dust in many classrooms and labs (Benson, 1997; Yoder, 1991). This seems to occur because so much technology planning concentrates on hardware and software, to the detriment of professional development essential to make teachers knowledgeable and comfortable with ICTs. Only after teachers were given professional development in how to work the multimedia content into their lesson plans did teachers start using the technology available to them (Yoder, 1991). In other words, "headware," and not hardware seems to be the essential element in the successful integration of technology into the curriculum (Jukes, 1996).

McNabb et al. (1999) suggested that a variety of professional development strategies, such as hands-on training, long-term study groups, online courses, peer coaching and modeling, are required to meet teachers' varying learning styles in the pursuit of advancing the use of technologies. They also stated that one off workshops run off-site were generally ineffective, often providing training with hardware and software not readily available back at schools. Professional development must be flexible to accommodate individual learner needs and change in technology access.

A review of the literature uncovers a variety of approaches to professional development in technology, but a common theme is that the traditional ad hoc, one-time in-service model so commonly used by schools is a relatively ineffective method. Killian (1994) witnessed teachers being subjected to professional development which was "fearsomely technical," then returning to schools where technology was "old, inadequate, or not even installed," and with no access to any support staff. Teachers were expected to use technology as an addition to their classroom activities with no allowance made for time impacts or reduction of other duties. Some teachers did not see where the technology fitted into the curriculum at all, and their students did not get on line.

Russell (1999) suggested that the Australian education system needs to encourage teachers to practice their ICT skill both at home and at school and that training activities need to be provided which are related to the school curriculum. Such activities must be consistent with the teachers' perceptions of their needs, and not be imposed by administrators who believe that they know what teachers want.

Lack of teacher professional development (and appropriate follow-up) has been linked time and again to be a major contributing factor to the failure of true reform (Goldberg & Richards, 1995; Johnson, 1996; Levin & Thurston, 1996; Means, Olson, & Singh, 1995; Mehlinger, 1996). If teachers are expected to integrate technology in meaningful, authentic ways, they need to be trained to use hardware and software beyond exposing their students to word processors and rote drill experiences.

Much of the PD offered to teachers has concentrated on how to use software applications, i.e. cool things to do with Excel, rather than looking at applications for Excel in the classroom such as how to crunch census data in social studies. The aim is not to train teachers but to show them how new technologies combined with rich information can powerfully change what is happening in classrooms. To further support teachers in this endeavour they need mentors, coaches and “just-in-time-help” which will promote risk taking and growth (McKenzie, 1999).

McKenzie also talked about “Technology Coaches” where every teacher becomes a technology coach. The staff agrees upon 30–100 “ICT talents” and carves them up amongst themselves; in this case every staff member become good at some aspect of technology.

Teachers need a certain level of technical competence to use technology effectively in instruction (Bitter & Yohe, 1989), and many teachers are seriously deficient in these basic technology skills (Willis et al., 1995). Teachers who develop technical competence also gain the confidence to use technology in their classroom. Basic technology skills are necessary for teachers to implement a program of instruction that integrates information literacy.

Technical confidence is important to teachers because it gives them a sense of autonomy in their work at classroom level. However, excellence in technical aspects of computers alone cannot guarantee effective learning opportunities for pupils. Non-teachers (e.g. parents, helpers) can also acquire technical expertise. Other capabilities such as those of curriculum organisation and classroom management are essential to teachers providing appropriate learning experiences. (Birch, 1995, p. 45)

In a national survey of teachers conducted by the University of Minnesota (Dexter & Anderson, 1998) it was shown that the precursors to teachers adopting ICTs for their teaching were the availability of hardware and appropriate software, technical support and compatible logistical arrangements. Another precursor was that their “technological imagination” had been cultivated. That is, either through modeling by a colleague, a class or their own exploration they had seen how ICTs would help them achieve the goal they had in mind.

Neiderhauser (1996) recognised that professional development should occur at home school sites, rather than in teacher professional development laboratories, so that teachers gain familiarity with the equipment and software they will ultimately use with their students. Teachers need demonstrations of hardware and software to get a sense of what is available but this should be hands-on, working with specific technologies on relevant tasks. Teachers must become information literate before they can provide an information literacy program for students.

Beth Randklev, principal of Ben Franklin Elementary School in Grand Forks, North Dakota, says that when teachers take professional development courses, they don't always remember everything when they return to their own school's technologies.

Often, what stops people is one little thing that they didn't know how to do. If you have a room full of kids [when something goes wrong] it discourages you from trying it again (Zehr, 1997, p.3).

The most common barrier to adequate professional development is the expense involved. Without professional development, however, other technology spending has a marginal effect (Boyd, 1997). A 1993 survey of districts by the research firm, Market Data Retrieval, showed that the average percentage of a school district technology budget devoted to professional development is just 15 percent (Zehr, 1997). Policy makers and administrators find it easier to spend money on tangible items like technology hardware that can be shown to the community (Zehr, 1997).

Much of the literature recommends that 30-40% of a school's technology budget be devoted to professional development. (Goldberg & Richards, 1995; Levin & Thurston, 1996; Panel on Educational Technology, 1997). Without a wider professional development context, there is no culture of continued learning, and without a culture of continued learning, there is no hope for sustained and lasting impact (Goldberg & Richards, 1995).

Research suggests that early enthusiasm for technology integration is likely to dissipate if proper support is not provided during the implementation phase (Alderman & Panton Walking-Eagle, 1996; Garavaglia, 1996; Kopp & Ferguson, 1996 and Software Publisher's Association, 1996) including a comprehensive maintenance system that promotes the use of newly acquired skills.

The 'learning from colleagues' and 'learning by doing' is a favoured model for computer training (Russell & Bradley, 1997). Much of the literature recommends the implementation of mentors based within schools.

The first step in building capacity is to identify teacher leaders who are willing to mentor, coach and collaborate with their peers. This leadership team should be afforded opportunities to

1. observe exemplary classrooms in other districts
2. receive additional IT professional development
3. develop model lessons based on specific district curriculum outcomes and
4. collectively reflect upon their experiences.

(Maddin, 1997, p. 56)

In a study by Williams and Moss (1993), teachers indicated a strong preference for receiving training from their ICT co-ordinator rather than from experts external to the school. However many teachers found that the lack of appropriate knowledge of content and pedagogy by their ICT co-ordinator in their subject area was a major barrier to effectively implementing ICTs into the curriculum (Pelgrum & Plomp, 1991; Kennewell, 1997). This was seen as even more critical in the later years of education where the syllabuses were more demanding.

The work of Joyce (1990) and others have demonstrated that sustained, lasting change in performance is most likely to occur when teachers partner with one another and meet regularly over many months to discuss strategies and swap stories.

McKenzie (1999) stated that programs that emphasise coaching and mentoring are the most effective ways to convert reluctant colleagues into enthusiastic users of technologies. This is because the learning opportunities provided match the readiness and skill level of the teacher. Technologies are used to support the teacher's goals within the context of the curriculum.

Jones (2001) stated that experienced teachers do not turn to institutions for technology assistance but look to each other for help. Today a small percentage are doing so online. According to Coley, Cradler, and Engel (1997), 16 percent of teachers currently use telecommunications for professional development. To incorporate technology into their classrooms, teachers are participating in online

discussion groups, forums, e-mail lists, bulletin boards, message boards, and chat rooms.

Coley and colleagues recommend that professional development for technology integration should:

- be driven by a clear understanding of the local needs of teachers;
- emphasise hands-on experience, especially for technology use professional development;
- use peer coaching rather than lecture format;
- integrate technology professional development into other professional development programs in the school and district;
- involve administrators as participants with teachers in staff development programs on technology use and integration in the curriculum;
- provide the release time needed for teachers to apply what they learned in professional development;
- provide follow-up support for implementation of technology skills learned in professional development;
- give teachers access to resources needed to implement what was learned in professional development; and
- facilitate communications among teachers-use telecommunications technologies to help teachers communicate and share their professional experiences.

(Sherman, 1998)

Similarly Collis (1988) recommended the following strategy for successful staff training:

- identify each teacher's "level of concern" and tailor in-service training to the level participants are at: encourage each teacher to identify his or her current level and to aim for progression to the next level;
- provide opportunities for local school exchanges (information exchange, collaboration, or evaluation);
- provide some incentive for time and effort;
- organise a place where teachers can learn and plan together;
- let teachers take computers and software home;

- choose a school target for a year, such as school-wide development; and
- evaluate teachers' efforts and growth in computer applications, being sensitive to the level each teacher is at.

One of the models for professional development discussed in McNabb et al. (1999) has the following properties:

- open technology lab time for experimentation;
- hands on projects;
- peer mentoring;
- show and tell;
- technology skill of the month club;
- release time to observe exemplary practices;
- team teaching with technology;
- tangible rewards;
- recognition of technology rich professional practices;
- on-site technology conferences;
- release time to attend conferences;
- action research; and
- professional reflection on practices.

Data gathered in the Hunter Valley of New South Wales in Australia (Schiller, 1999) demonstrated that successful IT staff development strategies used by principals and their leadership teams included:

- placement of computers into school staffrooms;
- encouragement for teachers to take school computers home over weekends and holiday periods. Some schools have purchased laptop computers to facilitate this;
- regular IT discussion and frequent, brief workshops during staff meetings;
- one-on-one practice sessions during lunch breaks or after school;
- peer tutoring;
- team teaching with, and shadowing of, more experienced colleagues;
- encouragement to attend computer courses within the system and from other providers such as TAFE, or private training companies;
- assistance from friends and colleagues who are more computer literate;

- use of 'train the trainer' approaches; and
- clear identification/appointment of 'technology leader/s' in the school.

It is important that schools do more with their technology budgets than just buy hardware and software if they want the technologies to be used by teachers.

If you look at the resources going in to help teachers use the technology, then things haven't changed much in 20 years, the focus has always been on the cost of hardware and software – but that's only about 15 per cent of the real cost. If you don't provide adequate resources to train the teachers, you end up with all this stuff being wasted. (Bigum, 2000, p.14)

Current literature on teacher learning indicates that a change in teaching practice will happen if planned professional development workshops incorporate a commitment to try new ideas in their classroom the next day; allow modification of workshop ideas to work in their classroom or school; allow time for teachers to try new ideas and evaluate effects; provides a suitable and sympathetic environment for participants to report success or failures to the group; allow participants to discuss problems and solutions regarding individual students and/or teaching matter; and encourage participation in a wide variety of teaching and learning approaches.

Therefore sending teachers to one-off workshops in most cases will do little more than show them what can be done. In addition to this they need pedagogical support in collaboration with colleagues.

Researchers warn against relying on one-shot workshops or classes that focus on mechanics rather than content. "What teachers actually need," the panel writes, "is indepth, sustained assistance as they work to integrate computer use into the curriculum and confront the tension between traditional methods of instruction and new pedagogic methods that make extensive use of technology. Such assistance should include not only purely technical support, but pedagogic support as well, ideally including classroom observation within the classrooms of successful technology-using teachers, periodic consultation with more experienced mentors, and ongoing communication with other teachers grappling with similar challenges. (Sherman, 1998, p. 8)

A large percentage of teachers remain reluctant and skeptical to the use of new technologies. Professional Development programs have been designed for the enthusiasts and have failed to convert reluctance into enthusiasm. Becker (1999) found that as many as seventy percent of teachers in American schools fall into the

“reluctant” or “late adopter” categories when it comes to the use of new technologies.

McKenzie (1999) argued that technology reluctants have special needs, interests and learning styles that need to be addressed if we expect all teachers to embrace new technologies. He further suggested that PD strategies that use teachers teaching teachers would help to reach late adopters and reluctant technology users and to make explicit connections between the work of teachers and Information Technology tools.

Moore (1991) found that the expectation of late adopters was for new technologies to make a very big difference in outcomes and performance. They also have little tolerance of needing to be presented with compelling evidence that their time and effort will pay big dividends before they are willing to make any change. He also found that they expected a complete package, which provides a total solution that is user friendly, complete and well supported.

2.4 ACHIEVING AN INFORMATION LITERATE SCHOOL

McKenzie (1999) presented ten lessons (Table 2.3) to reach the goal of an “information literate school community”.

Table 2.3
McKenzie’s 10 Secrets of Success

Lesson One
Spend 25% or more of the Technology Budget on Staff Learning Provide 15 –60 hours annually per teacher for several years
Lesson Two
Clarify Purpose – Problem solving & Decision Making
Lesson Three
Replace Staff Development and Training with Adult Learning
Lesson Four
Designate Student Learning as the Cause (not Applications)
Lesson Five
Address Emotions and the Challenge of Transfer
Lesson Six
Create Teams and a Culture of “Just in Time Support”
Lesson Seven
Use Surveys and Assessment to Guide Planning
Lesson Eight
Provide Time for Invention and Lesson Development
Lesson Nine
Hook the Passions of ALL Teachers
Lesson Ten
Persist

(McKenzie (1999, pp. 66-74)

Further to this McKenzie (1999) presented 11 signs to look for (Table 2.4 on page 47) to determine if a school is truly an “information literate school community”.

Table 2.4
McKenzie's Signs of Progress for an Information Literate School Community

Invention
Much of the school program ($\geq 25\%$) is dedicated to problem-solving, decision-making, exploration and the creation of new ideas. Both teachers and students are increasingly engaged in the discovery and building of meaning around challenging questions drawn from the curriculum.
Fluency
Teachers move back and forth between an array of instructional roles and strategies. Sometimes they are the sage on the stage. Other times they are the guide on the side. They are acquiring an expanding toolkit of strategies.
Support
The school provides ongoing support for all learners to develop thinking and information skills. These opportunities are rich, frequent and embedded in the daily life of the school.
Navigation
Learners are developing the agility to find their way through the new information landscape with little lost time.
Searching
Learners apply Boolean Logic. They search with appropriate syntax. They employ powerful search strategies to carve through mountains of information.
Selection
Learners know how to separate the reliable from the unreliable source. They recognise propaganda, bias and distortion.
Questioning
Learners know how and when to employ dozens of different types of questions. Some are best to solve a problem. Others help in making a decision.
Planning
Learners are acquiring planning and organisational skills. They make wise choices from a toolkit of research strategies and resources. They learn when a particular strategy might produce the best results.
Interpretation
Learners convert primary sources and raw data into information, and then proceed further (beyond information) to insight. They translate, infer and apply what they have gathered to the issue at hand.
Deep Thinking
Learners combine deep thinking and reading with a wide-ranging search for relevant information. This quest for information is but the prelude to more important work ... solving a problem, creating a new idea, inventing a product or composing a symphony.
Commitment
All curriculum documents include clear statements regarding the information literacy expectations that are developmentally appropriate for each grade level.

(McKenzie (1999, pp. 60-62)

2.5 SUMMARY

As with any educational change process, embedding ICTs into the curriculum requires teachers and principals to work together. All players in the change will bring to the process varying levels of understanding, enthusiasm and comfort. They must be prepared for false starts and a certain amount of discomfort as they progress through the various stages of change. With a successful change individuals will experience changes in their behaviour, thinking, knowledge, skills and attitudes.

The literature review has analysed from the current research five key factors that assist schools in embedding ICTs into the curriculum. In summary they are:

1. **Principals** need to lead by example through modeling the use of ICTs in their teaching and management. They should be communicating via E-mail, video-conferencing, powerpoints etc. to their staff and the community. They must also be instrumental in developing the ICT vision for their school and communicating this to the entire school community. Finally they need to identify key individuals and provide support both financially and moral to ensure that the ICT vision for the school is realised;
2. **Teachers** are key to the entire change process. Teachers need to have accepted the need to incorporate ICTs into their practice and feel supported in doing so. The critical change faced by teachers is to move from being the “sage on the stage” to becoming a facilitator and guide. Most importantly teachers need to be given time to develop skills and build confidence;
3. **Technical assistance** is particularly important for the majority of teachers who have not been brought up or educated in the digital world. One of the major factors shown to inhibit teachers from progressing through the change process is equipment failure. Many teachers give up in frustration when a whole lesson that they have invested a lot of time and energy in preparing cannot be achieved due to unreliable technology. Hence the literature strongly recommends on-site, just-in-time technical support;

4. **Time** is required for all change processes. Some of the literature talks about a five to six year time frame required for teachers to progress to the innovation stage of technology integration, and this is when all other factors are favourable. It is important that time be given to carefully develop the ICT vision as well as an appropriate time allocation to sell the vision to the whole school community in order to bring all players actively into the change process. Once this has occurred, time needs to be given for teachers to develop skills, practice and reflect on their practices and to work collaboratively with their colleagues; and

5. **Professional Development** is essential for teachers to develop the necessary skills and share best practices. Millions of dollars are spent on professional development to embed ICTs into the curriculum. The literature gives us examples of good and bad professional development models to meet this outcome. Some of the key points are:
 - 30–40% of the schools technology budget should be devoted to ICT professional development;
 - hands-on, on-site professional development run by colleagues has shown to be the most successful mode;
 - IT projects should be based on real projects;
 - Individual programs are required to meet individual preparedness and needs;
 - Do not ignore or give up on “technology reluctant”; and
 - Provision of just-in-time PD is essential

This literature review covers the five factors discussed above. Many of the studies tend to focus on only one of the factors at a time. Much of the recent research also focuses heavily on factors inhibiting the integration of technology into the curriculum. This case study will look at all the factors, but focusing on the key factor; teachers and their changing role. The outcome will be to recommend a model for schools to effectively embed ICTs into their everyday curricula.

Chapter 3 Methodology

3.1 INTRODUCTION

This chapter describes in detail the methodology used in the study. The rationale for the use of a case study is presented. The particular case under examination is defined and the methods used for data collection are discussed. The chapter concludes by describing the procedures employed for organising and analysing the data collected in the case study.

3.2 QUALITATIVE CASE STUDY

Qualitative research in education covers several forms of inquiry that help to explain the meaning of social phenomena with as little disruption to the natural setting as possible. A case study methodology is used to address problems in which understanding is sought in order to improve practice (Merriam, 1988). Case study research is the most widely-used approach to qualitative inquiry in education. Case study researchers collect intensive data about particular instances of a phenomenon, seeking to understand each instance on its own terms and in its own context (Gall et al., 1996).

Characteristics of qualitative research that figure prominently in case studies include the study involving *fieldwork*, the researcher being concerned with the *process* rather than outcomes or products; the researcher being the *primary instrument* for data collection and analysis with the aim to interpret *meaning* i.e., how the participants interpret their experiences (Merriam, 1988). Case studies are designed to bring out the details from the viewpoint of the participants by using multiple sources of data.

Merriam (1988) also discussed four characteristics of case studies.

1. *Particularistic* meaning the case focuses on a particular situation, event, program or phenomenon;

2. *Descriptive* meaning the end product from the study is a rich description of the phenomenon under study;
3. *Heuristic* meaning that the case illuminates the reader's understanding about the phenomenon under study by bringing about new meaning, extending their experience, or confirming to them what is known; and
4. *Inductive* meaning that for most part the study relies on inductive reasoning with generalisation, concepts or hypotheses emerging from the data.

The above characteristics can all be found in this study. The researcher was the *primary instrument* in collecting data and analysed it using *inductive reasoning* to develop generalisations. It used the *particular* experiences of teachers working in their normal environment (*fieldwork*) to gain an insight (*meaning*) into the factors that contribute to empowering teachers to embed ICTs into their teaching and learning programs in order *to improve future practice*.

As a lighthouse school the College environment provided a natural setting for the case study. Being a lighthouse school required the college to draw up a partnership agreement (*Direction Two*) between the Government, the school, its parents, and members of the local community. The partnership agreement established targets for improved outcomes that the school wanted to achieve. The College's Partnership agreement with regards to technology stated:

1. All learning areas will have a plan to embed IT in the curriculum;
2. 80% of staff will acquire as a minimum, the equivalence of Educational Computing Professional Development Modules one, two and three within two years of assignment at the College;
3. Staff professional development will improve staff IT skills as measured against the yearly staff audit;
4. A process to monitor and accredit student IT skills will be in place; and
5. The student profile will demonstrate increased skills.

Bromley (1986, p. 23) stated that case studies, by definition, "get as close to the subject of interest as they possibly can ...". Yin (1994) suggested that the researcher must possess or acquire the following skills: the ability to ask good questions and to interpret the responses, be a good listener, be adaptive and flexible so as to react to

various situations, have a firm grasp of the issues being studied and be unbiased by preconceived notions. In this case study, the researcher has had years of experience in using ICTs in both teaching and administration and her many years in the school in which the study took place ensured that her familiarity with staff, school policies and procedures assisted her in getting close to the subject.

1.3 SELECTING SUBJECTS FOR THE CASE STUDY

The study was conducted in a Tasmanian Senior Secondary College (yrs 11,12,13; ages 16 to adult) where the researcher had been a teacher for 14 years. To select the teachers and subjects/learning areas for the case study, all learning area managers were asked to do the following:

1. Document the use of technology in their learning area.
 - Use of hardware i.e., own lab, Learning Resource Centre (LRC), computer laboratory bookings, one computer in the classroom.
 - Types of software used, e.g., CD ROMS, Internet, word processors, and subject specific software.
 - Ways in which the technology is integrated into the curriculum e.g., as a regular part of the teaching program, used to teach entire topics with little teacher intervention, used in combination with teacher instruction, used by students as part of their own study time.
 - Frequency of use i.e., nearly every lesson, weekly, monthly, once per term.
 - Teaching strategies that teachers have employed that they have found successful when integrating technology into the curriculum.
2. Indicate what their learning area/subject would do to incorporate technology into the curriculum given access to hardware, software and PD.
3. Outline why their Learning Area (LA) or subject should be selected for a pilot program which will give their LA priority to resources such as hardware (mini-labs), software, e-mail for students, PD and classroom support.

From this information, three groups were selected, LOTE, English, and Mathematics. They were chosen because they each varied in their pre-study use of technologies. LOTE used technologies the most, Mathematics hardly at all, whilst the English area was somewhere in between. It was felt that the variation would give greater insight into the requirements for ICTs to be embedded successfully. The selection was made to maximise what could be learned in the period of time available for the study.

In more detail the three study areas were:

1. **LOTE** (Languages Other Than English) learning area.
Subjects: French, Japanese, Italian, German Stages 1 to 3 (see syllabus Appendix 1a, b and c)
4 subject teachers involved plus one support person.

2. **Maths** learning area.
Subject: Maths Applied Stage 1 (see syllabus Appendix 2)
2 subject teachers involved plus one support person.

3. **English** learning area
Subject: English 617 (see syllabus Appendix 3)
2 subject teachers involved plus one support person.

There were three support persons for the study, one for each learning area. The support people were selected because they were experienced and exemplary teachers in the learning area that they were supporting. In addition to this they had demonstrated the use of IT in their teaching programs and had technical IT skills to support their teaching programs when using IT. All had completed ECPD modules 1, 2 and 3 and two of the support persons wrote the ECPD modules and taught them to staff across the State. The selection of the support persons was done by the researcher and the Assistant Principal in charge of technologies at the College. The process involved classroom observation and discussions. The support person's role was to assist the pilot group to find appropriate resources and provided professional development in the use of IT and its incorporation into the teaching and learning program.

All teachers involved in this pilot program had completed or were near completion of the first three modules in the ECPD project. The school was also designated a *lighthouse school* prior to and throughout the study. Being a lighthouse school entailed many things, but with regard to technology it provided the following additional resources to the school in the year the case study occurred:

- one laptop computer per full time staff member;
- ten extra multi-media computers for student use;
- peripherals such as digital camera, scanner, data projector;
- limited software licencing; and
- one extra person for ITPD. (This extra staffing quota was dedicated to this pilot program)

3.4 DATA COLLECTION

Data in this study was collected using a case study approach.

Yin (1994) identified six primary sources of evidence for case study research:

- documentation;
- archival records;
- interviews;
- direct observation;
- participant observation; and
- physical artifacts.

Table 3.1 on page 53 discusses the strengths and weaknesses of Yin's sources of evidence.

The use of each of these sources of evidence requires different skills from the researcher. It is not essential to use all sources in every case study, but it is important that multiple sources of data are used to establish a reliable study. A case study should therefore use as many sources as is relevant to that case study.

Table 3.1
Types of Evidence

Source of Evidence	Strengths	Weaknesses
Documentation	<ul style="list-style-type: none"> • stable - repeated review • unobtrusive - exist prior to case study • exact - names etc. • broad coverage - extended time span 	<ul style="list-style-type: none"> • retrievability - difficult • biased selectivity • reporting bias - reflects author bias • access - may be blocked
Archival Records	<ul style="list-style-type: none"> • Same as above • precise and quantitative 	<ul style="list-style-type: none"> • Same as above • privacy might inhibit access
Interviews	<ul style="list-style-type: none"> • targeted - focuses on case study topic • insightful - provides perceived causal inferences 	<ul style="list-style-type: none"> • bias due to poor questions • response bias • incomplete recollection • reflexivity - interviewee expresses what interviewer wants to hear
Direct Observation	<ul style="list-style-type: none"> • reality - covers events in real time • contextual - covers event context 	<ul style="list-style-type: none"> • time-consuming • selectivity - might miss facts • reflexivity - observer's presence might cause change • cost - observers need time
Participant Observation	<ul style="list-style-type: none"> • Same as above • insightful into interpersonal behavior 	<ul style="list-style-type: none"> • Same as above • bias due to investigator's actions
Physical Artifacts	<ul style="list-style-type: none"> • insightful into cultural features • insightful into technical operations 	<ul style="list-style-type: none"> • selectivity • availability

(Yin, 1994, p. 80)

The rationale for using multiple sources of data is the triangulation of evidence. Triangulation increases the reliability of the data; in the context of data collection, triangulation serves to corroborate the data gathered because of the number of sources the data are obtained from. Case study is known as a triangulated research strategy.

Snow and Anderson (cited in Feagin, Orum, & Sjoberg, 1991) asserted that triangulation can occur with data, investigators, theories, and even methodologies. The need for triangulation arises from the ethical need to confirm the validity of the process.

This case study employed the use of multiple means of data collection including journals, interviews, observation and surveys. The study was conducted over the period of one academic year, from May to November.

3.4.1 Qualitative Data Collection

3.4.1.1 Documents

For case studies, the most important use of documents is to corroborate evidence from other sources. If the document should in fact contradict other evidence then the researcher has reason to inquire further into the topic.

a) *Journals*: The 11 teachers involved (Five from LOTE, three from English and three from Mathematics) were asked to fill out journals on a weekly (see Figure 3.1 on page 58) and monthly basis (see Figure 3.2 on page 59) for the duration of the study. The journals were structured with open-ended questions related to the topics under investigation as well as allowing the teachers to put in any other comments they felt relevant. The journals elicited the teachers' attitudes, beliefs and views of the phenomenon under study and due to their frequency allowed for any changes in these measurements to be noted throughout the study.

b) *Meetings*: Twice throughout the study there were meetings of all staff involved in the pilot groups. Meetings of Learning Areas were held on a more regular basis. Minutes of these meetings were taken and in most cases taped. (See an example in Appendix 4.) Yin (1994) cites minutes of meetings as an example of documents.

Using such materials in qualitative research is not much different from using interviews or observations (Merriam, 1992). The journals provided information on a regular basis from the staff, giving their own perceptions of how things were proceeding.

On the other hand the data obtained from meetings provided an opportunity for staff to discuss their progress and share their experiences. Often verbalising in this way and bouncing ideas off others resulted in a greater insight as to what had actually occurred. This method also resulted in a degree of action research in the case study.

Action research is where participants in the research investigate their own practice with the aim of improving it. The term indicates that there is not the normal separation between research and the application of its outcomes at a later stage.

Instead, research and action are integrated in a cyclical process of collecting evidence (data), examining it very closely (analysis), deciding if there are any implications (interpretation), planning a course of action on the basis of this evidence, putting this into practice, and evaluating it by collecting data, analyzing it and interpreting it, and so on. (Somekh, 1997, p. 114)

Kemmis (1993) discusses some of the benefits relevance of action research.

But it is also critical in the sense that it is activist: it aims at creating a form of collaborative learning by doing (in which groups of participants set out to learn from change in a process of making changes, studying processes and consequences of these changes, and trying again). It aims to help people understand themselves as the agents, as well as the products, of history. In my view, action research is also committed to spreading involvement and participation in the research process. (Kemmis, 1993, p. 3)

Hence both methods of document collection provided invaluable data to the case study as well as ensuring triangulation of evidence.

WEEK **Week ending Friday** **Date filled in**

Classes you teach in the program are,,

How many lesson did you teach this week of classes involved in the pilot program?.....

How many of these lessons involved the use of technology in your actual classroom teaching?

What sort of technologies/software did you use?

SOFTWARE	NO TIMES USED
Presentation software (Powerpoint)	
Internet	
Wordprocessing	
Spreadsheet	
Database	
E-mail	
CD-Roms	
Satellite Program	
Subject Specific software <i>(fill in as required)</i>	
Subject Specific software <i>(fill in as required)</i>	
Subject Specific software <i>(fill in as required)</i>	
Subject Specific software <i>(fill in as required)</i>	
OTHER	

Give any details of use that you think may be of interest

What was the highlight in using technology for this week?

What was the low point in using technology for this week?

What technical problems did you have this week?

Any other comments that you would like to make about this week?

Figure 3.1
Weekly Journal

Teacher 1
MONTH Date filled in
Classes you teach in the program are,,
QUESTIONS
<p><u>Technical support</u></p> <p>Time in preparation</p> <p>Successes</p> <p>Failures</p> <p>Changes to your teaching methodology</p> <p><u>Changes to students</u></p> <ul style="list-style-type: none"> • Attendance • punctuality • motivation • research skills • quality of work • autonomy • group work <p><u>Other</u></p>

Figure 3.2
Monthly Journal

3.4.1.2 Interviews

Dexter (1970) observed that interviewing is used when it enables the investigator to get better data, or more data, or data at less cost than other tactics. Interviews were used to find out things that could not be directly observed, such as the teachers' feelings, thoughts and intentions, thus finding out what was going on in their minds.

Interviews are often one of the most important sources of data in a case study. They usually take one of three forms: open-ended, focused, or structured. In an open-ended interview, the researcher asks for the informant's opinion on events or facts. This may then serve to corroborate previously gathered data. In a focused interview, the respondent is interviewed for only a short time, and the questions asked could have come from the case study protocol. In a structured interview the questions and order in which they are asked are determined ahead of time. Structured interviews can be considered an oral form of a written survey.

In this case study, interviews were used as they were perceived to be an excellent technique for collecting data with greater depth, breadth and detail than, for example, questionnaires. The interviews were set up to be an interactive dialogue with opportunities for both the researcher and participant to seek shared understanding (Lather, 1991).

At the end of the school year all staff from the LOTE, two out of the three of the staff from English and two out of the three staff from mathematics were interviewed. The researcher used the following open-ended questions with some impromptu questioning to further explore answers:

- I. In what ways has the introduction of IT changed
 - a. Pedagogy?
 - b. The curriculum?
 - c. Classroom management/organisation?
 - d. Student assessment?
 - e. Planning to teach?
 - f. Time spent preparing, etc?

- II. What support have you had in terms of
 - a. Technical?
 - b. PD?
 - c. Other staff?
 - d. Students?

- III. What is your vision for education in the future? In particular, what role do you see technology playing in benefiting student learning?

- IV. What influence will the introduction of computers into classrooms have on the
 - a. Ways in which students' learn?
 - b. The role of teachers?
 - c. Curriculum?

- V. How difficult has it been for you to incorporate IT into the curriculum? .

- VI. What support structures do you think the DETCCD should be putting into place to meet *Direction 6*?

The interviews were taped and later transcribed. (See an example in Appendix 5) During the interviews the researcher also took notes to record her own reactions and thoughts at the time of the interviews.

3.4.1.3 Observation

In the promoted position of Advanced Skills Teacher 3 (AST3) Technology the researcher documented through observation the views of the staff involved in the Pilot program as well as all staff in the college with regards to their attempts to embed ICTs into the curriculum.

The case study used the “*observer as participant*” (Junker 1960) method. This is also referred to as participant-observation. Participant-observation is a special mode of observation in which the researcher is not merely a passive observer. Instead, the researcher may assume a variety of roles within a case study situation and may

actually participate in the events being studied. The main concern is the potential bias of the researcher as an active participant.

A variety of methods were used to document the observations, the main one being recall after the observation periods to produce reflective memos.

3.4.1.4 Surveys

During the study year all staff at the College completed a survey on their use of computers and views on aspects of embedding IT into the curriculum (see Appendix 6). This allowed for comparison of the staff selected for the case study with the entire staff at the College. It allowed conclusions to be drawn as to how well the sample represented the entire school staff.

3.4.2 Quantitative data collection

Quantitative data produced by the investigator fall into the category of documents and are used to support the case study investigation.

3.4.2.1 Surveys

All staff at the College also completed a survey that asked them to rate themselves on a variety of IT technical skills. (see Appendix 7) This survey was run at the beginning and end of the academic year, prior to the study year, during the study year and again in the following year. Once again this process allowed the comparison between the staff selected in the case study with the entire staff at the College.

3.4.2.2 Statistical data

Data were collected on the participation and success rate of all College staff in obtaining ECPD modules during and for a couple of years after the study. Similar data were obtained for the entire State. This allowed for comparison between the teachers in the school in which the case study took place and government school teachers in other parts of the State.

3.5 DATA ANALYSIS

Analysis and interpretation is a simultaneous activity in qualitative research. Analysis begins with the first observation, the first document read, the first interview (Merriam 1988). All data obtained including journals, interviews, observation, meetings, surveys and statistical data were brought together for organisation. Yin (1984) calls this organised material the *case study data base* whilst Patton (1980) refers to it as the *case record*. “The case record includes all the major information that will be used in doing the case analysis and case study. Information is edited, redundancies are sorted out, parts are fitted together, and the case record is organised for ready access either chronologically or topically. The case record must be complete but manageable” (p. 313).

3.5.1 First stage of organisation

- All meetings were transcribed using a word processing package and stored in chronological order on a computer.
- The interviews were also transcribed using a word processing package and stored in subject areas on a computer
- Journals were sorted by subject area, staff, and chronological order.
- Observations were placed in chronological order.
- Results from IT view survey were analysed (Appendix 8)
- Results from IT skill surveys were analysed and graphed (Appendix 9)
- Case study school ECPD data were tabulated (Appendix 10)
- State ECDP Data were tabulated (Appendix 11)

3.5.2 Second stage of organisation

Once all data had been organised and read through, it was then decided to sort the data from the journals, meetings and interviews into categories. The categories were chosen as a result of simultaneous data analysis taking place throughout the study, the literature review and from the first reading of the case record. The categories were:

1. The Role of Management
2. The Teacher’s Role
3. Requirements For Technical Assistance

4. Time Allocation
5. Professional Development

3.6 FACILITIES AND RESOURCES

The College involved supported the project by providing hardware, software and technical support staff. Below are listed the resources available to staff in 1998.

3.6.1 Network and servers

At the time of the study the network consisted of 6 servers, 4 running NT and 2 SunOS (Unix). The primary domain controller has a single 200MHZ processor, 64 Mb Ram and 6 Gb HD storage.

3.6.2 Computer laboratories

- Business Computing Lab (21 PCs)
- PC Lab (10 PCs)
- Computer Science Lab (19 Acorns)
- Maths Lab (8 PCs)
- Graphics Lab (4 PCs)
- Journalism Lab (15 Acorns)
- Textiles Lab (4 PCs)
- CAD Lab (16 PCs)
- Electronics Lab (6 PCs)
- English Lab (10 PCs)
- Language Lab (5 PCs)
- LRC Student Lab (15 PCs)

Totals
• 47+ Acorns
• 153 PCs (20 CDs)
• 6 PowerMacs
• 73 Digital Notebooks
• 60 Printers

3.6.3 Peripherals

- Satellite dish
- 3 Scanners
- 2 Digital Cameras
- 4 Averkeys
- 3 Zip Drives

- CD Juke Box/stacker

3.6.4 Other resources

Finances allocated to technology in the 1998 school year can be seen in Table 3.2.

The State Education Department supported the study by providing 13 days of relief for staff involved in the project to use.

The classes involved in the study were given guaranteed access to resources whilst all other classes throughout the school were not. This included three or more computers in their classroom, budget for software, a support person and access to technicians when required, i.e. during class time.

Table 3.2
Finances Allocated to Technology in the 1998 School Year

Budget	\$66 000
Line Release AST3	\$12 500
Line Release Web Management	\$11 786
4 Line Release PD Support (District supported for 1998)	\$47 144
PD Funds EC	\$ 4 920
PD Funds DETCCD	\$ 2 370
Network Administrator	\$40 000
2 trainees	\$27 900
1 casual IT support person (24 hrs per week)	\$ 5 000
Total	\$151 620

3.7 SUMMARY

As a methodology case studies have been subjected to scrutiny with research showing that they are a reliable methodology when executed with due care. The literature contains specific guidelines for researchers to follow when carrying out case studies to enhance the reliability and validity of the investigation (Merriam, 1988, 1992; Stake, 1995; Yin, 1994).

Table 3.3 summarises the data collection used in the case study. Critical to the validity of the study was data collection using a variety of methods including both qualitative and quantitative methods. In this way, triangulation of evidence was achieved, increasing the reliability of the data and hence the conclusions drawn from the study. After collection the data were organised and analysed just as they are in experimental studies.

Table 3.3
Data Collection in the Case Study

		QUALITATIVE DATA COLLECTION			QUANTITATIVE DATACOLLECTION	
	Documents	Interviews	Observation	Surveys	Surveys	Statistical Data
<i>LOTE</i>	Weekly and Monthly Journals	At end of school year, at least two staff from each area were interviewed	Observation by the researcher	All staff at College surveyed on IT usage	Regular surveys of IT skill level of all staff at College	Data of all staff at the College and all staff in the State regarding IT Modules obtained
<i>ENGLISH</i>	Meetings					
<i>MATHS</i>						

Chapter 4 Case Study Data

4.1 INTRODUCTION

This chapter presents a descriptive narrative of the experiences of the teachers involved in the case study as they implemented change in their classroom practice by embedding ICTs into their teaching and learning programs. The majority of narratives come from teachers directly involved in the three learning areas (Mathematics, English and LOTE) in the case study. These narratives were the result of learning area meetings, full case study participant meetings and interviews with the teachers. A small number of the narratives came from other teachers in the college resulting from surveys conducted throughout the study period.

The narratives have been presented according to the sub-headings as developed in the literature review. These sub-headings are the categories affecting the integration of ICTs into the curriculum. They are:

1. the role of management;
2. the role of teachers (pedagogical, technical);
3. requirements for technical assistance;
4. time allocation; and
5. professional development.

The sub-headings under each of these categories have been determined by the comments from teachers in the study regarding them.

4.2 BACKGROUND INFORMATION

At the start of the 1998 year there was much staff dissatisfaction with IT at the college with many changes proposed that had resulted from decisions in which general staff had very little, if any, input. Some of these changes included:

- laptops for all full-time staff with the expectations that staff would communicate via E-mail, and enter class absences and access student details from a new trial administrative software package (very little training was provided prior to these expectations);
- desktops that were taken from staff rooms were redistributed to classrooms;
- a new IT technical support team was put in place (previously these jobs were done by teachers); and
- a partnership agreement required all Learning Areas to have IT plans and for all staff to achieve competency in computing modules 1, 2 and 3 within a three-year assignment.

Another problem that ICT faced throughout 1998 was that a promised ICT program from the Liberal government which would see schools receive one computer for every five students and all staff with laptops along with IT technical support, software, etc., did not come to fruition due to a change to a Labor state government. As a result of waiting for the Liberal policies to be enacted, the College did not spend as much money on hardware or software as they normally would, resulting in the staff feeling that we were lagging behind in technology innovation.

The major needs as determined by the ICT Committee with regard to ICT across the College were:

- greater access for students to technologies across all areas of the college;
- the need for multi-media software with hardware capable of supporting it;
- replacement of ACORN computers with PCs in the computing teaching area; and
- better printing facilities throughout the college.

Additional to this were requests from learning areas to increase hardware and software within their specific areas. The requests came from areas with little or no

technology as well as from areas fairly well off with regard to technology but still seeing a need for more. In total, the requests added up to half a million dollars whilst the actual budget for IT for that year was around \$70-80,000.

4.3 THE ROLE OF MANAGEMENT

In looking at the original questions posed by the study, the role of management was not listed as an example of support required by teachers under the second research question. It was not until well into the study, resulting from the literature review and observation, that the important role of management in the change process being examined by the study, was realised. As a consequence there was not an emphasis on the role of management in the case study design. In hindsight this is probably one of the major limitations of the research. By not making it as obvious as the other support issues, the opinions of the teachers in the research were not sought directly and there was no true analysis of this issue. The data being drawn on are thus mainly through observation by the researcher who was part of the management team for embedding ICTs into the curriculum.

The case study began after the decision-making with regard to the change of embedding ICTs into the curriculum. Policies and decisions were made at education departmental level and hence were taken on board by the College without any preparation or understanding of the purposes of these changes by the College community. Some of these changes included a laptop for each teacher with expectations that certain administrative processes would be performed and compulsory professional development in the use of ICT. There was certainly support from the College's administration and some staff for the change but this was not sold to the staff in a way that prepared for a smooth transition through the stages of change. The staff was not part of the decision-making process or involved in the vision for the implementation of technology.

Therefore, many of the factors that inhibited change resulted from moving too quickly to trying to embed ICTs without the majority of staff understanding the need for change and therefore supporting the change. The researcher took on the middle

management role for IT after having had a year's leave. She noted the staff dissatisfaction with IT at the College with many of the proposed changes resulting from decisions in which the general staff had very little, if any input as outlined above.

The management at the College level was placed in a difficult situation where resources, such as laptops for all staff, peripherals and other hardware were being given to the College before the groundwork was done in preparing staff for these changes.

The Principal at the College had only recently been appointed when these changes were being enacted. He was very supportive regarding the use of technology and had a vision for the use of ICTs in the teaching and learning program. He shared his vision with the administration and general staff. He also acted as a role model in using technologies such as E-mail, list-serves, web cameras; etc. When he did not have the technical skills to use technologies he used the IT support team to assist him. One example of this was in setting up the Principal's home page on the college's web site. He designed the site with the help of the technical support staff and then presented them with content, which they then entered into the web pages.

Staff in the study did talk about management at the Education Department and Government levels with regard to integration of technologies. These discussions focused on the financial support required to meet the vision and decision-making needing to be more consultative at the school level. One example of a quote from a teacher is:

Schools cannot afford to provide the necessary finances to provide and maintain ICTs. Therefore I suppose it is the Department that needs to make the decisions with regard to what can be provided within a given budget. The important thing is that they consult with schools and teachers in making these decisions.

4.4 THE TEACHER'S ROLE (pedagogical, technical)

4.4.1 Why should I use technology?

The teachers in this study were fairly representative of all the teachers at the College, as gauged by college-wide surveys (Appendix 6 & 7) and comparing their results with the observations and comments made by the subjects in the study. A strongly-held view was that technologies are only used if they result in better learning outcomes for students than traditional methods with which teachers are familiar. Moore (1991) found that teachers who are late adopters or reluctant technology users needed to be convinced that the result of their using the technologies would be a very big difference in student learning outcomes and performance. This was backed up by the following quotes from teachers in the case study.

I'm not going to use technologies just because it's there or for the sake of using it but if I feel it will actually help the students learn a particular area, obviously I'm going to make use of it, yes.

Every minute of teaching is really precious so the technology's really got to give me something that I'm not doing already and I hope that will be the case. It might even take a bit of the stress off me when that happens etc.

I've made a conscious decision to bring IT into literature but only when I can see its going to do equally as well and waste no time as more traditional methods that I've used.

The teachers in the study also felt the need for syllabus documents to reflect the need to use technologies as part of the requirement of the course to encourage reluctant teachers to use the technologies.

Teachers need to see the connection between their work and the tools, the best strategy is to write technology expectations into the curriculum guides/documents, for example in the language curriculum the syllabus states that students will compose 10 –15 papers annually using word processing.

From the College IT Views Survey (Appendix 6 and Appendix 8), there was evidence of staff who were starting to incorporate ICTs into their daily teaching programs and who were welcoming the impact that these strategies were having on student outcomes. These teachers had gone through steep learning curves, and

endured frustrations but had overcome all of this because of the benefits that they saw as the rewards for their efforts. Some comments supporting this were:

- *IT is the way of the future it is good to be able to keep up with it and see the potential.*
- *I know I am a better teacher due to IT skills, presentation, student presentation and research skills also improved.*
- *This year there has been a transition to seeing IT as a friendly tool rather than a cumbersome learning obstacle. The prospects for further competency are exciting not frightening.*
- *In the long run I'll have more teaching techniques at my disposal and students will have more learning techniques*
- *I look forward to using IT in the classroom and see the effects on the way I deliver the subject material etc.*
- *It has assisted me greatly, would be lost without it, and I have survived a fairly steep learning curve (it is ongoing)*
- *When we do move to the computer room, there is no doubt that they show more interest and enthusiasm.*
- *Technology allows me to conduct a French course, which I can be proud of.*

4.4.2 Not technology for technology's sake

As the teachers developed their skills and confidence in the use of ICTs, they were able to make sound judgments on when it was appropriate to use ICTs and, alternatively, when it was more appropriate to use non-ICT teaching strategies. Throughout the study they had moved from individuals trying to think of ways of using ICTs in every lesson they prepared, to teachers looking at the aims of their lessons and then developing the best strategies to meet these aims, whether with or without ICTs. This can be seen in the quotes obtained from teachers towards the end of the case study. These included:

We have to be careful though, I know that everything's going IT orientated but we also have to be careful not to jump into the river just because its flowing fast before we see where the river leads you to.

The bottom line for me is that from this year I have learnt that technologies are giving me a different tool that I might not always use, it's okay to do it another way because the other way might still be better. Whereas in the past I have fallen into the trap of thinking I've learned this new skill, I have to use it.

You've got to careful, sometimes doing it by hand is the right way to do it, you don't always have to use the computer. One of the traps that we've possibly fallen into is that we used to hand write an assignment, you'd sit there and quickly write up an assignment, you'd run to the photocopy and do it, now because we've learned so many

skills I think we all feel that we ought to present something that looks professional and then you get really picky don't you because you print it and you think oh no. If you had written out the page you would white it out or cross it out you would not rewrite the whole page because of one error. I don't think you do anything with technology unless you can do it better or faster.

IT is only one component of what we're doing here. Its one that needs so much resources, so much professional development, so much technical support, is that really being realistic?

4.4.3 A feeling of “losing control”/ The sage on the side

Throughout the study, the teachers went through an intensive IT PD program to develop their skills and confidence in using the technologies available to them at the College. This included obtaining IT Modules, how to use other software packages, CDs, peripherals. The PD was offered to the staff both in groups and as one-on-one sessions. They were also given assistance in the classroom when using new technologies for the first time. There still remained for many, particularly at the beginning of the study, the fear of students knowing more than themselves when it came to using technologies and a fear of being made to look an “idiot” in front of their students.

Technology has to be one of the major ones where we are shown not to know it and not to know as much as our students. And you just have to accept that. I think the main thing is to not to try and be the expert.

As teachers we feel nervous in front of students when we are lacking confidence to satisfactorily demonstrate IT competence.

When you take on something totally different it's really threatening to not feel as if you're in control. You mightn't want to take control but you would like to feel that you could if you wanted to or needed to.

Another concern that they had was not being sure what students were doing all the time when using technologies. Were they on task? Were they using the time wisely?

I think one of the issues for me has been sort of “losing control”, you send them over to the computers to do things and you don't know exactly what they're doing.

There is no doubt that they become more distracted and sidetracked when on the computers, they like to explore what else is on the computer too.

As the teachers became more familiar with the idea that they were not in the classroom to be the “fountain of all knowledge”, and that their role was more of a facilitator in the learning process, they were able to become more flexible in how they managed their classrooms and saw the benefits that students gained in taking responsibility for their own learning.

I think it comes back to the idea that we are a community of learners, forget that we're teachers, we are also learners. It is acceptable to use kids who know how to use the technologies and really lean on them.

With IT there is more time for students to decide how they spend their time in class. I walk around to check if students are on task. I am gathering meaningful evidence for assessment. Teacher direction is still important but so is student direction in the group tasks.

I find I'm teaching less and less to a whole class I'm now able with the technology set out much more individual learning. I've got a lot more resources to meet individual needs. I'm much more a facilitator, it took me a while to feel much comfortable with this but I think it takes time and has to come with confidence. I also have confidence in the use of IT so that I can allow the unexpected to happen in the classroom, I can learn all the time. So I'm feeling much more comfortable now about facilitating and I think IT really makes teachers change in that way. I actually feel quite comfortable saying to students I don't know but I'll try to work it out.

I've actually changed my teaching style for the better with IT because I'm a perfectionist with lesson preparation, I really like to dot the i's and cross the t's and I have found that I've got to say to kids “I don't know ask somebody else”. You are right you don't know what kids are all doing. I've actually adapted and I feel quite comfortable with it now. But to start with it wasn't a comfortable situation for me not knowing precisely what everybody is doing and not knowing it all. But I've changed and I think I'm probably a better teacher because of that. I've made a real effort this year with my lit class because that's a subject that's not seen as having an IT focus and because it's pre-tertiary there is a lot to get through. So I've only ever been able to do things if I can do them better.

With technology I have extensively changed the way I manage the classroom. I have always been relatively free in allowing students certain time to be able to go off and access information in the library etc. Now of course it has extended far more with access to Internet or CD's or whatever. Students are all over the campus and if you're going to do that trust becomes so essential. There are some students you do have to watch but most are able to take a fair bit of responsibility for their work.

4.4.4 Teacher vs computer

There is a fear among teachers that the “powers that be” will see technology as a cheap alternative to employing teachers. With the rapid development in the area of communication technologies and on-line learning, will governments look at providing education for students through distance education methods where the current huge costs of physical environment (schools) and personnel (teachers) will be much reduced?

I think the only bit that worries me is that because of time or resources that they will say students can learn with computers, its cheaper than having teachers. I don't see this coming from teachers because I think most of us recognise the real importance of the one to one interaction between teacher and student.

With the intranet here are great opportunities for students to share work. Personally I don't want to put lesson notes step by step up on the web, I can't see a point doing that, and I'm not going to do myself out of a job. I can see now that there's lots of potential for putting background reading etc. I've changed my idea about online publishing but it still is to me very much a question of creating teaching and learning resources as an adjunct to what you do in the classroom, it's just another way of preparing resources.

I always remember as a student teacher my lecturer saying your most important role, as a teacher is not to teach Italian or French but to make a positive difference to that person's life and to help them to become a good citizen and a good human being. And that has always stuck in my head and I think it is very true. With less and less contact with students we have less chance to do that and I think that's sad.

I actually find that technology gives me more opportunity to have one to one with the students because whilst most are using the technologies I can spend more time with individuals.

4.5 REQUIRMENTS FOR TECHNICAL ASSISTANCE

Throughout the period of the Case Study, the technical support at the college consisted of one Network Manager, two IT trainees and, for about 20 hours a week, a Network Support Officer. The learning areas in the case study were given priority throughout the college for technical support and also had their support person with limited training in technical support. The demand for technical support was far

greater than the manpower provided. As this was also the first year that staff had their own laptops, there was an increased demand for technical support. Year 1998 was also the first year where the College employed professional technical support rather than using teachers on class time release to provide technical support.

4.5.1 How much and what type of technical support is needed?

The literature suggests that one of the major barriers to the integration of ICTs into the classroom is lack of technical support (Maddin, 1997; McKenzie, 1999; Stearns, et al., 1991; Veen et al., 1991, 1992). The comments of the staff in the College and observations made of their responses when technology did not work for them supports this research. For many teachers, one lesson “ruined” by unreliable technology due to poor technical support resulted in them deciding that it really was not worth the effort, returning instead to traditional methods of teaching.

You have to remember that we are teachers, our time is better put into using technology, I have an expectation that if I walk into a classroom all of the machines are operating. I don't suppose you ever get to the stage where technical support is exactly as you want it. There has to be an technical support person on call at all times for classroom teachers. Sometimes I need help to get started and you need it now in the classroom when you've got 20 kids.

You've also got to take into account that teacher's needs are different at different times. Like sometimes you're just absolutely hassled and the whole thing won't work and all you want is for someone to fix it and you don't want them to sit down and explain to you how to do it. The technicians have to be flexible but we've also got to be prepared to say what we want at the time. Do we just want you to fix it or would you please spend some time showing me what you are doing, so maybe I can fix it next time.

Technical manpower, I think if I had to give you a priority that would be it for me, even more than having computers in every room.

I think it's been excellent being a part of the pilot program because we've been very privileged, there has been excellent technical help. While our situation has been excellent I don't know if that's going to be the case for other schools.

4.5.2 Frustration with technology because you can't rely on it!!

Teachers need to feel psychologically safe when experimenting with new technologies (Herrman, 1988). Feelings of apprehension when learning to use ICTs

can interfere with learning, as well as teachers' abilities to integrate the technologies into their classroom practice (Hunt & Bohlin, 1992).

Observing the frustration of other teachers in their use of ICTs can be enough to prevent an individual from even giving it a go. Further evidence testifying to the reluctance of teachers to use technologies unless they are totally confident of their reliability can be seen in the following comments from teachers in the study.

It's really hard to rely on the technology when sometimes you have only got 15 minutes to do something that you should have done yesterday but didn't get a chance, so you go and type something up and then it won't print or something goes wrong. So that's where the greatest difficulty lies. The more that happens, the less you start to want to use it. Yes I have had some bad experiences that way, which knock your confidence around in using it I suppose.

I've just had all the frustrations and things that everybody else has had. Nice to know we all share them actually. I've typed up something and I can't print it out because the printer isn't connected, so then I write it out because I can't be bothered for someone to come and fix up the connection.

I have reverted to writing things by hand (even though my handwriting is disgusting) because it doesn't break down!!

I notice that, even if things were going smoothly with computer technology (which they often don't) I am loath to use it too much as I only have one contact per week with the group. Perhaps if I saw them more frequently I might be more tempted to try it out more often.

Unlike Robyn who is spending a lot of time on familiarisation with the technology, I'm unprepared to use certain things in class (the encoder) until I am certain I have full expertise and the chances are that it will not go wrong.

4.5.3 How much technical knowledge should teachers be expected to have?

There was a range of opinions amongst the staff as to how much technical knowledge they thought teachers needed. Some felt that it was not part of their job to know how to fix equipment or set it up, they wanted reliable equipment that they could use as a tool. Others felt it was worth the time and effort to learn some of the skills required to solve technical problems, like getting printers to work, or knowing what to do when the screen freezes etc. When things went wrong some wanted it fixed as soon as possible whilst others wanted to know what had gone wrong and

how they could fix it the next time it happened. As teachers increased their skills in the use of computers, they also displayed greater confidence in trying to fix problems when there were technical glitches.

There are frustrations as far as technical support is concerned. I don't want to be somebody who's always dependent on others and there's certainly things I've learned that I can do, there are some things which I don't think teachers should be expected to do. You never get there with computing, there's always more to learn and more to do and I don't think we can expect teachers to do the technical side. I think some of the danger that we're expected to become a jack-of-all-trades and I don't see that as my role. I think in terms of how I can teach better not in terms of how I can get the equipment up and running and I think that's a really important.

You need a balance; some people can play around with their computer to suit their own needs without having to call someone all the time. They see it as their tool, they want some control over it, it's not some foreign thing that every time something goes wrong someone else has got to touch it. I mean it's the same with your VCR or your microwave or whatever you want to know how to use the basic things but you should be able to rely on them and when they go really wrong you need help.

Before something didn't work it was a matter of help it won't work, why won't it work. But then as we've all got better we've got a list of things to try now to do for ourselves before we call for help. So what you need is some sort of professional development for if its not working, do I make a phone call, what are the things I should be checking.

4.5.4 Fear of accessing technical assistance (feeling 'dumb' and a 'nuisance')

In the earlier part of the study, teachers were quick to access whatever technical help they could get whenever they needed it. The College established protocols for getting technical assistance which consisted of an on-line help desk where tasks were prioritised and assigned to members of the IT Services team. The reluctance of staff to follow these protocols indicated that they felt the need for any problem with ICTs to be fixed as they occurred rather than waiting. As teachers developed more confidence and skills in trouble-shooting technical problems the number of requests for assistance decreased. Another factor resulting in the reduction in requests was a fear of seeming "stupid". "Surely by now I should be able to fix this myself". This is evidenced in the following statements, which only started to come up towards the middle of the study.

I think the technical support has been good, I think probably we all want it to be fixed right now and that I suppose is a frustration for some. You feel that you should know what's wrong and be able to fix it yourself and so you're sort of hesitant to call in somebody because its probably something that they've told you already or fixed up last week

I think the support is there I don't have a problem with that. It's just when something goes wrong in your classroom at that time you don't think you can rush out and ring up somebody and say come and help. And they will probably say well all you had to do was this.

Yes, the technical support has been really good, mind you I was still nervous, no not nervous, I know that Mark and his crew are so willing when you ring up, but I just feel oh I can't ring them again.

Mark is very easy to approach for help – he doesn't make you feel silly even if you ask silly questions.

4.6 TIME ALLOCATION

Throughout the period of the case study, the issue that arose again and again, from surveys, interviews, etc., was time. Lack of time was given as one of the major obstacles to embedding ICTs into the curriculum. Teachers talked about the time needed to learn the new skills, time needed to develop ways of incorporating it into their teaching programs and then time to “test” the new methods.

4.6.1 I just don't have the time

I suppose one of the big factors for everybody is time isn't it. Not having the time to actually explore everything, get familiar with everything. New skills take time to practice and that's the difficulty because its on top of our normal teaching load, its not instead of my marking or planning, its on top of. There are only so many hours in the day.

We spend a lot of time trying to master the software itself, and then looking for ideas, preparing lessons. It was a lot of time initially but it won't be as much time next time round. When you do anything new you want to it well. Even once you've got past the stage of finding something, deciding what you're going to do, you still need time to do it yourself first and see if things really work.

The estimate of time required for novices with computers to actually learn, revise and re-do operations, needs to be higher than what one would think. I used to think it was just me but I observe my friends in

LOTE all have the same problems and expend much time in rectification.

The main factor has been the time element because I try to keep a balance between working hard and having the rest of my life. There is always so much time needed to keep up with the one or more subjects we teach. Teaching with technology is like taking on a whole new field. If I had more time it would be an utter pleasure but it is often very difficult because you don't want to be left behind and you want to do the best for your students but you just know that you've got to keep a balance in your life.

Teachers often had feelings of guilt over not having enough time to experiment with ICTs and in “wasting” other teachers time when asking for assistance. There was also frustration because they saw the time requirements for using ICTs in the curriculum as something that was never finite.

You feel bad because you say I'm drawing the line at this, I'm not going to do that because I'm out of time and then you feel I'm going to be left behind.

Other staff are good, but then again you ask them a question and that means its pulling them away from whatever they were doing, their lesson planning or whatever so sometimes again there's this problem of imposing

I am enjoying preparing to use more technology in the classroom but there still aren't enough hours in the day – and that's frustrating. Everything re IT seems to be moving so very quickly and sometimes it feels overwhelming when one is coping with normal classroom preparation/marking etc. then expected to spend time learning and developing (using) new skills in short spaces of time.

Personally I suppose when I did modules One and Two I could have done with a more extended amount of time on each of them. I was frantic about them and couldn't take forever and at other times during the year they've been very much a choice between you know overload and so probably for some of us we need possibly a slower more consolidated, more thorough approach, whereas other people can actually hoon through them. I found there was not enough time to revise, consolidate and expand the new skills.

I think the problem is the fact that it isn't a finite process, you never get there do you. The knowledge required is just growing and growing and growing and we have to keep running after it.

4.6.2 It is worth putting in the time

For teachers, like many other professions, time acts as a barrier to many changes that are attempted to be implemented, not just ICTs. In the case of teacher's time is seen as having been well spent if the result is improved learning outcomes for students.

You look at the learning curves that the staff have been on this year I would have to think that everyone feels they're better off than they were in February.

Even though I have spent hours of my time and had frustrations, IT is worth the effort. These skills are moving us into the 21st century. This is the way of the future. We must learn or be left behind. Needs problems working through in a positive way. It will get better and you will feel a great deal of self worth for doing it. There appears to be a threshold of knowledge, once gained then life becomes much better, unfortunately it takes a while to get to that threshold.

It needs to be recognised that IT is causing a lot of extra work, though it is undoubtedly inevitable and necessary.

Once having mastered a skill in the use of ICTs, most teachers saw that the initial "large" amount of time put in would in the future actually save them time. This was because of the value they saw in the skill applied to their teaching and learning program.

When I have mastered that skill it becomes natural. For example the other day I wanted to type up something that was on the screen so that my students could see it and I was able to, where as once upon a time I would have written it by hand and then put it onto the computer and then printed it off so it has saved time in that sense.

The other day I used the scanner and I was able to do it after an hour with a few false starts and a few blind corners. I think now that took me an hour to do but it is going to save me hours and hours and hours of time in the future. So sometimes you've got to say yes it has taken me four or five hours but actually that is a skill now that I have got.

Some teachers in the study were still unconvinced that the huge time factor required was worth it as a measure of improvement in their offerings in the classroom.

All these aspects take huge amounts of time most of which Nina and Maria are not sure the end results justify. Nina says that her students find her lessons interesting and fun but NOT because of the technology and she feels the time it takes is not worth the effort.

The amount of time that I have to invest in learning these new skills, seems, at this point to far outweigh the benefits my class will gain.

4.6.3 How to survive despite lack of time

Those teachers who accepted that they could not be all things to all people and recognised that there would never be enough time to do all the things they would have liked to become better teachers, were happy in the knowledge that they were good teachers and worked to improve the learning environments for their students within realistic time-frames.

I've always recognised though that gradually it would be a time saver in many ways and that gradually I've become more proficient. I've said to myself this year to look at it in a broader scale so I'm sort of wanting to be proficient in a year full stop but maybe just to be a five year continuum and I get concerned about younger teachers. I've always said to younger teachers its no good being a good teacher for 10 years of your life, you've got to be a good teacher for 30 years of your life so if you get yourself burned out because you're working every weekend and you're working every night you're just doing yourself and teaching a disservice

I wouldn't do without the internet, I wouldn't do without email and CD ROMs etc. but personally I don't use them much myself in my teaching approach and then I think to myself well what can I expect maybe I can give myself a two year time thing and not expect everything to happen in a month or two months and then I think that might be a bit better.

There is never enough time to obtain all resources and information available, you know there's a whole lot more out there but in the end I've got to say to myself well that's enough, that's all the information that I've got time to look at and go through.

I need to get computer technology into perspective

4.7 PROFESSIONAL DEVELOPMENT

4.7.1 Types of professional development on offer

For teachers to incorporate ICTs into the curriculum, from observation and data obtained from the case study, the following professional development programs were found to be needed.

1. Using computers for 'self' and administration i.e.:
 - File management including backup;
 - Word processing;
 - E-mail; and

- Web searching.
2. Skills in using other software as required i.e.,
 - Spreadsheets (Excel);
 - Databases (Access);
 - Drawing packages and image manipulation (Image Composer);
 - Web Authoring (FrontPage); and
 - Others subject-specific software.
 3. Technical Skills for self help for those who do not always want to rely on technicians:
 - How to set up desktop, screensavers, etc.;
 - How to install printers and other software;
 - Downloading from the internet; and
 - What to do if computer freezes, won't print etc.
 4. Use of peripherals:
 - Scanners;
 - Digital Cameras;
 - Digital Projectors and AVerkeys; and
 - Printers.
 5. Developing skills in modules one, two, three and four, teachers then had confidence to start experimenting with the use of ICTs in the classroom. To do this successfully, they needed PD on how to incorporate ICTs into the classroom successfully. This included:
 - Lesson preparation, what, where, how to use ICTs to get the required learning outcomes;
 - Assistance in the classroom (team teaching);
 - Exposure to “good practice” by other teachers;
 - Time for discussions with other teachers in their learning areas on how best to incorporate ICTs; and
 - Classroom management strategies for using ICTs when there is only access to four computers in the classroom for 25 students.

Initially teachers were asking for skill development PD but towards the end of the study more were asking for pedagogical PD to incorporate ICTs into the curriculum.

So that I think my needs in the future are, extending my own skills and passing it on to the kids which means time and PD, for example I can send emails back and forwards to people but I haven't actually used email in class and I really need to talk to someone about how to use that in an English class and what am I going to do with it.

I'm finding the hardest thing is really trying to work out what I should do in my classroom, which is advantaged by using technology, and is not just a quicker way of doing what we're doing on paper because I don't see any point in doing that. We have to actually change what we're teaching yet we've still got to get through the same syllabus.

4.7.2 How Professional Development was offered

The ECPD program provided a program that all teachers at the college could do either by attending evening classes or through the support of the support person at a time more convenient, such as during school hours. All teachers were expected to complete the first three modules (Module One: Introduction to Computing; Module Two: Word Processing; Module Three: Email and Web Searching) within a three-year appointment at the College (Partnership Agreement and Education Department expectations).

See Appendices 10 and 11 for statistics on number of staff obtaining modules, both College and State data.

As each pilot program had its own 'Support Person' for PD a lot of the PD was one-on-one or to the small group. In addition to this, PD was offered to:

- All three pilot groups;
- Larger groups incorporating the pilot groups plus other teachers;
- Whole of staff; and
- Collaborative – peer PD amongst teachers.

The majority of PD was in-house due to the expertise of staff, but when individuals needed help with specific pieces of software they went to PD programs offered

outside of the college. As with all PD, teachers were expected to return with the skills and share them with their colleagues.

PD was offered at various times for small to larger groups, where in most cases teachers could opt into the program. “Just-in-time” assistance was also provided as well as one-on-one PD.

4.7.3 When Professional Development was offered

Most of the PD was offered during school hours, with the ECPD program being offered early evening (4.00 p.m. – 6.00 p.m.). Large group PD was offered at times when teachers had more time to go to programs (i.e. non-teaching times of the year such as start and end of year, and during student exam periods).

Other PD was offered on demand, i.e. “just-in-time” wherever possible. The majority of teachers felt that their ICT PD needs were better met by “just-in-time” PD. There was a view that PD presented to large groups at times when the technologies were not being used in the classroom, i.e. as a possible use in the future, were OK for giving you a general understanding of what was possible, but was often a waste of time because you were not going to use it and hence practise it immediately.

When we attend PD for a new skill that we don't need at that time it seems very overwhelming, it's very easy to switch off. You think I'm not going to be using it anyway for ages and by the time I have to use it I will have forgotten it all and I'll need somebody back again to reteach me. Unless you're going to learn the skill to be using it straight away then it sort of almost seems a waste of time. I know its useful because you have got it in the background but it still seems a waste of time at the time. I found it very useful to ring someone and say I will be wanting to use such and such next week so can you show me how to use it. That was very productive.

There's a lot of incidental things that you learn and its probably where don't want a PD session you want to be able to call someone and do it right then

You almost need a person to call 24 hours a day. When you go home like at the weekend and you're sitting there on Saturday afternoon and you think ah, now what.

We all feel that step-by-step notes are useful. Even though we may learn something and feel confident at the time often there are long intervals between learning and having to use and the memory fails.

Because you don't use certain things all the time whatever you learned the end of last year you feel well that's gone anyway I can't remember any of that so I'm back to point scratch.

I need PD to get me started and then I will go off and do the homework. In addition to this you need on call PD when I get stuck and can't manage on my own.

Others felt that the time constraints throughout the year made the periods when they were not teaching ideal for learning new technologies because they had the time and energy to put into developing the skills as well as the time to think of ways of using these newly acquired skills when teaching resumed.

The time we had at the end of last year with the three different modules was the best I really appreciated it. During the year its really hard to try and gain new skills on top of what you're doing because its not as though you're learning those new skills instead of, you're picking up another bag. So as you're walking along the airport with four suitcases all of a sudden you're expected to take another one and if you take on that other one, you're very likely to drop all the others, you can't manage them. But if you can put one down you can manage the others, or not pick up the other one.

4.7.4 Who provided the professional development?

The professional development was offered by:

- the support person who was selected due to expertise in the learning area as well as for technical ability. Some support persons had more expertise in the learning area than technical skills;
- computing teachers;
- teachers who had expertise in a particular software package, peripheral; and
- outside experts in the use of technologies.

Teachers felt happy in sharing their skills with each other and often felt more comfortable developing their skills when assisted by fellow colleagues than by outside experts.

I've found that I've picked up a huge number of things recently just by simply mentioning a problem in the right company. Somebody says but you just do it like this and nobody else in my staffroom knew that and then I showed everybody else how to do it.

In choosing between someone with technical skills and someone with learning area knowledge for providing PD I would say someone with the technical skills but also with a good knowledge of people's difficulties in teaching. I suppose the best thing for me is someone who knows exactly what they're doing, can show me in the least amount of time.

Most of us would prefer the cooperative learning, I actually quite like experimenting but its good to have somebody to ask when you are unsure. That is my preferred learning style and to be able to say to somebody I want to do this and would like you to stand there and hold my hand so I'm confident and not making the wrong decisions.

Teachers who no longer saw themselves as the “sage on the stage” but as a facilitator in a learning community saw the value to be gained for themselves and their students in nurturing the skills that the students had developed in the use of ICTs.

Students acquire IT skills faster than most staff, this should be given consideration, and teachers will have to use the talents of their student.

I have encouraged students to help each other. In particular, some students who use the internet and WORD regularly have been able to pass on their skills to others who have little previous experience. Here is real cooperative learning in action!

4.7.5 Was professional development compulsory?

As a result of the College's partnership agreement, where all teachers were expected to complete modules One, Two and Three within a three-year appointment at the College, then yes some of the ITPD was compulsory. Some teachers were glad to have something compulsory because it forced them to develop their IT skills, while others felt that making them compulsory was counterproductive.

Anyway can I make the point that I think that incidental help needs to be documented because I feel that has been the most valuable help that we can have, not modules enforced on people. You need to know these things when you need to know them.

But this is one of the things too with ITPD you know we're made to jump through certain hoops and then you don't use those hoops.

People need to be getting guidance and encouragement. Any too vehement directions (such as everyone having to get Mod 1, 2 and 3) are probably counterproductive.

Too much emphasis is placed on modules. Most staff needed PD to do the tasks they need to do now, give them what they want when they want it not compulsory modules

4.8 SUMMARY

This chapter's emphasis has been on presenting narrative data obtained from teachers in the study. The narratives have been organised under the following sub-headings, according to how the teachers see them impacting on the integration of ICTs into the curriculum:

1. the role of management;
2. the role of teachers (pedagogical, technical);
3. requirements for technical assistance;
4. time allocation; and
5. professional development.

Chapter 5 provides further analyses of these narratives together with other data obtained in the study with the aim of answering the research questions underpinning the study. Information obtained from the literature review is also used to support some of the conclusions drawn.

Chapter 5 Case Study Data Analysis

5.1 INTRODUCTION

The previous chapter presented narrative data obtained from teachers in the study as to how they interpreted their needs in embedding ICTs into the curriculum. In this chapter all data from the study will be analysed along with information presented in the literature review to draw conclusions about the factors affecting the embedding of ICTs into the curriculum.

The analyses are presented in order of the research questions underpinning the study, which were listed in Chapter 1. These questions were:

1. In what ways does the role of the teacher change in a computer integrated classroom?
2. What support is needed by teachers to develop strategies and teaching activities to successfully use computers in their teaching programs? (i.e., Technical Support, Information Technology Professional Development, Teaching and Learning Professional Development, time)?

The analyses vary slightly in order from the way the data have been presented in the literature review and case study data chapters. The role of the teacher is addressed first as this related to the first question of the study and then the need for support for teachers in the form of the role of management, technical assistance, time and professional development is analysed.

5.2 THE TEACHERS' ROLE (pedagogical, technical)

Before teachers consider the use of ICTs in their teaching and learning programs they need to develop skills in the use of these technologies. This begins by using them for their own convenience, for things like communication (E-mail), word processing

assignments, storing student results in packages such as spreadsheets. These skills assist in their administrative role as a teacher but have no real impact on what happens in the classroom.

5.2.1 Technology to improve learning outcomes

A lot of early experimental use of ICT in the teaching and learning program shows little variation from previous pedagogical practices and flows on from the teachers' use of ICTs for administration.

Unless teachers can be convinced that using ICTs improves learning outcomes for students, many are not willing to use them. This can lead to a 'Catch 22' situation, in that if ICT usage is not supported by necessary pedagogical change there will not be measurable improvement in student outcomes, the result being teachers giving up on ICTs as a teaching tool.

Moore (1991) found that teachers who are reluctant technology users needed to be convinced that the result of their using ICTs would be a very big difference in student learning outcomes and performance. The following quote from one of the teachers in the study supports this:

Every minute of teaching is really precious so the technology's really got to give me something that I'm not doing already and result in better outcomes for students.

5.2.2 Losing control of the learning process

One of the barriers to embedding ICTs in the curriculum can be the fear held by teachers of losing control over the learning process. This was backed up by the following quotes from teachers in the study.

I think one of the issues for me has been sort of "losing control", you send them over to the computers to do things and you don't know exactly what they're doing.

There is no doubt that they become more distracted and sidetracked when on the computers, they like to explore what else is on the computer too.

In addition to not knowing exactly what is taking place during every minute during a lesson, an added fear for some teachers is that of looking foolish in the eyes of their

students because they do not have the necessary skills to be in total control of the technologies they are using. In many instances, one or more students had greater knowledge and skills than the teacher when it comes to using the technologies. One teacher from the study said the following:

Technology has to be one of the major ones where we are shown not to know it and not to know as much as our students.

Another went further and said:

And you just have to accept that. I think the main thing is to not to try and be the expert.

5.2.3 No longer the “Sage on the Stage”

Hannafin and Savenye (1993) stated that the interactive nature of ICTs, and the capacity for them to enable student-centered exploration, requires a "fundamental shift" (p. 28) in the role of the teacher. The teacher can no longer be a dispenser of information to relatively passive learners. They point out that terms like "manager of information," "coach," "guide," "organiser," "initiator," and "diagnostician," appear in the literature to describe the technology-oriented teacher's new role. Kook (1997) defines five roles that teachers will assume as they become more active in their use of ICTs:

1. information consultants;
2. team collaborators;
3. facilitators;
4. course developers; and
5. academic advisors.

The teachers in the study who felt the most confident in their use of ICTs in the classroom and who observed positive changes in student learning outcomes as a result, were the ones who came to accept that their role as teacher was no longer the giver of all knowledge but as a co-learner in the classroom.

I think it comes back to the idea that we are a community of learners, forget that we're teachers, we are also learners. It is acceptable to use kids who know how to use the technologies and really lean on them.

The result is a more individualised program for each student in the class.

I find I'm teaching less and less to a whole class I'm now able with the technology set out much more individual learning. I've got a lot more resources to meet individual needs. I'm much more a facilitator, it took me a while to feel much comfortable with this but I think it takes time and has to come with confidence. I also have confidence in the use of IT so that I can allow the unexpected to happen in the classroom, I can learn all the time. So I'm feeling much more comfortable now about facilitating and I think IT really makes teachers change in that way. I actually feel quite comfortable saying to students I don't know but I'll try to work it out.

5.2.4 Conclusions

From the literature review and this study, we know that educational change is a slow process. Firstly, teachers need to develop confidence in the use of technologies in a non-threatening way. Most commonly this has been by using technologies for non-classroom activities such as keeping records of assessments, communication through E-mail, word processing assignments etc. When they have developed a level of confidence and have been convinced of the value to learning outcomes for students, teachers will begin the experimentation process by incorporating ICT activities into their teaching programs. For this to be successful, teachers must accept a change in their role; they are no longer the central figure in the teaching and learning process but instead co-learners with the students.

The major challenges to be faced in the integration of technology in the classroom will be the pedagogical implications, the impact on the structure and content of curriculum, classroom organisation and practice and the changed role of the teacher..... The role of teachers in such classrooms will become that of guides, facilitators and learners, as teachers receive instruction, assistance and guidance from students. Different classroom management skills will need to be developed, as student/teacher interaction becomes more student-centred, and as students are encouraged to view their teacher as co-learner, losing centrality in the teaching/learning process.

(Department of Training and Education Co-ordination (NSW), 1997)

Part of this change is accepting that students know more about technologies than they, the teachers do. Davis (1997) discussed the importance of pedagogical issues, namely, that classroom use of ICTs requires a different approach to teaching and learning. Classrooms need to be organised differently, teachers' views of teaching and learning need to be reassessed and teachers need to accept that some pupils will know more about the technologies than they do.

The real change can be observed by the different types of activities taking place in the classroom as compared to a classroom with teacher as “fountain of knowledge”. The Apple Classrooms of Tomorrow (ACOT) project indicated that over time, effective use of technology changed the role of the teacher in the following ways:

- beliefs and attitudes about the purpose and nature of instruction;
- interaction with students (moving from lecturing to guiding and mentoring);
- use of co-operative and task-related interaction among students; and
- collegial sharing among teachers.

The purpose of using ICTs in the teaching and learning program is to improve student learning outcomes. With successful implementation of ICTs the whole learning environment is changed. It changes what is being learned, why it is learned, how it is learned, how learning resources are accessed, and the communication between students, teachers and the outside world. Integral to this is the teacher.

The important lessons to be learned from this study are that this change in the teacher’s role is not an easy one to accept and that it will take time. The amount of time required will depend upon the individual and the amount and type of support provided. Support is the critical factor and the basis of this study is to make recommendations as to what support is necessary to provide the environment that will lead to successful integration of ICTs into the teaching and learning program.

5.3 THE ROLE OF MANAGEMENT

As discussed in the previous chapter this was not considered to be a major aspect of the study until well into the case study. Therefore, the data analysis is based on observations by the researcher, who was part of the management team. This is seen as a limitation of the study and certainly something warranting further research.

5.3.1 A vision

Some writers contend that for successful change a vision must be created, communicated and have commitment and then people work towards the vision (Beckhard & Pritchard, 1992). Another view is that before any action for change the

vision must emerge which requires time and reflection and must be shared amongst all players (Fullan, 1992c).

Much of the change was directed from outside of the college. Decisions about how many computers, laptops for staff, the type of technical support, what sort of software and the time line for implementation were all imposed from the DOE. This meant that the vision was an imposed one rather than a vision developed by the Principal in conjunction with his staff, the result being that this change was not one that had the full support of staff, making it difficult for management to implement. Staff were not involved in Fullan's first stage of a change, i.e. initiation, mobilisation or adoption phase, consisting of the process that leads up to and includes a decision to adopt or proceed with a change.

Fullan (1993) states the problem this way

When those who have the power to manipulate changes act as if they have only to explain, and when their explanations are not at once accepted, shrug off opposition as ignorance or prejudice, they express a profound contempt for the meaning of lives other than their own. For the reformers have already assimilated these changes to their purposes, and worked out a reformulation which makes sense to them, perhaps through months or years of analysis and debate. If they deny others the chance to do the same, they treat them as puppets dangling by the threads of their own conceptions. (Fullan 1993, p. 23).

It also resulted in some of Gross et al's (1971) barriers to change, these included

- the teachers lack of clarity about the innovation;
- their lack of skills needed for implementation;
- the unavailability of required instructional materials; and
- lack of staff motivation.

When others are making the decisions, teachers can resist, lobby, hold out, attempt to influence a situation to their own advantage. When teachers work for the common good, they give up a large measure of self-interest in the outcome. With leadership and responsibility comes the need to see others' points of view and act fairly in their eyes. (Barth, 1990, p. 129)

5.3.2 ICT committee

According to Patterson, Purkey, and Parker, 1986

The leader must have skill in setting up ad hoc problem-solving teams. These teams are formed in such a way that they combine ideas from unconnected sources, view problems as wholes, take multiple perspectives on issues, and have the power tools to carry out the assignment. (p. 18)

Middleton (1998) holds that for a healthy environment to be established and maintained within a school it is essential that all stakeholders are able to participate in the decision making process when ever possible. A stakeholder is defined as any individual upon whom the change will impact.

To try to overcome this poor start to the change process the management team at the college worked hard to try to put processes in place to involve staff in the change process in order to give them greater ownership of the change. This included developing a vision for the college with regard to the implementation of ICTs. An ICT committee was formed with representation from the following areas

- teaching and learning
- IT staff
- Library
- Assistant principal – Resources
- Technical support team
- Bursar
- Non- IT background staff.

This committee became the decision-making body for ICT within the college and in collaboration with the Principal and all staff developed the ICT vision and three-year plan for the college. To assist in this process, staff meetings, both full and smaller groups, were run to discuss issues related to ICTs, staff and student surveys were conducted and listserves were set up for discussion.

In more recent times the ICT committee consisted of two committees, the “Core” which consists of:

- Assistant Principal – Resources
- Manager (AST3) Information Technology Services

- Manager (AST3) Information Services
- Manager (AST3) Open and On-line Learning
- Manager (AST3) Vocational Training
- Manger (AST3) Student Administration Database
- Manager (AST3) Professional Development
- Network Manager
- Bursar

and the “Whole” which consists of the “Core” and one representative from each learning area:

- Maths
- English
- Science
- Studies of Society and Environment
- Technology
- Visual Arts
- Performing Arts
- Health and Physical Education

Although this resulted in a very large committee it provided greater representation for all staff so that they can have a voice in the decision making with regard to ICTs. It also provided for information to be well disseminated amongst the staff to assist in their decision making as well as keeping them up-to-date with day-to-day changes.

Since implementing this committee structure there has been a greater ownership of the ICT vision and the accompanying plan by all staff members and therefore a greater acceptance of change.

5.3.3 The Principal as an ICT role model

Jones (2001) postulates that Principals should be able to evaluate teaching practices and model “best practice”. Teachers will not embrace technologies if their Principals have not done so. Further, he says that Principals should use the schools web-site as a vehicle for communication, PowerPoint presentations at meetings and online professional development.

The Principal in this case study played a vital role in selling the ICT vision to the entire school community and acted as a role model for teachers and students in his use of ICTs. Although he lacked technical skills, he utilised the team to assist him in using technologies and made sure he was seen using these technologies. He did this by using listserves and the webcam to communicate and hold meetings with other Principals around the state. He not only tried to use technologies when appropriate to do so himself, he also encourage, supported and congratulated other staff who used technologies in their communications with others and in the classroom.

He supported the ICT committee but ensured that the ideas requiring his support also had the support of the staff; he therefore ensured that the 'vision' had been sold and accepted by the majority of staff. One example of this was in the purchase of laptops for staff. He was aware of the big financial and time commitment this would mean to the College and although he fully supported it he needed to be convinced that the majority of staff also supported it before a financial commitment was given. As a consequence the proposal to purchase laptops was well debated amongst all staff, with the pros and cons considered. This also meant that staff were well informed and prepared for the consequences of the decision and their responsibilities.

In his leadership role the Principal also put policies and practices into place that "forced" all staff, including the "reluctant" technology users to use the technologies made available to them. Some examples of this were communication of essential information by E-mail only, replacing print based newsletters with electronic information boards and running staff-meetings on-line.

5.3.4 Conclusions

Schools are currently undergoing enormous changes in curriculum, methodology, assessment procedures, use of technologies, administrative structures and responsibility for decision-making. The complexity of the challenges confronting schools today calls for a collaborative delineation of school leadership. Wherever possible it is important for the Principal in collaboration with his/her staff to develop the vision that leads to change. The Principal will be instrumental in communicating the vision to the whole school community.

A good leader will set up a team to manage the change process in collaboration with all players. In sharing the leadership functions amongst a greater number of people, we enhance the opportunities for teachers to develop skills in negotiation, collaboration and co-operation which can only lead to greater collegiality and benefits for the school as a whole.

Finally, with regard to the specific change of implementing ICTs into the curriculum the Principal and leadership team must act as role models for all staff and students in the use of technologies. With the large number of tasks and responsibilities that Principals have it is important that the Principal has a supportive team in his or her senior ICT staff and technicians to advice and assist as well as taking on much of the leadership in this area.

5.4 REQUIREMENTS FOR TECHNICAL ASSISTANCE

5.4.1 The teacher's technical skills

Madden (1997) states that teachers without trouble-shooting skills are less likely to use technology.

In this case study, the technical skills of the teachers varied from complete novice to advanced technical skills. Some teachers had never touched a computer and others had previously held technical support jobs at the college such as running the network. All staff were presented with a laptop and for many this was very daunting. Some of the novices were fearful of damaging the computers by pressing the wrong buttons etc. Some teachers felt it important to learn basic technical skills such as trouble-shooting printer operation, loading software, control panel features etc., as they did not want to have to rely on technical assistance for every little thing that went wrong. This gave them the control to maximise their use of the technologies available to them. These people were encouraged and offered professional development and help sheets to assist them in their technical skill development.

Others, and perhaps the majority, expected the equipment to work all the time, and when it didn't they saw it as the responsibility of others to fix it. Attempts were made to encourage these teachers to develop some of the basic skills as well as providing the technical assistance needed. One of the more pertinent quotes from one of the teachers in the case study was:

You need a balance, some people can play around with their computer to suit their own needs without having to call someone all the time. They see it as their tool, they want some control over it, it's not some foreign thing that every time something goes wrong someone else has got to touch it. I mean it's the same with your VCR or your microwave or whatever you want to know how to use the basic things but you should be able to rely on them and when they go really wrong you need help.

5.4.2 Unreliable technology

One of the biggest inhibitors to the embedding of ICTs into the curriculum is technology failure.

I have an expectation that if I walk into a classroom all of the machines are operating. ...Sometimes you're just absolutely hassled and the whole thing won't work..... So that's where the greatest difficulty lies. The more that happens, the less you start to want to use it. Yes and I have had some bad experiences that way. Which knock your confidence around in using it I suppose.

It is imperative that there is enough technical support to maintain equipment. One of the common pitfalls is for schools to buy lots of computers and other supporting technologies that gives a good student/computer ratio but they fail to provide the support to maintain those computers.

Technical manpower, I think if I had to give you a priority that would be it for me, even more than having computers in every room.

It is also very important that the support be on-site support rather than technical assistance from a central site. (Stearns et al., 1991)

5.4.3 Just-in time technical support

A major requirement from teachers is to have technologies working when they want to use them, this means there needs to be a support system in place that does its best to have equipment operating by due dates but, just as importantly, "just-in time" support is available when failure occurs during a lesson.

Teachers needs are different at different times. Like sometimes you're just absolutely hassled and the whole thing won't work and all you want is for someone to fix it and you don't want them to sit down and explain to you how to do it. The technicians have to be flexible but we've also got to be prepared to say what we want at the time. Do we just want you to fix it or would you please spend some time showing me what you are doing, so maybe I can fix it next time.

This is probably the most difficult requirement for a technical team to meet. In the case of this study at any one time there were up to 40 different classes running. There was never enough support staff to give a guarantee that at any one time a member of the team is available and has the skills to fix the problem instantaneously. The process used at the college was the use of an on-line request form that staff outlined the problem and the urgency, i.e., when it needed doing by. This system was ideal for the majority of technical assistance requests. For the urgent phone calls from teachers trying to run classes, the technical support team had to judge the urgency, i.e., priority would be given to the entire network being down over fixing a stand alone printer, which was not working, in one classroom. Obviously, what some teachers see as a priority in their classroom differs from individual to individual.

5.4.4 Conclusions

Often overlooked is the necessary proportional increase in the number of technical support staff as the number of computers on a network increases. The technical support staff must be highly skilled and have an understanding of the needs of an educational environment. In an educational environment the support staff are maintaining systems which have multiple users, which adds considerably to the support requirements, compared to most business environments where systems have one user only.

There need to be support protocols and guidelines in place to protect the support team as well as ensure equity for staff requiring support. The support team also needs to be flexible and perceptive in understanding what sort of support is wanted in a situation, i.e., "fix and go away" or "show me how to fix so that I can learn for the future".

It is important for the technical support team to work closely with those providing ICT professional development as they see first hand the skills and knowledge of the staff they are working with and know the professional development needs required. For similar reasons, it is important that there be representation from the technical support team on the Technology Management Committee.

5.5 TIME ALLOCATION

The Office of Technology Assessment (OTA) calls teachers' time shortage the "biggest barrier" to technology use in classrooms. Schools that have excelled in bringing technology to learning have provided teachers with time to attend professional development, explore software, seek help from colleagues, and plan lessons that incorporate new technologies."Unless there are significant changes to the rhythm of the school day or changed incentives for giving teachers more time to learn and experiment with new technologies, this barrier to technology use will remain immense.""
(Sherman, 1998)

5.5.1 Time to learn

With the push towards use of technologies in the classroom there has been a big increase in the percentage of the professional learning budget targeted for IT PD programs. Therefore, a large amount of time has been set aside for teachers to learn, i.e., to go to professional development sessions on how to use ITCs and how to integrate them into the curriculum. What has not followed is adequate amounts of time given to teachers to take the next step, that is time to practise and reflect.

5.5.2 Time to practise and reflect

McKenzie (1999) recommended that each teacher be given at least one week per year of invention time; that is, time to translate new ideas and strategies into practical classroom lessons. Teachers need whole days away from the classroom to take ownership, to put theory into practice, and so develop technology-enhanced learning experiences for their students.

I suppose one of the big factors for everybody is time isn't it. Not having the time to actually explore everything, get familiar with everything. New skills take time to practice and that's the difficulty because its on top of our normal teaching load, its not instead of my marking or planning, its on top of. There are only so many hours in the day.

We spent a lot of time trying to master the software itself, and then looking for ideas, preparing lessons. It was a lot of time then but it won't be as much time next time round. When you do anything new you want to it well. Even once you've got past the stage of finding something, deciding what you're going to do, you still need to do it yourself first and see if things really work.

5.5.3 Conclusions

Throughout this study time was given as the most common reason for not achieving the goals for technology integration that teachers set themselves. Time was usually found to attend relevant professional development and relief was provided to cover classes so that teachers could attend. The time that was lacking and complained about most was time to practise and reflect.

The main factor has been the time element because I try to keep a balance between working hard and having the rest of my life. There is always so much time needed to keep up with the one or more subjects we teach. Teaching with technology is like taking on a whole new field. If I had more time it would be an utter pleasure but it is often very difficult because you don't want to be left behind and you want to do the best for your students but you just know that you've got to keep a balance in your life.

If time to practise and reflect are not factored in, then in many instances the time and money spent in sending staff to professional development on how to use technologies in the classroom is wasted.

Because you don't use certain things all the time whatever you learned the end of last year you feel well that's gone anyway I can't remember any of that so I'm back to point scratch.

One strategy used by the school in the study was to provide access to technologies at home, which gave teachers greater opportunities to practice during out of school hours. This was done by providing teachers with their own laptop with software, allowing them to borrow other peripherals and assisting them with technical support to connect to internet providers, etc.

To conclude, the following two quotes from teachers in the study are presented. The first summarises the big issue teachers face in finding time for any new change process and the second a more positive comment regarding the value gained from the time put in.

The time we had at the end of last year with the three different modules was the best I really appreciated it. During the year its really hard to try and gain new skills on top of what you're doing because its not as though you're learning those new skills instead of, you're picking up another bag. So as you're walking along the airport with four suitcases all of a sudden you're expected to take another one and if you take on that other one, you're very likely to drop all the others, you can't manage them. But if you can put one down you can manage the others, or not pick up the other one.

It needs to be recognised that IT is causing a lot of extra work, though it is undoubtedly inevitable and necessary.

5.6 PROFESSIONAL DEVELOPMENT

According to Heck and Wallace (1999), staff development for ICTs occurs in stages:- awareness, information gathering, time management, concern about the impact on students learning, collaboration with colleagues and refocusing for improvement. These stages are also referred to as survival, mastering, moving towards learner-centred instruction and innovation.

Given this complexity, planning for professional development must be long term and provide flexibility to accommodate individual learner needs. Research suggests that early enthusiasm for technology integration is likely to dissipate if proper support is not provided during the implementation phase (Alderman & Panton Walking-Eagle, 1996; Garavaglia, 1996; Kopp & Ferguson, 1996; Software Publisher's Association, 1996) including a comprehensive maintenance system that promotes the use of newly acquired skills.

In most instances planning for ICT integration provides budgeting for hardware and software purchases, leaving very little for professional development spending. However the literature recommends that 30-40 percent of the technology budget should be earmarked for professional development. (Goldberg & Richards, 1995; Levin & Thurston, 1996; Panel on Educational Technology, 1997)

5.6.1 ICT skills, technical skills and pedagogy

Teachers need more than PD to develop their ICT skills, they also need PD for professional growth and pedagogy. Many of the early PD programs spent 97% of the

time on technical aspects with only 3% of the time discussing educational applications. (Rhodes & Cox, 1990).

In the early stages of this study, the biggest PD demands were for developing technical skills in using software and hardware. When staff had developed these competencies and became more confident in their use of ICTs, their PD requirements were related to pedagogy and classroom activities and strategies. The following quotes confirm this:

I think my needs in the future are, extending my own skills and passing it on to the kids which means time and PD, for example I can send emails back and forwards to people but I haven't actually used email in class and I really need to talk to someone about how to use that in an English class and what am I going to do with it.

I'm finding the hardest thing is really trying to work out what I should do in my classroom, which is advantaged by using technology.

Teachers need a certain level of technical competence to use technology effectively in instruction (Bitter & Yohe, 1989) and many teachers are seriously deficient in these basic technology skills (Willis et.al., 1995). Teachers who develop technical competence also gain the confidence to use technology in their classroom. Basic technology skills are necessary for teachers to implement a program of instruction that integrates information literacy.

5.6.2 Hands-on using technologies available in the school

McNabb et al. (1999) stated that one-off workshops run offsite were generally ineffective, often providing training with hardware and software not readily available back at schools.

Russell (1999) suggested that teachers should be encouraged to practice their ICT skills both at home and at school. The College in the study did this by providing each staff member with a laptop and software, as well as encouraging staff to borrow peripherals to take home. The staff in the study acknowledged the value of this in their individual professional development program with statements such as the following:

Having access to my own computer to take home and into the classroom has dramatically improved the speed with which I have been able to pickup IT skills. There is very little time in the day to practice

skills learned, but in the evenings and at weekends I have been able to experiment without all the external pressures of being at school.

5.6.3 Just-in-time PD

The biggest demand for PD was “just-in-time” PD, and staff in the study found that this sort of PD was the most valuable.

When we attend PD for a new skill that we don't need at that time it seems very overwhelming, it's very easy to switch off. You think I'm not going to be using it anyway for ages and by the time I have to use it I will have forgotten it all and I'll need somebody back again to reteach me. Unless you're going to learn the skill to be using it straight away then it sort of almost seems a waste of time. I know its useful because you have got it in the background but it still seems a waste of time at the time. I found it very useful to ring someone and say I will be wanting to use such and such next week so can you show me how to use it. That was very productive.

There's a lot of incidental things that you learn and its probably where don't want a PD session you want to be able to call someone and do it right then

You almost need a person to call 24 hours a day. When you go home like at the weekend and you're sitting there on Saturday afternoon and you think ah, now what.

5.6.4 Peer coaching

In a study by Williams and Moss, 1993, teachers indicated a strong preference for receiving training from their ICT co-ordinator rather than from experts external to the school. Jones (2001) stated that experienced teachers do not turn to institutions for technology assistance but look to each other for help.

I've found that I've picked up a huge number of things recently just by simply mentioning a problem in the right company. Somebody says but you just do it like this and nobody else in my staffroom knew that and then I showed everybody else how to do it.

Most of us would prefer the cooperative learning, I actually quite like experimenting but its good to have somebody to ask when you are unsure. That is my preferred learning style and to be able to say to somebody I want to do this and would like you to stand there and hold my hand so I'm confident and not making the wrong decisions.

5.6.5 Best Practice

Best practice is a technique or methodology that, through experience, has proven to reliably lead to a desired result. A commitment to using best practices is a

commitment to using all the knowledge and technology at one's disposal to ensure success. Throughout the study regular whole of College professional development sessions were run where teachers both from within the College and outside the College demonstrated their “best practice” in the use of technologies in their teaching programs. In addition to this some teachers invited other teachers to come into their classrooms and observe first hand their practices.

Some of the best PD I have ever experienced has been in observing another teacher in action in the classroom. I was then able to take this “best practice” and run it with my own classes.

5.6.6 Time an important aspect of any ICT PD program

The work of Joyce (1990) and others have demonstrated that sustained, lasting change in performance is most likely to occur when teachers partner with other teachers and meet regularly over many months to discuss strategies and swap stories.

As mentioned previously in section 5.4, time is a major issue for staff, with teachers giving it as one of the major barriers to them being able to reach their ICT goals. With regard to PD, time is needed to attend professional development activities, to practise skills, develop classroom strategies, to experiment, reflect, and to collaborate with others.

I am enjoying preparing to use more technology in the classroom but there still aren't enough hours in the day – and that's frustrating. Everything re IT seems to be moving so very quickly and sometimes it feels overwhelming when one is coping with normal classroom preparation/marking etc. then expected to spend time learning and developing (using) new skills in short spaces of time.

5.6.7 Conclusions

In summary, the results from this study suggest that a successful ICT professional development program needs to do each of the following:

- address individual learning styles and meet individual needs;
- emphasise hands-on experiences using the technologies found on-site;
- provide access to technologies both on and off-campus for staff to practice and experiment;
- develop technical skills, IT skills and pedagogy;
- use peer coaching and teacher collaboration;
- provide just-in time PD;

- showcase “best practice”;
- recognise technology rich professional practices;
- give release time to teachers to attend PD, go to conferences and most importantly to practice and apply what has been learned both individually and collaboratively; and
- offer incentives for staff to put time and effort into developing their skills and knowledge for the purpose of embedding ICTs into the teaching and learning program.

Chapter 6 Conclusions and Recommendations

6.1 INTRODUCTION

In this chapter, the changing role of the teacher is discussed, an overview of the findings of the study is presented and then recommendations are made regarding the support required for teachers to make the necessary changes to embed ICTs into their teaching and learning programs. Recommendations are made for the attention of the DOE, Principals and ICT Managers, as well as for teachers. The recommendations are underpinned by the assumption that the experiences of this case study may be transferable to other school settings. Finally, recommendations for further research are made.

6.2 THE CHANGING ROLE OF THE TEACHER

As discussed in Chapter 2, research has shown that teachers have been fairly slow in adopting technologies into their teaching and learning programs. It was also shown that this has mainly been due to the way in which education departments and schools have gone about the introduction of technologies. Initially technologies meant computers and these were used purely for computing subjects and were the sole domain of computing teachers. There was very little if any pre-service or in-service training; it was left to those teachers who had the inclination, desire and time to teach themselves how to use the technologies.

When non-computing teachers began to see how they too could use these computers in their own teaching programs they had to fight to gain access to the machines. The computing teachers owned the technical knowledge and non-computing teachers needed their support or had to learn for themselves how to load software, troubleshoot, etc. if they also wanted to use the computers.

Before technologies were to become widespread across all curricula, teachers had to be convinced that using the technologies would result in better learning outcomes for students than resulted from the traditional methods with which teachers were familiar.

It was at this point that schools needed to support these teachers by providing greater access to technologies for teachers and students, developing professional development programs in the area of ICTs and by making available technical support accessible to all. Many teachers were still skeptical about the rush to use technologies, considering this to be just one more in a series of educational bandwagons.

In this study, it has been shown that those teachers exhibiting competence in embedding technologies into the curriculum have been those who are prepared to admit a lack of expertise and to explore possibilities of computers with curiosity and enthusiasm in partnership with their students. These teachers:

- have a positive attitude to ICTs;
- understand the educative potential of ICTs;
- use ICTs effectively in the curriculum;
- manage ICT use in the classroom;
- evaluate ICT use;
- use a range of ICT resources; and
- update their skills regularly.

These teachers have gone through steep learning curves and endured many frustrations, but continue to persevere because of the benefits they see in the outcomes for students. For many, the new skills they acquired and the satisfaction of facing a challenge and overcoming it add to a teacher's sense of professional growth.

McKenzie (1999) describes an effective teacher as one who has a toolkit of strategies that can dramatically modify student performance when the choice of tool fits the situation and the individual student. Teachers are now using ICTs as another tool in the repertoire when trying to meet the individual and learning outcomes required.

Since this study, the Education Department of Tasmania has introduced a fifth module *Integrating ICT into Teaching and Learning* as part of the ECPD program.

In order to obtain this module, teachers need to show evidence of the following:

- Creating and sustaining a culture that encourages the use of ICT as a valuable tool for life long learning
- Learners electing to use appropriate ICT resources
- Providing a supportive learning environment that values ICTs
- Modeling good practice, using ICTs
- Participating in global learning communities
- Showing planning and evaluation which reflects integration of ICT into the teaching and learning program, inclusion of appropriate classroom management strategies
- Integrating ICTs across the curriculum
- Reflecting on the effectiveness of ICT and incorporating this into future planning
- Providing learners with opportunities to use ICTs as a tool to enhance their learning, using ICTs in a variety of contexts
- Using ICTs to provide for different learning styles and levels of achievement
- Giving opportunities to learners to express their creativity and imagination
- Promoting the global network as a resource and communication tool
- Using ICTs to create, locate, modify, and share educational resources
- Creating teaching and learning resources
- Locating and using web resources
- Contributing to shared resources both locally and globally

At the start of this study, there would have been a very small number of teachers who would have been able to show the outcomes required for this module. In more recent times, because of the support structures put in place as a result of the outcomes from this study, there is now a much greater number of teachers who have these skills and a much larger number rapidly developing the skills.

The requirements for this module give a good indication of the way in which the role of the teacher has changed and is continuing to change with the use of ICTs in their

teaching programs. These changes do not come easily, a huge amount of effort, time and work on the teachers behalf is required, but even more importantly this can only happen if these teachers are provided with a supportive environment. That is what this study has been all about, determining what this environment needs to look and feel like. The remainder of this chapter will make recommendations as to what is required for teachers to be able to competently and confidently provide a technology-rich learning environment for their students.

6.3 OVERVIEW OF THESIS

From the literature review and this study, it has been shown that educational technological change is a slow process. Teachers need to develop confidence in the use of technology in a non-threatening way. When they have developed this confidence and are convinced of the value to learning outcomes for students, they will begin the experimentation process by incorporating ICT activities into their teaching programs. For this to be successful, teachers must accept a change in their role; they are no longer the central figure in the teaching and learning process but instead a co-learner with the students. Part of this change is accepting that many students know more about technologies than they do.

The important lessons to be learned from this study are that this change in the teacher's role is not an easy one to accept and that it will take time. The amount of time required will depend upon the individual and the amount and type of support provided. Support is the critical factor and the basis of this study is to make recommendations about what support is necessary to provide the environment that will lead to successful integration of ICTs into the teaching and learning program. The types of support shown in this study to be crucial for this successful integration of ICTs come in the form of:

- a supportive, ICT skilled management/Principal;
- adequate technical assistance;
- time to learn and experiment; and
- appropriate professional development.

6.3.1 A supportive, ICT skilled management/Principal

The complexity of the challenges confronting schools today calls for a collaborative delineation of school leadership. Wherever possible it is important for the Principal in collaboration with his/her staff to develop the ICT vision that leads to change and communicate this vision to the whole school community.

A good leader will set up a team to manage the change process in collaboration with all players. In sharing the leadership functions amongst a greater number of people, we enhance the opportunities for teachers to develop skills in negotiation, collaboration and co-operation which can only lead to greater collegiality and benefits for the school as a whole.

With regard to implementing ICTs into the curriculum the Principal and leadership team must act as role models for all staff and students in the use of technologies. This means that they must have skills and knowledge in the use of ICTs and be seen using these technologies.

6.3.2 Adequate technical assistance

Often overlooked is the necessary proportional increase in the number of technical support staff as the number of computers on a network increases. The technical support staff must be highly skilled and have an understanding of the needs of an educational environment.

This study has clearly shown the need to have support protocols and guidelines in place to protect the support team as well as ensure equity for staff requiring support. The support team also needs to be flexible and perceptive in understanding what sort of support is wanted in a situation, i.e., “fix and go away” or “show me how to fix so that I can learn for the future”.

It is important for the technical support team to work closely with those providing ICT professional development as they see first hand the skills and knowledge of the staff they are working with and know the professional development needs required. For similar reasons, it is important that there be representation from the technical support team on the Technology Management Committee.

6.3.3 Time to learn and experiment

Throughout this study time was given as the most common reason for teachers not achieving the goals for technology integration that they had set themselves. Time was usually found to attend relevant professional development and relief was provided so that teachers could attend, however the time that was lacking and complained about most was time to practice and reflect.

If time to practice and reflect are not factored in then in many instances the time and money spent in sending staff to professional development sessions on how to use technologies in the classroom is wasted. One strategy used by the school in the study was to provide access to technologies at home, which gave teachers greater opportunities to practice during out of school hours. This was done by providing teachers with their own laptop with software, allowing them to borrow other peripherals and assisting them with technical support to connect to Internet providers etc.

6.3.4 Appropriate professional development

This study has shown that a change in teaching practice will happen if professional development is provided through the “just-in time” model and allows for new ideas to be tried in the classroom the next day. Teachers need to be allocated time to try new ideas and evaluate their effectiveness. Collegiality is important in providing a sympathetic environment for teachers to work together and discuss problems and solutions. The PD program also needs to address individual learning styles and provide access to technologies both on and off campus. Finally there must be recognition of technology rich practices by showcasing “best practice” and giving recognition through rewards and incentives for those teachers who are developing their skills and knowledge for embedding ICTs into their teaching and learning programs

6.4 RECOMMENDATIONS TO DEPARTMENT OF EDUCATION

If the Department is serious about the importance of embedding ICTs into the curriculum then it must take on board the findings of this study with regard to the following critical prerequisites to ensure that the use of these ICTs results in improved learning outcomes for students.

6.4.1 Management

Management must have the knowledge and skills to show leadership in the use of ICTs across all curricula and administrative practices. In many cases those in principalship positions have reduced their contact or teaching time with students, therefore Principals need to keep up to date with the new teaching methodologies and use of technologies by being provided with appropriate PD programs and by spending more time observing “best practice” teachers in their classrooms. The Department needs to ensure that these types of PD programs are part of the PD program for Principals and other leaders. It is also imperative that one of the selection criteria for Principals and other leaders is based on high level ICT skills.

6.4.2 ICT skilled teachers

The Department needs to employ a workforce of teachers who have the knowledge and skills to organise the classroom and structure appropriate learning tasks so that ICTs become an integral and valuable part of learning. This means giving teachers and support staff adequate and appropriate professional development and time allocation in their loads to develop the skills and knowledge to prepare technology-rich learning programs. It also means that the teacher-training programs need to adequately prepare beginning teachers with the same skills. I would go as far to say that the selection criteria for teachers should also include one based on ICT skills essential to teaching and learning.

In the Tasmanian Education Department ICT in Education (K-12) Strategic Policy 2002-2005 it states that teachers will keep informed about the potential benefits of ICT in their teaching practices and the ways in which this potential can be enabled, through professional reading, collaboration and professional learning. It also states that all staff in school leadership positions will demonstrate competence, and

ongoing commitment to developing skills in the use of ICT in teaching and learning, as a requirement for promotion.

6.4.3 Schools need adequate infrastructure and technical support

Schools require adequate hardware, software, infrastructure and bandwidth to run the programs essential to the students' learning programs. In addition to this they need a technical support team that is able to maintain the infrastructure to a standard that allows teachers to get on with the job of teaching without concerns of whether the equipment is working or not. This study has shown very clearly that if teachers cannot rely on the equipment they will opt for non-technological and therefore at times inferior teaching programs.

6.4.4 Curriculum documents that reflect ICT competencies

A final recommendation is the need for all curriculum documents to specify technological requirements. This is backed up from a quote from one of the teachers in the study (see page 71 of this thesis).

The DOE needs to develop policies to ensure that the above are met to at least minimum standards in all schools. The recommendations following for Principals and teachers expand further on the needs in each of these areas and hence give direction for policy development.

The following quote from McKenzie gives a good analogy for what is needed to ensure that technologies are embedded into the curriculum. McKenzie (1999, p. 4) uses a gardening metaphor to explain the stages required for IT to be embedded into the curriculum.

The soil (the community of teachers and learners) needs to be cultivated and fertilised (PD prior to equipment arriving) prior to planting and the garden needs to be maintained and weeded (support PD, technical etc. for when equipment arrives) for the plants to thrive.

6.4.5 Summary

Table 6.1 below summarises the recommendations to the DOE by stating what is required and the strategies recommended to achieve this.

Table 6.1.
Summary of Recommendations to DOE for Embedding ICTs into the Curriculum

REQUIREMENT	STRATEGIES
Management with skills and knowledge in the use of ICTs in curricula and administration.	<ul style="list-style-type: none"> • PD for leadership to include ICT leadership • Skills in use of ICTs as part of the selection process for Principals and other leadership positions.
A skilled ICT teacher Workforce	<ul style="list-style-type: none"> • ICT skills addressed appropriately in teacher training • ICT Skills requirement in selection process for teachers • Support for ICT PD programs
Reliable, adequately-supported ICT infrastructure including access to technologies to teachers outside of school hours.	<ul style="list-style-type: none"> • Financial and technical assistance to ensure adequate infrastructure • Minimum standards to be set for infrastructure • Financial and technical assistance to maintain technologies • Financial assistance to allow access to hardware, software, internet access for teachers outside of school hours
Curriculum Documents that reflect and assess ICT Competencies	<ul style="list-style-type: none"> • In collaboration with Assessment Board and teachers ensure syllabus documents reflect ICT usage.

6.5 RECOMMENDATIONS TO PRINCIPALS & ICT MANAGERS

Hord et al. (1987) identified six 'stages of concern'. They stated that

The developmental and interactive nature of concerns is real and must not be ignored. Concerns are influenced by:

- participants' feelings about an innovation;
- their perception of their ability to use it;
- the setting in which the change occurs;
- the number of other changes in which they are involved; and, most of all
- the kind of support and assistance they receive as they attempt to implement change (p. 43).

It is important when implementing any change within a school that all the concerns mentioned above are taken into account. Change should not be imposed; rather it

should be an innovation that has had the input of all staff, so giving them ownership of the change. Therefore, change should not be rushed, and this is particularly important if change is being imposed from outside the school itself, i.e., from the Department. When change is being imposed look for ways to shape the change to meet the needs and wishes of the staff rather than just accepting the change as given. In the case of technological change, it is important that before teachers are expected to use the technologies that the groundwork has been prepared. We have all heard the stories of computers collecting dust (see Chapter 2, page 37) in the back of the rooms because the administration, local or external, have purchased the equipment without having prepared the staff to use them. What a waste of money this can be.

6.5.1 The school's ICT vision

Before adopting any change the whole school community needs to have developed a vision for the change. This includes teachers, parents and students having discussions about where they want to be heading with regard to technologies at their school. My recommendation would be for this vision to be presented as a two to three year plan for ICTs at the school. The Principal will be instrumental in communicating the vision to the whole school community, in keeping the vision alive, keeping it up to date and in providing adequate funding to support the vision.

Means (1995) observed that sites most successful in infusing technology throughout their entire programs were schools and projects that devoted a good deal of effort to creating a school-wide instructional vision, a consensus around instructional goals and a shared philosophy concerning the kinds of activities that would support those goals. What appears to be important is not the point at which technology becomes part of the vision but the coherence of the vision and the extent to which it is a unifying force among teachers.

A good leader will set up a team to manage the change process in collaboration with all players. This would in most cases mean an ICT committee with full school representation. Sharing the leadership functions amongst a greater number of people leads to greater collegiality and benefits for the school as a whole.

6.5.2 Leadership modeling technology use

With regard to the specific change of implementing ICTs into the curriculum the Principal and leadership team must act as role models for all staff and students in the use of technologies. This means using technologies in as many ways as possible and being seen to be using technologies. Examples of this include communication using E-mail, bulletin boards, listserves, on-line discussions and so on; using PowerPoint presentations when giving talks to school community groups and publishing works on the web.

6.5.3 Support

For technologies to be successfully integrated into teaching and learning programs teachers need support in a number of areas.

Research indicates that to accomplish the profound changes associated with the integration of technology in the overall learning environment, there is a real need for training and support at all levels (e.g. Means, 1993, Aust and Padmanabhan, 1994, etc.). This is reflected in ACOT's current mission statement: "Change the way people think about and use technology for learning" (Dwyer, 1994, p. 23).

Based on the research in this study the types of support required are technical, time, professional development and financial.

6.5.3.1 Technical assistance

In the school, there needs to be an adequate number of technical personnel, the number being dependent on the number of computers and the number of users. The technical support staff must be highly skilled and have an understanding of the needs of an educational environment. To ensure that all solutions are based on best educational practice rather than the best technical solution, it is recommended that the technical support staff are closely managed by teachers, i.e., AST3 or Assistant Principal and as important as good technical skills are good interpersonal skills when selecting technical support staff in a school environment.

The demands placed on IT support staff can at times be very great and often teachers place unrealistic expectations on the support staff. Therefore, there need to be support protocols and guidelines in place to protect the support team as well as ensure equity of access for staff requiring support.

It is important for the technical support team to work closely with those providing ICT professional development as they see first hand the skills and knowledge of the staff they are working with and know the professional development needs required. Most technical support staff will also be expected to provide PD for staff and students and therefore need to also be able to explain things clearly without continuous use of technical jargon.

To ensure the best decision-making with regard to ICTs it is important that there be representation from the technical support team on the Technology Management Committee.

6.5.3.2 Time allocation

Teachers need both training and opportunity to reflect upon the appropriate role for technologies in curriculum and pedagogical practice. PD in either mode without the other is likely to be ineffective. This means time requirements need to be placed into the equation if we don't want to waste resources and lower the morale of a teachers already suffering from change fatigue. It would be recommended that there be some time allocation as part of the teachers' load to be able to spend time learning to use ICTs, prepare classroom activities and share with colleagues their expertise and knowledge.

6.5.3.3 Professional development

Current literature on teacher learning indicates that a change in teaching practice will happen if planned professional development workshops incorporate a commitment to try new ideas in their classrooms the next day; allow modification of workshop ideas to suit their own classrooms; allow time for teachers to try new ideas and evaluate effects; provides a suitable and sympathetic environment for participants to report success or failures to the group; allows participants to discuss problems and solutions regarding individual students and/or teaching matter and encourages participation in a wide variety of teaching and learning approaches.

As we have seen it takes considerable skill and knowledge for teachers to make effective use of technologies. While a few teachers have been able to learn on the

job, the majority of teachers have neither the time nor energy to develop adequate ICT skills as they struggle to cope with the many and growing demands of their job.

Funding teacher release time for an in-service program would be very expensive, time consuming and probably not particularly cost effective. One method that does appear to work is a school-based staff development programme that provides one-on-one in-service training that is individualised to teachers own specific needs. This would require suitably qualified staff/IT Consultants to design and implement a program that:

- develops technical skills, IT skills and pedagogy;
- addresses individual learning styles and meet individuals needs;
- emphasises hands-on experiences using technologies found on-site;
- provides access to technologies both on and off-campus for staff to practice and experiment;
- uses peer coaching and teacher collaboration;
- provides just-in time PD;
- showcases “best practice”;
- recognises technology rich professional practices;
- gives release time for teachers to attend PD, go to conferences and most importantly to practice and apply what has been learned both individually and collaboratively;
- offers incentives for staff to put time and effort into developing their skills and knowledge for the purpose of embedding ICTs into the teaching and learning program; and
- does not forget the PD needs of the IT Consultants.

6.5.3.4 Financial support

All the support recommended above does not come cheaply. If we are serious about assisting staff to embed ICTs into their teaching program then we need to also be serious about finding funds to provide the types of support recommended. In many earlier cases of introducing ICTs into schools the bulk of funding went to purchasing hardware, and to a lesser extent, software. There the problems began, because the teaching staff did not have the technical nor pedagogical skills to use the computers and so in many cases the computers sat idle.

A recommendation from this study and from the literature (McKenzie, 1998) is for the budget to be split up in the following way:

- 33% on Infrastructure;
- 33% on IT Technical Support; and
- 33% on PD.

The above split up shows a commitment to all aspects of embedding ICTs into the teaching and learning program by giving equal financial weighting to the infrastructure, technical support and professional development. This should ensure that technologies bought are both supported technically and utilised by teachers who have knowledge and experience in good pedagogical use of technologies.

The budget should be linked to the ICT plan and hence the ICT Vision for the school. The third of the budget set aside for technology infrastructure needs to take into consideration the need to replace hardware and software at least every three years. Therefore it would be recommended that a percentage of this budget be set aside for future years to allow for this necessary updating of technology infrastructure and software.

6.5.4 Summary

Table 6.2 over page summarises the recommendations to Principals and ICT Manager by stating what is required and the strategies recommended to achieve this.

Table 6.2.
Summary of Recommendations to Principals and ICT Managers for Embedding ICTs into the Curriculum

REQUIREMENT	STRATEGIES
ICT Vision	<ul style="list-style-type: none"> • Needs to be determined by whole of school community • Need ICT Committee that fully represents whole school community to implement vision
Supportive Principal	<ul style="list-style-type: none"> • Be seen to be supportive • Needs to model technology use • Principal, ICT Manager attend ICT PD
Reliable, adequately supported ICT infrastructure	<ul style="list-style-type: none"> • Need to maintain, need to update hardware and infrastructure on a regular basis • Student manned “just in time” help desk
Teacher Accessibility to “tools”... access to personal notebooks is pivotal to effective change	<ul style="list-style-type: none"> • Need to maintain
Strategic, whole staff, paced, classroom based PD	<ul style="list-style-type: none"> • Learning Technology Consultants • One on one PD to meet individual “just in time” needs of staff • Teams/pairing of staff for support • Whole staff/larger group “visionary” PD sessions • IT staff skills register • Incentives for skill development and sharing of practices
Time	<ul style="list-style-type: none"> • Need to find ways of giving teachers time to learn and practice ICT skills.
Budget	<ul style="list-style-type: none"> • Need to ensure continuing financial support to maintain ICT vision. • 3-year budget is valuable in ensuring the replacement of computers etc is budgeted for on a three-four year cycle.

6.6 RECOMMENDATIONS TO TEACHERS

Some of the recommendations coming out of the study for teachers are:

1. Work with the administration to ensure that you have adequate support:

a) Access to technologies

Teachers need access to their own computer, preferably a laptop for convenience of taking it into classrooms, and to their homes, or to conferences, etc. It also means access to the software both at school and at

home, adequate storage facilities, E-mail and Internet access. Teachers should be given assistance in accessing the Internet from home. This may mean financial assistance to pay for Internet providers or access directly from home to the school network. For ease of use, it is important for teachers to access files stored on the schools network easily from home. This study has shown that teachers successful in embedding ICTs into the curriculum were those who put in extra time to learn and this was usually done in their own time at home.

b) Access to technical support

To use the technologies, teachers need to be able to rely on them when teaching. It is important that teachers can use technologies with confidence and know that when something does go wrong that in the majority of cases there will be someone with technical know-how to fix it then and there.

c) Access to appropriate and timely PD

Teachers need professional development when they need it, not before and not after. It is important that “just-in-time” PD is available as this is the type of PD resulting in the best outcomes for teachers.

d) Time to learn and prepare

Teachers often feel that there is never enough time to do anything properly. It is a real juggling act to keep up with preparation, marking and administration as well as finding time to learn new skills. Teachers need to talk to the administration about this and work with them to find ways that time can be given to support the work that teachers do. Such strategies as student-free days, staff meeting times dedicated to IT PD, relief to have time to go to PD or share with colleagues or to visit other classes to see how technologies are being used. Teachers need to look for ways to share the workload amongst colleagues, teacher aides and so on.

2. Teachers should only use technologies when these do a better job than the non-technological method that they have been previously using. That is don't use technologies for technologies' sake.

3. Teachers need to give themselves time. Most of the research says that it will take three to five years before teachers develop the skills to successfully integrate new technologies into the curriculum. Also because technologies are changing so rapidly there is no endpoint in the learning curve and so teachers must be prepared to be continually learning new skills and adding them to their repertoire of tools for teaching and learning.

4. Teachers should work with their colleagues. It is unrealistic to expect teachers to know how to use every piece of technology to its fullest capacity. Teachers should ask other colleagues if they know how to use something before going to the manual or spending hours trying to teach themselves. Successful schools set up a system of “experts”: one teacher keeps up to date with how to use the scanners, another keeps up to date with the features of “WORD” and so on. When given a responsibility like this a teacher must keep up to date and share their skills and knowledge with others by “show and tell” or handing around printed tutorials. It is a good idea to keep all ICT tutorials published on the school’s intranet for all to use, teachers and students. Another important resource is the students themselves, a large number of them will have skills in the use of some technologies that are much greater than the teacher’s skills. Use the students to teach the other students as well as the teacher. This forces the student doing the teaching to develop new and valuable skills as well as giving them a feeling of achievement and self-esteem. It also saves the teacher time, which is a very precious commodity.

6.6.1 Summary

Table 6.3 over page summarises the recommendations to the teachers by stating what is required and the strategies recommended to achieve this.

Table 6.3.
Summary of Recommendations to Teachers for Embedding ICTs into the Curriculum

REQUIREMENT	STRATEGIES
Teacher Accessibility to “tools”... access to personal notebooks is pivotal to effective change	<ul style="list-style-type: none"> • Access to own computer and hardware during work hours, and ideally access to computer and hardware, Internet etc. after hours, ideal strategy is to be provided with laptop.
Reliable, adequately supported ICT infrastructure	<ul style="list-style-type: none"> • “just in time” IT support structure
Strategic, whole staff, paced, classroom based PD	<ul style="list-style-type: none"> • Learning Technology Consultants • One on one PD to meet individual “just in time” needs of staff • Whole staff/larger group “visionary” PD sessions • Incentives for skill development and sharing of practices
Work with Colleagues and students in developing ICT skills	<ul style="list-style-type: none"> • IT staff skills register • Teams/pairing of staff for support • Use students to teach students
Time	<ul style="list-style-type: none"> • Need to find ways of giving teachers time to learn and practice ICT skills.

6.7 LIMITATIONS OF THIS STUDY

The major limitation of this study is that it has occurred at only one setting, i.e., one Senior Secondary College in Tasmania. Although data were collected from all staff through surveys and observation, the core study has looked only at 11 teachers and three different learning areas. Whilst the study reports on the pedagogical changes and support needs of these staff to embed ICTs into the curriculum, the results may not be applicable to other Senior Secondary Colleges, let alone other educational institutions, due to the small sample size.

Another limitation is that since the year of the study there have been many changes in the processing power and capabilities of technologies, which may have changed the nature of what is possible when embedding ICTs into the teaching and learning program. Therefore the results may or may not be applicable to current educational institutions.

6.8 FURTHER RESEARCH RECOMMENDED

Obviously further studies similar to this one operating at different educational sites would be of benefit to support, or otherwise, the conclusions from this study. This could be done by following the same methodology or by applying the recommendations within a setting and measuring the results. This would need to be done in other senior secondary, secondary and primary schools.

Following on from this study further research could be conducted into the role of the Principal, Assistant Principals and ICT Managers in providing a supportive environment for teachers to feel comfortable and ready to develop skills and knowledge in the use of technologies in their teaching and learning program. The results from such a study would be valuable in assisting the development of PD programs for Principals and managers to support the embedding of ICTs into the curriculum. This could be done in a variety of ways; one way would be to run an action-research project involving an ICT PD program for a group of Principals and then measure the outcomes within their school resulting from the PD program. Another way would be to analyse the different ways that Principals operate and correlate this with the ways in which ICTs are embedded in their schools.

Another valuable study would be to analyse the effects of providing teachers with their own computers, software and Internet access from home, and comparing these effects to those at school in which teacher access to technologies is only possible on campus.

6.9 SIGNIFICANCE OF THIS STUDY

Despite the limitations of this study mentioned above, the significance of this study is that it has resulted in a number of recommendations for Education Departments, Principals and ICT managers and teachers. If these recommendations are taken on board then there will be improvement in any school in the way in which ICTs are embedded into the curriculum. It is important to remember that the reason for embedding ICTs successfully into the curriculum is for the purpose of improved

learning outcomes for students. This is the whole purpose of the education system: to educate students for their future life choices.

I am confident in making this statement because the resulting recommendations have arisen as a result of this study as well as through other studies undertaken as discussed in the literature review in Chapter 2. Further, throughout the study many of concluding recommendations have been enacted within the study school over the past few years and at least from anecdotal evidence there has been a dramatic increase in the use of technologies in ways that have resulted in better learning outcomes for students. In some instances this anecdotal evidence would say that this has resulted for two reasons, one because the use of these technologies for some students has resulted in improved learning outcomes because it has engaged them in learning and, secondly, because some of the uses result in better learning outcomes because they are better methods in explaining and teaching a particular topic than previous methods had proven to be.

6.10 CONCLUDING REMARKS

This study has looked at the needs of teachers for them to embed ICTs into their teaching programs. The critical aspect is obviously the teachers themselves; it is they who have to have the desire (see the need), the time and the support to make the pedagogical changes to their teaching practice. Figure 6.1 shows the journey that teachers go through when embedding ICTs into the curriculum. It is shown as cyclic, with teachers moving into and out of the process depending on circumstances, successes and failures when using ICTs in their teaching programs. Problems can arise at any time resulting in staff forfeiting their desire to embed ICTs into the curriculum until another need arises (“If I Have To”) and the cycle begins again. Continuous effort is required to keep the cycle going and this is seen in the quote from one teacher in the study:

It's like a roller coaster too, with all these new things, you become overwhelmed and then you feel some joy when you get everything going well and then despair as it all goes wrong, and so I go back to doing things by hand again.

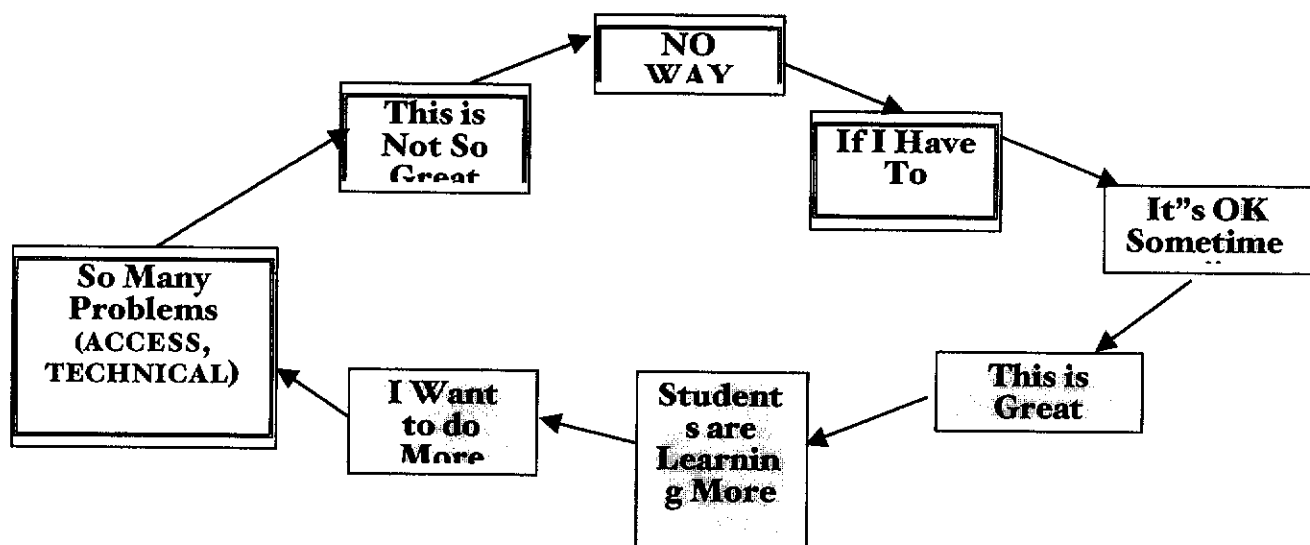


Figure 6.1 Teachers Embedding ICT cycle
(Adapted from group workshop at ACEC Conference 2000)

It is important that teachers, principals and ICT managers and education departments are aware of this model. It allows them to get feedback on both individuals and whole schools as to how well-supported teachers are and when more support is needed. Teachers can use it to understand and accept that at times things will not work out as they had planned, but that all is not lost, and that with support things can get better again. For principals and managers it allows them to see when teachers have come to a point in the cycle where they need extra support and encouragement to ensure that they move onto the next stage and for Education Departments to be able to understand why support is needed when it is asked for.

In conclusion some final comments from the study from three different teachers.

Has it all been worthwhile?

Teacher One

Oh I think so, yeah I think the students and I have got a lot more out of it than I thought that I would and I was optimistic at the outset that it would be worth the effort. And it's a lot of effort to begin with but its going to be easier next year as a result of everything that I've learned this year and its just another approach, another way of looking at it. I mean even if you know the contents you still have to change your approach because the student make up of the class is different and the next year I'm changing my text book so I'd be changing certain ways that I did things and ways that I was going to present the information. This is just an extra dimension and its been a really good way of looking at what you want the students to get out of a particular activity and by incorporating IT they get the language

outcomes that you are looking for but they get a whole lot of other skills along the way and use of IT is going to be so important in practically everything that anyone's going to do when they leave college so if you can give them a confidence and a familiarity with everything there must be an advantage as a result of it, even if its not going to be used in exactly the same way, they are going to take that confidence and familiarity to the next stage and they're going to be better as a result of it.

So are you glad, happy that you're in IT?

Teacher Two

Oh yeah I just find it exciting, frustrating when things go wrong, but I feel an absolute high when things go well and I really get satisfied about doing something new and different. Yeah I think the personal satisfaction is it makes me seem like I'm being the best teacher that I can be. IT is one of the many ways that you do that and have that chance to do it.

Teacher Three

It has been difficult but its been a challenge, its frustrating at times, when equipment doesn't work or things don't go right or you want to know how to do something and you don't know who to turn to find out. Its nice that I know about web sites and I know about email and I don't feel like I'm left behind and I actually do find it enjoyable learning all this. I enjoy teaching and I think as I become more comfortable I will become better even at deciding which technology to use and which not to. To start with its like you have to sample them all, but then I think you get a bit more selective after a while.

...Well that was my final comment, I know it gets frustrating at times and I just look at the number of hours that I've spent, IT has really added to my work load, but it is terrific to be in a place where you feel that your skills are being added to and you're there at the top. I just think we're really fortunate despite the frustrations.

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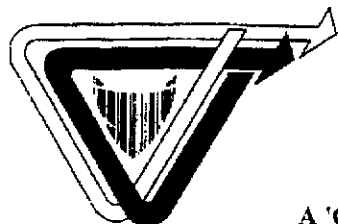
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Tasmanian Secondary Assessment Board

12 FR833 C French Stage 4

A 'C' Syllabus for the Tasmanian Certificate of Education

First Year of Availability:

1992

Revised: 1996

Subject Description

This is the less demanding of two syllabuses designed for students who have completed French Stages 1, 2 and 3. It is designed to consolidate and extend students' skills in oral/aural and written communication in French with a greater emphasis on the former. It will also enable students to develop an awareness of another culture and a deeper understanding of their own language.

Previous Experience

Successful completion of *FR332 B French Stage 3* or *FR331B French Stage 3*.

Neighbouring Syllabuses

This syllabus is one of a set designed for students who have successfully completed French stages 1, 2 and 3. This set of syllabuses consists of:

12 FR833 C French Stage 4

12 FR834 C French Stage 4

Learning Objectives

Through studying courses derived from this syllabus students will develop their ability to:

- listen to contemporary French both live and recorded, in order to acquire knowledge and understanding, to assist in solving practical and theoretical problems, to form hypotheses and judgements, to predict consequences and for aesthetic pleasure;

- speak French intelligibly, fluently and relevantly in initiating or responding to personal and group encounters, instructions, requests for information, explanations, hypotheses and interpretations or judgements;
- read contemporary French responsively and accurately, aloud and silently, using relevant materials in order to acquire more knowledge and understanding, to assist in solving practical and theoretical problems, to form hypotheses and judgements, to predict consequences and for aesthetic pleasure;
- write French accurately and relevantly in initiating or responding to personal and group encounters, instructions, requests for information, explanations, hypotheses, interpretations or judgements and for aesthetic pleasure;
- understand the cultures of French-speaking communities, to compare these with their own, to see the value of other ways of viewing the world and to relate to the people of these cultures.

Content

The following details represent the grammar to be covered. Additional material may be treated, particularly where the course-book used requires it.

Students are expected to achieve oral mastery of the items listed and passive recognition of those marked with an asterisk, i.e. students should be able to recognise and understand these items in the spoken and written language but should not be expected to use them actively themselves.

All correspondence to: The Chief Executive Officer
Tasmanian Secondary Assessment Board
P.O. Box 147
Sandy Bay TAS 7006

Grammar

All those points of grammar covered in 9/12 FR.332 B French Stage 3. Not all components will be needed to communicate effectively.

ADJECTIVES

- Irregular as they occur e.g. *sportif/sportive, sec/sèche*
- * Superlative
- Interrogative - *quel*

PRONOUNS

- **Il est/c'est* (common cases only)
- *Indefinite - *quel qu'un*
- *Interrogative e.g. **qui/quoi* after a preposition
- * Object pronouns with Imperative (*affirmative and negative*)
- * Personal pronouns (use of two object pronouns together, including *y* and *en*).

NEGATIVES

- * Subjects e.g. *Personne ne chante; rien ne change*

ADVERBS

- Regular
- Comparison - regular and * irregular
- Of place
- Of quantity
- Of time

VERBS

- immediate past (*venir de*) (present only)
- present
- perfect
- * pluperfect
- near future
- simple future
- imperfect
- *conditional of common verbs

(i) Conjugation in the prescribed tenses of verbs already studied *plus s'asseoir, courir, croire, envoyer, recevoir, rire, suivre, tenir* (and others deemed necessary in relation to thematic content and including modal verbs).

(ii) **si'* clauses

(iii) Government of verbs - *à/de*

(iv) *être en train de*.

(v) *être sur le point de*.

PREPOSITIONS

- Characteristic use of the following prepositions - *à, de, en, dans, avant, entre, vers, près de, chez, depuis, sans, pendant, jusqu'à, pour, sur, sous, derrière, devant, à côté de, au milieu de, contre, en face de*.

Themes and Topics

Themes and topics are to be the basis for the development of

- key vocabulary and idiom in all four macro skills;
- cultural knowledge and awareness;
- positive world attitudes.

Other themes and topics may be treated should they arise, however assessment is to be limited to the themes and topics listed.

a) Revision and Extension of the topics listed in Stages 1, 2 and 3.

b) The following list based on Van Ek, J. A: "*The Threshold Level for Modern Language Learning in Schools*" provides an overview of the Themes and Topics introduced in Stages 1, 2 and 3 with details for their development in Stage 4.

1. PERSONAL IDENTIFICATION

name, address, telephone number, date and place of birth, age, sex, marital status, nationality, origin, family, likes and dislikes, character.

2. HOUSE AND HOME

types of accommodation, rooms, furniture, own room, services, amenities, region, common plants and animals.

3. LIFE AT HOME

family, occupation of parents, daily routines, money, pets.

4. EDUCATION AND FUTURE CAREER

schooling, daily routines, school-year, subjects, recreation, examinations, future career.

5. FREE TIME, ENTERTAINMENT

hobbies, interests, radio and TV, cinema, theatre, concerts etc., sport.

6. TRAVEL

travel to school, holidays, countries and places, public transport, private transport, entering and leaving a country, nationalities, languages, hotels, hostels and camping, travel-documents, fares, tickets, luggage, traffic, getting and giving directions.

7. RELATIONS WITH OTHER PEOPLE

friendship and aversion, invitations and appointments, correspondence, clubs and societies, politics.

8. HEALTH AND WELFARE

parts of body, ailments, accidents, personal comfort, hygiene, medical services, emergency services.

9. SHOPPING
shopping facilities, foodstuffs, clothes and fashion, household articles, medicine, prices, weights and measures.

10. FOOD AND DRINK
types of food and drink, places where you eat and drink.

11. SERVICES
postal services, telephone, telegraph, bank, police, hospital, garage, repairs, petrol-station.

12. WEATHER
climate and weather conditions.

Functions and Notions

Functions and Notions differ from themes and topics in that their development is spread over the full period of the course and the standard should gradually become higher. They represent the various ways in which the pupil is able to operate and the general notions which can be understood and expressed by the end of the course.

The functions and notions for Stage 4 are the same as those in Stages 1, 2 and 3, but are treated in greater depth, given the students' increased competence in the language.

FUNCTIONS

Socialising e.g.

- modes of address
- greetings
- health enquiry
- leave-taking
- introductions
- thanking
- expressing good wishes

Exchanging Information e.g.

- identifying
- asking for and giving information
- describing
- seeking confirmation
- expressing opinions
- agreeing or disagreeing
- permission
- appearance
- intention
- expressing likes, dislikes, preferences, wishes
- comparing
- narrating personal experiences
- reporting
- enquiring about and expressing knowledge
- expressing certainty and doubt
- necessity and need

- ability
- enquiring about opinions
- enquiring about or expressing hope
- commenting

Expressing Attitudes e.g.

- friendship and love
- approval
- interest
- surprise
- dislike and like
- apology
- boredom/fear
- gratitude
- regret
- anger
- praise
- encouragement
- complaint
- asking for evaluation

Getting Things Done e.g.

- offering
- requesting
- suggesting and making arrangements
- inviting
- reacting to offers, requests, suggestions and invitations
- instructing and giving orders
- suggesting

Organising and Maintaining Communication e.g.

- attracting attention
- expressing lack of comprehension
- asking for rephrasing or repetition
- asking how to say something in French
- asking for translation
- pausing/holding initiative e.g. link words in conversation
- asking how to spell a word
- punctuating and paragraphing
- setting out a personal letter
- seeking confirmation
- seeking an explanation (eg of vocabulary)
- telephoning
- punctuation (including punctuation for conversation)

NOTIONS

References to

- people
- places
- things
- events
- qualities
- actions
- existence/non-existence
- availability/non-availability
- presence/absence
- ideas

Time

- clock time
- points in time
- future time
- dates
- the past
- beginning and ending
- sequence
- before, after, at the same time
- duration
- frequency

Space

- location
- movement (verbs, adverbs)
- distance
- motion towards, from, where

Quantity

- numbers and simple fractions
- expressions of amount
- measurement
- expressions of degree

Characteristics

- shape
- physical appearance
- colour
- age
- substances
- sound
- taste
- smell
- condition
- psychological characteristics

Evaluations

- price
- true/false
- correct/incorrect
- ease/difficulty
- appreciation/approval
- usefulness/importance

Possession

Negation

Assessment

Assessment for accreditation shall be at the end of the course of study based on syllabus 12 FR833C French Stage 4 as language learning is a cumulative process.

- Students' achievements on this syllabus are to be assessed against pre-determined criteria. For each criterion a wide range of achievement is possible and students' individual achievements will be rated using a four point scale.

The four ratings are 'A', 'B', 'C', or 'D' where each rating represents a range of achievement with respect to that criterion.

- A rating of 'D' is used when a student has offered work for assessment but there has been little evidence of achievement.
- A rating of 'C' represents the range of achievement which is considered to be at an acceptable standard for this syllabus.
- A rating of 'B' represents the range of achievement which exceeds the standard considered to be acceptable for this syllabus.
- A rating of 'A' is the highest rating that a student can attain on a particular criterion.
- Where no work has been offered for assessment no rating will be given against that criterion.

Standards for each criterion are established and reviewed through a process of consultation between all teachers of the syllabus. Advice on these standards is available through the Tasmanian Secondary Assessment Board.

Criteria

The assessment for 12 FR833C French Stage 4 will be based upon the degree to which the student:

Listening

1. shows understanding of the spoken language by responding appropriately in verbal form;
2. shows understanding of the spoken language by responding appropriately in written form;

Speaking

3. speaks the language with acceptable fluency;
4. converses intelligibly and accurately;
5. reads aloud with acceptable pronunciation and intonation;

Reading

6. processes written information in order to solve problems and to carry out a variety of tasks;
7. shows understanding of the written language by responding in verbal or written form (in English);

Writing

8. communicates ideas and information in the written language;

9. writes the language using a range of appropriate vocabulary and structures;

Cultural Awareness

10. shows an awareness of differences and similarities between French culture and that of the learner, implicit in the themes and topics of the course.

Award Requirements

The minimum requirements for an award in this syllabus are as follows:

Satisfactory Achievement (SA)

A rating of 'C' on at least seven criteria, including one from each of LISTENING and SPEAKING, and one from either READING OR WRITING, and 2 'D' ratings.

High Achievement (HA)

A rating of 'B' on at least six criteria, including one from each of LISTENING and SPEAKING, one from READING or WRITING, 3 'C' ratings and 1 'D' rating.

Outstanding Achievement (OA)

A rating of 'A' on at least six criteria, including one from each of LISTENING and SPEAKING, one from READING or WRITING, 3 'B' ratings and 1 'C' rating.

When a student has satisfactorily attended class and has made a conscientious attempt at the tasks related to this syllabus and set by the teacher but where the requirements for an SA award have not been met then this syllabus will be listed separately on the Tasmanian Certificate of Education, provided that no award for a neighbouring syllabus has been listed for that year. A recommendation by a school for such inclusion should be based on a global judgement of the student's performance and should not be related to ratings on individual criteria.

References and Resources

This list is not exclusive. Teachers may find other course books useful.

A Votre Avis: *What Do I Say?*

What Do I Say Next Arnold.

Asher & Webb. *French For Your GCSE*. Hutchinson.

Honde-Grosjean. *A vous de parler*. Arnold.

Jarvis, Bunin, Birchbickler. *Invitation*. Holt, Rinehart, Winston.

Morton. *English Grammar for Students of French*. CIS.

Rogers & Horrigan. *Year 10 Exercises in French*. Longman.

Rogers & Horrigan. *Year 11 Exercises in French*. Longman.

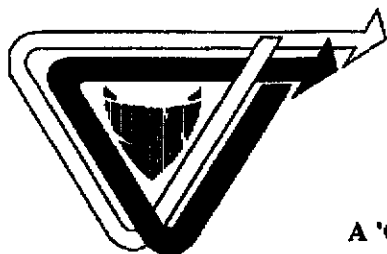
Rogers. *HSC Exercises in French*. Longman.

Sprake. *Communiqué*. Oxford.

Smith. *Toutes Directions*. Oxford.

Whitmarsh. *New Simpler French Course*. Longman.

Wildbore. *Débrouillez-vous*. Arnold.



Tasmanian Secondary Assessment Board

12 GR813 C German Stage 4

A 'C' Syllabus for the Tasmanian Certificate of Education

First Year of Availability:

1992

Revised:

1997

Subject Description

This syllabus is designed for students who have completed 9/12 GR312 B German Stage 3. It provides students with the opportunity to further develop their communication skills. It focuses on learning and communicating in situations which are relevant both to life in German-speaking countries today and to the learner's age and interests. The learner's experience of the language and its cultural background is also extended and enriched by activities which are not directly assessed.

Previous Experience

Successful completion of 9/12 GS312 B German Stage 3.

Neighbouring Syllabuses

This syllabus is one of a set designed for students studying Stage 4 German. This set consists of:
12 GR812 C German Stage 4
12 GR813 C German Stage 4

Learning Objectives

Through studying courses derived from this syllabus it is intended that students will develop their ability to:

- listen responsively and accurately to simple current German spoken live and on recorded audio and audio-visual materials, in order to acquire knowledge and understanding, to assist in solving practical and theoretical problems, to form hypotheses and judgements, to predict consequences, or for aesthetic pleasure;

- speak simple German intelligibly, fluently, relevantly and with due regard for the cultural conventions of the language, in initiating or responding to personal encounters, instructions, requests for information, explanation, hypothesis, interpretation or judgement, and invitations to individual or joint action;
- read current German responsively and accurately, using relevant published or unpublished materials, in order to acquire more knowledge and understanding, to assist in solving practical and theoretical problems, to form hypotheses and judgements, to predict consequences, or for aesthetic pleasure;
- write simple German accurately, relevantly and with due regard for the cultural conventions of the language, in the form of guided compositions, dialogues and informal and simple formal letters, in initiating or responding to personal encounters, instructions, requests for information, explanation, hypothesis, interpretation or judgement, invitations to individual or joint action, or for aesthetic pleasure;
- acquire direct access to current German culture, and gain sympathetic insight into its concerns, ideas, beliefs and values, and the ways in which they differ from those in Australia.

Content

In order to develop their competence in listening, speaking, reading and writing, and to achieve the objectives associated with that competence, students will be expected to participate in a range of communication activities based on a combination of elements from each of the following aspects of current German:

All correspondence to: The Chief Executive Officer
Tasmanian Secondary Assessment Board
P.O. Box 147
Sandy Bay TAS 7006

Topics

- Self
- Family, Friends, Relationships with others
- Personalities, Personal Characteristics
- Pets
- School and Education
- Shopping
- Hobbies, Leisure Activities and Sport
- House and Home
- Daily Routine
- Local Area, City Services
- Food and Drink and Eating out
- Holidays
- Travel and Transport
- Weather
- Major Festivals
- Health
- Occupations, Work, Careers, Workplaces
- Contemporary issues
- Comparisons between Australia and German-speaking countries

Functions and Notions

Functions and notions differ from topics in that their development is spread over the full period of the course. They represent the ways in which the student is to be able to operate and the general notions which can be understood and expressed by the end of the course.

FUNCTIONS

Socialising

- modes of address - people (*du, ihr, Sie*)
- greetings
- health inquiry
- leave-taking
- introductions
- thanking
- expressing good wishes

Exchanging Ideas

- naming, identifying
- asking for and giving information
- comparing
- expressing possession
- seeking confirmation
- agreeing or disagreeing
- enquiring about or expressing likes and dislikes
- expressing simple opinions
- narrating personal experiences or a series of events
- describing

Expressing attitudes

- expressing love, approval, gratitude, regret, interest, surprise, apology, anger, praise, encouragement, complaint, indifference, boredom, resignation
- asking for evaluation

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Getting things done

- offering
- requesting
- suggesting
- making arrangements
- inviting
- reacting to offers, requests, invitations

Organising and Maintaining Communication

- attracting attention
- expressing lack of comprehension
- asking for rephrasing or repetition
- asking how to say something in German
- spelling and asking for spelling
- setting out a postcard or informal letter
- telephoning
- punctuation and paragraphing

NOTIONS

People places, things, actions, events, qualities and ideas

- presence/absence

Time

- clock time
- points in time
- dates, seasons, weather
- present, present indicating the immediate future, conversational past, narrative past, anterior past
- duration and frequency
- repetition
- sequence
- beforehand/afterwards/ at the same time

Space

- location
- address
- direction
- distance and movement
- movement towards/away

Quantity

- numbers, cardinal and ordinal
- addition, subtraction, multiplication, division
- measurement
- degree
- amount

Characteristics

- shape
- physical appearance (parts of the body, clothing)
- colour
- age
- size
- condition
- taste
- sound
- nationality
- psychological characteristics

Evaluation

- evaluating things seen, done, heard
- price
- correct/incorrect
- ease/difficulty

Modality

- permission/prohibition
- ability/inability
- possibility
- compulsion
- moral obligation
- allegedness
- volition and intention

Relation between units of meaning

- comparison
- possession
- negation

NOTE: The above lists indicate only the prescribed, assessable content. Teachers and students may increase them in whatever way they see fit.

Grammar

The emphasis of the syllabus is on communicating in current German. However, this should not be taken to mean that the teaching of grammar can be ignored, since competence in using a language is inseparable from, though not identical with, competence in using its grammar. What the syllabus implies is that grammatical items are not usefully taught, practised or tested in isolation. They should be dealt with as arising from the need to communicate in the prescribed activities. Consequently, there is no list of specific grammatical items to be mastered independently, although many are clearly implicit and often explicit in the above lists of Functions and Notions.

Vocabulary

Vocabulary is most effectively learnt in context. In this syllabus therefore the extent of the vocabulary to be learnt is defined by the prescribed content and communication activities and in the recommended resource materials or their equivalent.

Sequence and Depth

A recommended sequence of topics is indicated above. The depth of learning required is that which will enable the learner to perform the prescribed communication activities at the standard required for this syllabus.

Enrichment Activities

Students should also be given the opportunity to engage in activities, such as those listed below, which need not be formally assessed:

Enjoying German literature;
Hearing and singing German songs;
Viewing recent German films and television programmes;
Cooking and/or sampling German food;
Playing games in German;
Celebrating the major German festivals of the year;
Corresponding with a German-speaking penfriend;
Participating in German language competitions.

Assessment

Students' achievements on this syllabus are to be assessed against pre-determined criteria. For each criterion a wide range of achievement is possible and students' individual achievements will be rated using a four point scale.

The four ratings are 'A', 'B', 'C', or 'D' where each rating represents a range of achievement with respect to that criterion.

- A rating of 'D' is used when a student has offered work for assessment but there has been little evidence of achievement.
- A rating of 'C' represents the range of achievement which is considered to be at an acceptable standard for this syllabus.
- A rating of 'B' represents the range of achievement which exceeds the standard considered to be acceptable for this syllabus.
- A rating of 'A' is the highest rating that a student can attain on a particular criterion.
- Where no work has been offered for assessment no rating will be given against that criterion.

Standards for each criterion are established and reviewed through a process of consultation between all teachers of the syllabus. Advice on these standards is available through the Tasmanian Secondary Assessment Board.

Internal assessments of all criteria will be made by the school. Schools will report the student's rating for each criterion to the Tasmanian Secondary Assessment Board.

The Tasmanian Secondary Assessment Board will supervise the external assessment of designated criteria(*). The ratings obtained from the external assessments will be used in addition to those provided by the school to determine the final award.

Criteria

The assessment for *12 GR813 C German Stage 4* will be based upon the degree to which the student demonstrates:

- *1. responsiveness and accuracy in understanding as a listener;
- *2. accuracy of pronunciation and intonation in reading aloud prepared passages of contemporary prose;
- *3. fluency in reading aloud prepared passages of contemporary prose;
- *4. communication of relevant meaning when speaking;
- *5. accuracy of grammar and usage when communicating as a speaker;
- *6. responsiveness and initiative when communicating as a speaker;
- *7. responsiveness and accuracy in understanding as a reader;
- *8. communication of relevant meaning when writing;
- *9. accuracy of grammar and usage when communicating as a writer;
- *10. use of a variety of vocabulary and sentence structures when communicating as a writer;

Award Requirements

The final award will be determined by TASSAB using the 20 ratings (10 ratings from the internal assessment and 10 ratings from the external assessment).

The minimum requirements for an award in this syllabus are as follows:

Satisfactory Achievement (SA)

16 'C' ratings of which 6 must be from external assessment, and 2 'D' ratings.

High Achievement (HA)

13 'B' ratings of which 6 must be obtained from the external assessment; with 5 'C' ratings and 2 'D' ratings

Outstanding Achievement (OA)

13 'A' ratings of which 6 must be obtained from the external assessment; with 5 'B' ratings and 2 'C' ratings.

When a student has satisfactorily attended class and has made a conscientious attempt at the tasks related to this syllabus and set by the teacher but where the requirements for an SA award have not been met then this syllabus will be listed separately on the Tasmanian Certificate of Education, providing that no award for a neighbouring syllabus has been listed for that year. A recommendation by a school for such inclusion should be based on a global judgement of the student's performance and should not be related to ratings on individual criteria.

Internal Assessment Procedures

The purposes of assessment are:

- to encourage students to make progress by having attainable short-term goals (e.g. communicative competence in a clearly defined social situation), which are suitable for the range of abilities, achievements and aspirations within a particular group, while at the same time reassuring teachers that students are actually making progress, i.e. to motivate students and teachers;
- to help students and teachers to recognise where their strengths and weaknesses lie, so that together they can take action to remedy weaknesses and build on strengths, i.e. to inform the teaching and learning process;
- to provide information of a useful kind to relevant people outside the classroom, e.g. other staff members, parents, prospective employers, i.e. to inform relevant others;
- to encourage students to work together co-operatively through helping each other in peer-assessment, i.e. to encourage co-operative styles of work;
- to encourage students to be involved in the learning/assessment process, to take some responsibility for their own learning and to learn to evaluate their own efforts, so that they can make informed decisions about future courses of action in the light of their own aspirations, i.e. to encourage student responsibility and involvement.

Assessment should:

- be a continuous process throughout the teaching and learning of the syllabus.
- be both formal and informal in nature.

- involve not only teachers, but also students as assessors, both of others' competence and of their own.
- be followed by consultation between teachers and students about necessary remedial action.

External Assessment Procedures

LISTENING COMPREHENSION

Criterion 1 will be assessed in two parts as follows:

1. Students will view and listen to an interview on videotape from Prero, R: *Das Interview* (Tasmanian Secondary Assessment Board, 1994), and complete the unseen comprehension exercise.
2. Students will listen to one or more unfamiliar passages, not exceeding a total of 10 minutes in length, similar to the examples listed in the *References and Resources*, and complete a comprehension exercise similar to the tasks in the recommended course books, and those for reading comprehension below.

READING COMPREHENSION

Criterion 2 will be assessed in two parts, using passages accompanied by: the completion of German sentences by matching against a list of possible clauses; by answering English questions in English; or by completing English sentences.

The total combined length of the reading comprehension passages will be no more than 600 words.

1. Students will read a passage selected from three articles prescribed each year from *Juma* (See *References and Resources*).
2. Students will read one or more unseen passages.

READING ALOUD

Criteria 3 and 4 will be assessed by means of a passage approximately 120 words long.

SPEAKING

(Criteria 5, 6 and 7) will be assessed by a 15 minute interview which will include several aspects of the Content, during which students will be encouraged to discuss matters of interest to them.

WRITING

(Criteria 8, 9 and 10) will be assessed by means of guided composition. From a choice of at least three topics each for a letter and an essay, students will be expected to write approximately 200 words on either one topic or on two topics from different sections.

References and Resources

The following list indicates examples only of suitable resources currently available to meet the aims of the syllabus. The listing of a resource here does not imply that all sections of that resource meet the aims and requirements of the syllabus, but that it contains at least some useful and relevant material.

RECOMMENDED TEXTS

Sidwell, D. and Capore, P. *Deutsch Heute* Teile 2 & 3 - Neue Ausgabe (Thomas Nelson, 1990)

Schmidt, N. et al: *Deutsch aktiv* Teile 1 & 2, (Langenscheidt)

Cumming, G: *Zeitmosaik* (Hulton Educational Publications, 1978)

Aufderstraße, H: *Themen* 1, 2 & 3 (Max Hueber Verlag)

Listening Comprehension

Rach, R: *Sagen Sie mal* (Mary Glasgow, 1983)

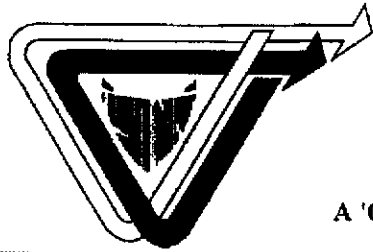
Prero, R. *Das Interview*, TASSAB, 1995.

Beile, W. & A: *Sprechsituationen - Modellen* 4 & 5 (Internationes, 1986)

Reading Comprehension

Juma - a magazine published in Germany for older teenagers world-wide who learn German as a foreign language. Four issues annually, multiple copies available free of charge. Can be ordered through the Goethe Institut.

Appendix 1c Japanese Syllabus



Schools Board of Tasmania

12 JP839 C Japanese Stage 4

A 'C' Syllabus for the Tasmanian Certificate of Education

First Year of Availability:

1992

Revised: 1994

Subject Description

This is the more demanding of two syllabuses designed for students who have completed Japanese Stages 1, 2 and 3. It will enable students to further develop their skills acquired in the Stage 1, 2 and 3 syllabuses, in the areas of reading, writing, listening to and speaking Japanese. This syllabus has an equal emphasis on each of the four areas.

Previous Experience

Successful completion of 9/12 JP 337B Japanese Stage 3 or equivalent.

Neighbouring Syllabuses

This syllabus is one of a set designed for students in Grade 12 in their fourth year of study of Japanese. This set of syllabuses consists of:

- 12 JP838 C Japanese Stage 4
- 12 JP839 C Japanese Stage 4

Learning Objectives

Through studying courses derived from this syllabus it is intended that students will:

- develop communication skills of listening, speaking, reading and writing to enable them to obtain and convey spoken and written information;
- develop some understanding of the culture of Japan and to compare it with their own and to see the value of other ways of viewing the world;

• appreciate the similarities and differences and to develop informed attitudes towards Japan;

- develop the ability to take growing responsibility in the management of their own learning so that they learn how to learn a foreign language;
- learn how to acquire and convey information specifically in the acquisition and development of the skills of Listening, Speaking, Reading and Writing;
- apply logical processes through the discovery and application of grammatical structures and patterns;
- undertake practical tasks, including oral and written activities, as individuals, in pairs, or as members of groups;
- make judgements, comparisons and decisions in relation to matters of both a cultural and a linguistic nature;
- work creatively and solve problems.

Content

Assessment should be limited to content outlined below.

1. Pronunciation

Continued attention to pronunciation.

All correspondence to: The Chief Executive Officer
Schools Board of Tasmania
P.O. Box 147
Sandy Bay TAS 7006

2. Grammar

Revision of the language structures as outlined in the Japanese Stage 1, 2 and 3 syllabuses plus the following:

A) PARTICLES

- o* - with *matsu, yasumu*, verbs of motion
- to* - with *iu, omou, kiku, kaku, yomu* also in comparisons
- ga* - with *wakaru, koto ga aru, koto ga dekiru*
- ni* - with *mieru, kikoeru, naru, suru, noru*, also meaning "for" eg in *Korewa watashi ni muzakashii desu*
- ka* - between nouns (meaning "or")
- de* - reason
- no* - meaning "one" (replacing noun)
- yori* - "than"
- shika* - "only"
- ka* -)
- mo* -) with interrogatives, eg *nanika*,
- demo* -) *itsudemo*
- demo* - with nouns (= "even")

B) VERBS

- nai de Kudasai*
- nakute mo ii*
- te wa ikemasen/dame desu*
- te shimau*
- te kureru/lageru/morau* (recognition only)
- ja nakatta desu / dewa arimasen deshita*
- sugiru*

plain forms (dictionary form, plain past and negative forms) for recognition at end of sentence (in diaries, casual conversation etc.) and for use before:

- *deshoo*
- *kamo shiremasen*
- *soo desu*
- *to iu, omou, kiku, kaku, yomu*
- tari - turi*
- nakute wa ikemasen*
- past tense + *koto ga aru*
- present tense + *koto go dekiru*

C) SENTENCE CONNECTORS

- *te* form of verb
- *de* after nouns and *na*-adjectives
- *kara, node* (because)
- *ga, keredo(mo)*
- *mae(ni), ato(de), toki(ni), aida(ni), tsume(ni)*

D) ADJECTIVES

- *te* form
- ...*yasui/nikui*

E) INTERROGATIVES

- *dono, dore, doo, dorch, dochira*
- *nansai, nanko, nando, nanka, nambon, nambai, nandai, nansatsu*
- *nammui, nambiki, nankagetsu, nanshuukan, nannen*
- *dooshite, naze*

F) ADVERBS

- *ku* forms of adjectives
- *ni* after *na*-adjectives

G) PREPOSITIONAL NOUNS

- *tonari, mi, hidari, chikaku*
- *koko, soko, asoko*

H) COUNTERS

- *sai, ko, do, kai, hon, hai, dai, satsu, mai, hiki, kagetsu, shuukan, nen*

I) NOUNS

As topics dictate

A more extensive vocabulary will be required for 12 JP839 C Japanese Stage 4 than for 12 JP838 C Japanese Stage 4.

(see Appendix for vocabulary for External Assessment).

J) MISCELLANEOUS

- *tsumori*
- *konna, sonna, anna*
- *ichiban*
- *hitotsu* (each)
- *nokoto ga suki desu*

K) ADJECTIVAL CLAUSES/PHRASES

For example

- *koohii o nonde iru hito*
- *me ga ookii ningyoo*
- *me ga kirei na kodomo*

3. Themes and Topics

These themes and topics are to be the basis for the development of vocabulary and idiom in all four macro-skills. Themes and topics other than those listed may be treated should they arise, HOWEVER ASSESSMENT WILL BE LIMITED TO THE THEMES AND TOPICS LISTED.

The following themes and topics listed in the Stage 1, 2 and 3 syllabuses will be extended during Stage 4.

- (a) self
- (b) family and friends
- (c) daily routine
- (d) hobbies, leisure activities
- (e) sport
- (f) food and drink

- (g) holidays and travel
- (h) places
- (i) shopping
- (j) pets
- (k) birthdays and ages
- (l) likes and dislikes
- (m) topics and events of general interest to this group
- (n) social etiquette
- (o) entertainment
- (p) clothing - Western and traditional (see Culture notes)
- (q) personal relationships - peer groups, boy/girl relationships
- (r) days of the week, seasons, weather, holidays, including 'tsuyu' - the rainy season
- (s) festivals - (see Culture notes)
- (t) describing things around you
- (u) money and prices
- (v) career choices and ambitions

4. Functions and Notions

Functions and notions differ from themes and topics in that their development is spread over the full period of the course, and that the standard should gradually become higher. They represent the various ways in which the students are able to operate, and the general notions which can be understood and expressed by the end of the course.

The following functions and notions include those listed for Japanese stages 1, 2 and 3.

FUNCTIONS

Socialising

- modes of address
- greetings
- health inquiry
- leave taking
- introductions
- thanking
- expressing good wishes
- dining etiquette
- congratulations
 - birthday/festivals etc

Exchanging Information

- identifying
- asking for/giving information
- narrating personal experience
- agreeing/disagreeing
- likes/dislikes/interests
- asking and telling the time.
- stating wishes
- describing
- identifying
- asking and giving location of people/objects
- inquiring about ownership of objects
- asking and giving ages/prices/distances

- asking questions about and giving specific answers about your immediate environment
- describing personal/physical feelings e.g. pain/hunger etc
- asking and giving dates/times etc
- stating wishes
- quoting hearsay, what people said, what one heard/read/wrote
 - *to imashita*, *soo desu*, *to yomimasu*, *to kakimasu*, *to kikimasu*.
- asking and giving numbers
 - use of prescribed counters
- describing how something looks/sounds
 - *ku miemasu* / *kikoemasu*, *ni miemasu* / *kikoemasu*.
- describing how things are done
 - use of adverbs
- giving reasons
 - kara*, *node*
- expressing uncertainty
 - deshoo*, *kamo shiremasen*
- stating favours
 - *te kureru* / *ageru* / *morau* (for recognition only)
- making comparisons
 - yoru*, *ichiban*, *to* *to dochira ga* *desuka* (with nouns only)
- stating ability to do things
 - *koto ga arimasu*
- relating experiences
 - koto ga dekimasu*
- stating plans
 - *tsumori desu*
- listing actions
 - *tari*, *tari shimasu* / *shimashita*
- listing likes and dislikes
 - no/koto ga suki desu*

Expressing Attitudes

- love
- approval
- interest
- surprise
- like/dislike
- apology
- disapproval
- surprise
- interest
- apology
- opinions
 - to omoimasu*
- uncertainty
 - deshoo*, *kamo shiremasen*, *to omoimasu*.

Getting Things Done

- asking for something
- making arrangements
- inviting
- giving and denying permission
- asking people to do something
- instructions and polite commands

- evading an answer
- requesting people not to do things
.... *nai de kudasai*
- ordering people not to do things
.... *te wa ikemasen. te wa dame desu*
- giving/seeking permission not to do things
.... *nakute mo ii desu (ka)*
- telling people what must be done
.... *nakute wa ikemasendame desu*

Organising and Maintaining Communication

- attracting attention
- expressing lack of comprehension
- asking for repetition
- understanding appropriate classroom instructions
- expressing lack of knowledge
- asking for clarification
- expressing understanding and lack thereof
.... *ga wakrimashita / wakarimasen.*

NOTIONS

References to:

- people
- places
- objects
- actions
- to events.
- dates/seasons/holidays
- nationalities and languages

Time

- clock time.
- points in time
- present time
- future time
- past time
- duration

Space

- location of objects and people
- movement

Quantity

- numbers
- expressions of amount
- various classifiers

Characteristics

- age
- colours, big/small, interesting/boring etc.
- adjectival clauses, adverbs

Evaluations

- price.

5. Japanese Script

Students should be able to read and write hiragana and katakana, and the following 120 prescribed kanji:

INSERT KANJI

Any kanji not in the prescribed list, which are used in class materials and textbooks, should be for recognition only, and may be included as part of internal assessment.

6. Cultural Knowledge and Awareness

- Continued development of the topics listed in Stage 3.
- The further development of informed attitudes towards Japanese and the Japanese people, through the themes and topics, using discussion, analysis and comparison.

7. Competencies

When covering the content of these courses, teachers are expected to pay careful attention to the students' acquisition of the competencies outlined in the course objectives.

Assessment

Students' achievements on this syllabus are to be assessed against pre-determined criteria. For each criterion a wide range of achievement is possible and students' individual achievements will be rated using a four point scale.

The four ratings are 'A', 'B', 'C', or 'D' where each rating represents a range of achievement with respect to that criterion.

- A rating of 'D' is used when a student has offered work for assessment but there has been little evidence of achievement.
- A rating of 'C' represents the range of achievement which is considered to be at an acceptable standard for this syllabus.
- A rating of 'B' represents achievement which exceeds the standard considered to be acceptable for this syllabus.
- A rating of 'A' is the highest rating that a student can attain on a particular criterion.
- Where no work has been offered for assessment no rating will be given against that criterion.

Standards for each criterion are established and reviewed through a process of consultation between all teachers of the syllabus. Advice on these standards is available through the Schools Board of Tasmania.

Internal assessments of all criteria will be made by the school. Schools will report the student's rating for each criterion to the Schools Board of Tasmania.

The Schools Board of Tasmania will supervise the external assessment of designated criteria(*). The ratings obtained from the external assessments will be used in addition to those provided by the school to determine the final award.

Criteria

The assessment for *12 JP839 C Japanese Stage 4* will be based upon the degree to which the student is able to:

Listening

1. demonstrate understanding of short statements and questions spoken in the Japanese language;
- *2. demonstrate understanding of passages spoken in Japanese;

Speaking

3. pronounce Japanese accurately;

- *4. initiate and respond to questions on familiar topics, in Japanese, in both one-to-one and group situations;

Reading

- *5. deduce meaning and extract relevant information from a passage written in Japanese using hiragana, katakana and a selection of the 120 prescribed kanji;
6. decipher hiragana, katakana and the 120 prescribed kanji;

Writing

- *7. convey information in Japanese using hiragana, katakana and the 120 prescribed kanji where appropriate;
8. write hiragana, katakana and the 120 prescribed kanji;

Culture

9. acquire and use information from various sources, including other members of the class group;
10. demonstrate an awareness of the similarities and differences between Japanese and Australian cultures.

Award Requirements

The final award will be determined by the Schools Board using the 14 ratings (10 ratings from the internal assessment and 4 ratings from the external assessment).

The minimum requirements for an award in this syllabus are as follows:

Satisfactory Achievement (SA)

11 'C' ratings, of which 3 must be obtained from external assessment and including one from each of Listening, Speaking, reading and Writing; with 2 other ratings of 'D'.

High Achievement (HA)

10 'B' ratings, of which 3 must be obtained from the external assessment and including one from each of Listening, Speaking, reading and Writing; with 3 'C' ratings and 1 'D' rating.

Outstanding Achievement (OA)

10 'A' ratings, of which 3 must be obtained from the external assessment, and including at least one from each of Listening, Speaking, reading and Writing; with 3 'B' ratings and 1 'C' rating.

When a student has satisfactorily attended class and has made a conscientious attempt at the tasks related to this syllabus and set by the teacher but where the requirements for an SA award have not been met then this syllabus will be listed separately on the Tasmanian Certificate of Education, provided that no award for a neighbouring syllabus has been listed for that year. A recommendation by a school for such inclusion should be based on a global judgement of the student's performance and should not be related to ratings on individual criteria.

External Assessment Procedures

CONVERSATION

Criterion 4 will be assessed as follows:

1. The student will be asked to ask and respond verbally and non-verbally to questions about, and make simple comments on, one of the Themes and Topics (o) to (v) for 5 minutes. The topic will be represented by a picture, a drawing or a photograph which will be given to the student 10 minutes beforehand.
2. The student will engage in a conversation with the examiner for 5 minutes on any topic from the Themes and Topics (a) to (m).

AURAL COMPREHENSION

Criterion 2 will be assessed as follows:

1 short passage and 1 dialogue (about 350 JI each). Each will be read 3 times, with pauses at the end of each sentence or short group of sentences. There will be a 2 minute break between each reading and a 3 minute break at the end of each passage. Students will have time to read the questions before the first reading and will be allowed to write at any time. Answer types could include T/F, pictures, answers in English and multiples choice.

WRITTEN EXAMINATION (2 HOURS)

QUESTIONS 1 AND 2

Criterion 5 will be assessed as follows:

Students will be required to read two passages and show their understanding by completing any of the following tasks:

- (a) Multiple choice questions in Japanese.
- (b) True / False questions in Japanese.
- (c) Short Answer Questions in English.

Criterion 7 will be assessed as follows:

QUESTION 3 Translating about 10 short sentences into Japanese.

QUESTION 4 Writing in Japanese (250 - 350 JI) on a topic in one of the following formats - dialogue, description of a picture, a letter or prose. The topic will be outlined in English or suggested by a picture.

References and Resources

An eclectic approach is recommended, with the following textbooks providing useful resources for all syllabuses:

- Alfonso. *Japanese Books 1, 2, and 3*. Curriculum Development Centre.
 Lee. *Isshoni*. Morton Bay Publishing
 McBride and Burnham. *Kimono Levels 1, 2 and 3*. CIS Educational
 McLaughlin. *Ikimashoo*. CIS Educational.
 Williams. *Active Japanese Books 1, 2 and 3*. Longman Paul.
 Hisako Yostiki, Kiyo Saka. *Speak Japanese: A Textbook for Young Students (Books 1 and 2)*. Kenkyusha.
 R. Murano, M. Tanimichi, S. Murano. *Pictures and Tasks*. Bonjinsha. 1988.
 The Association for Overseas Technical Scholarship (AOTS). *Japanese Life Today: A reader for Japanese Language Study*. 3A Corporation. 1987. ISBN 4-906224-39-3-C0081.
 S. Tomioko, S. Takaoka et al. *Japanese Writing through Pictures and Topics*. Semmon Kyoiku, Shuppan.
 F. Motohashi, S. Hayashi. Tsuda Centre for Japanese Language Teaching. *The Japan Times*. 1989.
 M. Wood, J. Howie. *Japanese for Senior Secondary Students*.
Basic Functional Japanese: The Japan Times.
Japanese for Busy People: Kodansha.
Speak Japanese: Kenkyusha.
Japanese for Communication.
Japanese Language and People: BBC
Japanese for Everyone.

Appendix 2 11/12 MT722 B Mathematics

First Year of Availability: 1993 Revised: 1996 *January, 1997*

Subject Description

This is the most demanding of three Mathematics syllabuses designed for students in Years 11 and 12. It provides opportunities for students to consolidate previous mathematical experiences by applying their knowledge and skills in mathematical modelling and problem-solving situations associated with algebra, chance, finance and space. The syllabus is designed for students seeking to continue their mathematics education, including those seeking to prepare for the future study of *11/12 MT730 Mathematics Applied*.

Previous Experience

It is expected that students will have successfully completed *10 MT422 B Mathematics*, or equivalent. Some students may be counselled to undertake this syllabus having previously completed *11/12 MT721 B Mathematics*.

Neighbouring Syllabuses

This syllabus is one of a set designed for students in Years 11 and 12 studying Mathematics. The set consists of:

11/12 MT720 B Mathematics

11/12 MT721 B Mathematics

11/12 MT722 B Mathematics

This syllabus provides a pathway to *11/12 MT730C Mathematics Applied*.

Learning Objectives

Through studying courses derived from this syllabus it is intended that students will consolidate and develop their:

Mathematical competencies

MC1 ability to work constructively at mathematical tasks presented as problems in real world contexts;

MC2 ability to present solutions in a clear and logically-argued manner;

Mathematical modelling with Algebra

A1 ability to use algebraic processes in a variety of mathematical modelling situations;

Mathematical modelling in Chance

C1 knowledge of chance processes and ability to model and analyse situations by considering experimental and / or theoretical probabilities;

Mathematical modelling in Space

S1 ability to use diagrams and calculations to solve problems involving measurement in non-spherical contexts and time on the Earth's surface;

Mathematical modelling in Finance

F1 knowledge of, and ability to apply, standard financial models relating to personal investment, consumer credit and depreciation.

Content.

A primary aim of this syllabus is to demonstrate applications of mathematics and develop the student's ability to apply mathematics to real world problems. Most students prefer to see that their studies in mathematics have direct relevance to their

present and future lives. Applications can make the study of mathematics more relevant, and hence the student's motivation may be enhanced. In addition, applications can lend themselves to being studied in less formal, more open ways than via the traditional methodology of the mathematics classroom. Practical modelling investigations outside the classroom should be encouraged in this subject. Experiences and tasks in which students engage should provide opportunities for them to develop: - the ability to address a real-world problem by selecting an appropriate modelling strategy such as a scale-drawing, a diagram, a table, a graph, an equation, systematic calculation or a computer program; - flexibility of approach in following through a selected modelling strategy; - a concern for accuracy and the need to validate the mathematical solution; - the ability to interpret the mathematical solution in the real-world context.

ALGEBRA

Mathematical Modelling with Algebra (approx. 40 hours)

Within this module there are three aspects of algebra, namely:

1. Fundamental algebraic skills;
2. Function study;
3. Modelling real-life situations.

The emphasis given to each aspect should be negotiated by the teacher and students, taking into account the ability of the students, their immediate needs and their future needs in terms of further study in Mathematics.

1. Fundamental Algebraic Skills

Students should be given the opportunity to consolidate previously acquired skills. This may involve:

- expanding and simplifying polynomial expressions in one variable;
- factorising expressions that involve removal of common factors, difference of two squares and trinomials;
- solving linear equations;
- solving quadratic equations (by factorising and by using the quadratic formula);
- solving two simultaneous linear equations in two unknowns whether presented in the form $y = mx + c$ or $ax + by + c = 0$
- simplifying basic algebraic expressions.

2. Function Study

Specifically, students should be given opportunities to:

- consider relationships that can be described by the equation of a straight line;
- sketch graphs of linear functions of the form $ax + by + c = 0$ by the location of intercepts;
- understand the significance of m and c when sketching the graph of the line $y = mx + c$;
- consider the notions of an independent variable and a dependent variable;
- plot scatter-graphs and estimate the equation of a possible 'line of best fit' by calculating m and c from consideration of a line of sight;
- solve two simultaneous linear equations in two unknowns graphically, whether presented in the form $y = mx + c$ or $ax + by + c = 0$;
- understand the significance of the zeros, the y -intercept and the dominant term of quadratic and higher degree polynomial functions;

- sketch graphs of quadratic and higher degree polynomial functions, including those involving multiple zeros;
- sketch graphs of half planes $ax + by + c \leq 0$, $ax + by + c > 0$. The extent of the treatment of non-linear functions and equations should be limited by the ability and needs of the students. If a knowledge of quadratic equations is required, students should understand that the roots can often be found efficiently by factorisation, and that the quadratic formula can be applied on other occasions.

3. Modelling Real Life Situations

This aspect of the module may involve out of class tasks. Some modelling investigations may need to be conducted over an extended period of time. Selected 3 tasks may involve:

- miscellaneous modelling that requires experimentation, the collection of data and the eventual application of one of a variety of available mathematical strategies;
- modelling of financial situations that requires a consideration of both revenue and cost functions;
- graphical modelling of travel situations whereby information is available that relates to distance covered, time taken and speed;
- an analysis of networks;
- solving modelling problems that can be described by two simultaneous linear equations in two variables;
- the use of linear programming methods.

CHANCE AND DATA

Mathematical Modelling in Chance (approx 20 hours)

Students undertaking a course based on this syllabus may have little previous experience with this module. For this reason, the introduction should highlight experiments that relate to the past and present experiences of students. There should be the opportunity to estimate probabilities experimentally and develop the understanding that a probability can be derived from a 'long-run frequency'. The everyday use of language relating to chance is common and misconceptions about chance processes are widespread. Students should have the opportunity to extend and refine the use of such language while analysing and developing their understanding of events of a probabilistic nature. Specifically, students should be provided with opportunities to:

- conduct experiments involving everyday situations in which chance processes occur, and calculate experimental probabilities from repeated trials of an experiment;
- discuss the notions of impossibility and certainty;
- calculate odds and convert odds to probabilities;
- investigate the notion of a theoretical probability distribution;
- apply systematic counting methods, which include listing and using tree diagrams, to find the number of simple events contained in a sample space;
- use Venn diagrams where appropriate as an aid to analyse and solve problems;
- develop intuitive ideas of when it is appropriate to multiply or add probabilities;
- simplify probability tasks by considering complementary events;
- investigate multi-stage chance experiments by the intuitive use of tree diagrams;
- use simulations to model some common gambling games.

SPACE

Mathematical Modelling in Space (approx 20 hours)

In this module, some emphasis should be given to outdoor activities. Practical investigations involving the use of clinometers, magnetic compasses and stop watches may be encouraged. Reinforcement of previously acquired mensuration skills forms part of this module. Specifically, students should be provided with opportunities to:

- solve problems involving the calculation of perimeter and area of polygonal shapes with particular reference to calculation of areas of triangles using $A = \frac{1}{2} ab \sin c$ and Heron's formula;
- solve problems involving the calculation of surface area and volume / capacity of common solids;
- solve problems involving the calculation of speed, distance and time;
- solve problems arising from practical situations such as those found in surveying and navigation;
- apply their knowledge of trigonometric ratios to the solution of problems which may be resolved to right triangles;
- apply the sine and cosine rules to height and distance problems arising from situations which may be modelled in two dimensions;
- identify position on the earth's surface by a consideration of latitude and longitude;
- solve problems involving the respective standard times (zone times) of two cities on the earth's surface;
- solve problems involving Australian time zones.

NUMBER

Mathematical Modelling in Finance (approx 20 hours)

The focus of this section of the syllabus is to extend students' experiences with standard algebraic models as used by financial institutions in investment and credit situations. This should involve consolidation of some aspects of consumer arithmetic studied previously (percentage, simple interest, compound interest, hire purchase etc.), but with greater reference to the ways in which institutions operate. Calculator skills should be emphasised and computer spreadsheets should be used wherever possible. Specifically, students should be provided with opportunities to:

- perform simple interest calculations in a variety of situations including
 - daily balance accounts
 - minimum monthly balance accounts by using a calculator, interest tables or spreadsheets;
- perform compound interest calculations using the formula
$$A = P(1+i)^n$$
where $i = \frac{r}{100}$ to include the calculation of A given P , and the calculation of P given A ;
- apply the depreciation formula , $B = V(1 - i)^n$;
- investigate circumstances under which hire purchase contracts exist and the conditions applied in the event of early completion of payments;
- consider the first few entries of a table which details repayments under a reducing interest schedule, the interest rate per period being given;
- recognise that although hire purchase schedules are based on reducible interest schedules, the overall interest paid is sometimes expressed in terms of a flat rate;
- investigate the widespread use of credit cards, develop an understanding of their main features, and contrast interest rates charged on credit cards with interest rates advertised for investments;

- consider fundamental principles associated with income tax and discuss the major aspects of completing a taxation form;
- apply the Annuities in Advance formula,

$$F = P(1+i)[(1+i)^n - 1] / i$$
for the calculation of F given P , and P given F , in a variety of financial situations;
- apply their skills in the use of financial formula to compare and contrast claims and conditions offered by financial institutions.

Assessment

Students' achievements on this syllabus are to be assessed against pre-determined criteria. For each criterion a wide range of achievement is possible and students' individual achievements will be rated using a four point scale. The four ratings are 'A', 'B', 'C' or 'D' where each rating represents a range of achievement with respect to that criterion.

- A rating of 'D' is used when a student has offered work for assessment but there has been little evidence of achievement.
- A rating of 'C' represents the range of achievement which is considered to be at an acceptable standard for this syllabus.
- A rating of 'B' represents the range of achievement which exceeds the standard considered to be acceptable for this syllabus.
- A rating of 'A' is the highest rating that a student can attain on a particular criterion.

Where no work has been offered for assessment no rating will be given against that criterion. Schools offering this syllabus must participate in the moderation process through attendance at meetings and completion of the moderation requirements determined by the State Moderation Committee. Standards for each criterion are established and re-viewed through a process of consultation between all teachers of the syllabus. Advice on these standards is available through the Tasmanian Secondary Assessment Board. Internal assessments of all criteria will be made by the school. Schools will report the student's rating for each criterion to the Tasmanian Secondary Assessment Board.

Criteria

The assessment for *11/12 MT722 B Mathematics* will be based upon the degree to which the student is able to:

Mathematical competencies

1. work constructively at mathematical tasks, both individually and cooperatively with others. (MC1);
2. achieve required standards in the communication of mathematical ideas and solutions, using appropriate terminology, language and notation in the presentation of logical arguments (MC2);

Mathematical modelling with Algebra

3. expand, factorise, and manipulate algebraic expressions and solve linear and quadratic equations (A1);
4. identify the distinguishing features of linear, quadratic and higher degree polynomial functions and of linear inequalities in order to sketch their graphs (A2);
5. select and apply algebraic or graphical models as, for example, in linear programming, to solve real world problems (A3);

Mathematical modelling in Chance

6. recognise the difference between experimental and theoretical probabilities and use a range of counting techniques and diagrams to calculate theoretical probabilities (C1);

Mathematical modelling in Space

7. use diagrams and calculations to solve problems involving the measurement of distances and areas in non-spherical contexts and position and time on the Earth's surface (S1);

Mathematical modelling in Finance

8. demonstrate a working knowledge of standard financial models relating to personal investment, consumer credit and depreciation (F1)

When establishing standards for each criterion teachers should use the following guide:-

- A. Has demonstrated a high level of proficiency in meeting the criterion.
- B. No doubt the criterion has been met. The student is able to apply the skill/knowledge/understanding in a variety of contexts.
- C. The criterion has been met to a minimum acceptable level. The student has demonstrated the skill/knowledge/understanding in straightforward, clearly defined tasks.
- D. Work has been completed and submitted for assessment but there has been little evidence of achievement of the criterion.

Award Requirements

The minimum requirements for an award in this syllabus are as follows:

Satisfactory Achievement (SA)

6 'C' ratings and 1 'D' rating.

High Achievement (HA)

5 'B' ratings, 2 'C' ratings and 1 'D' rating.

Outstanding Achievement (OA)

5 'A' ratings, 2 'B' ratings and 1 'C' rating.

When a student has satisfactorily attended class and has made a conscientious attempt at the tasks related to this syllabus and set by the teacher, but where the requirements for an SA award have not been met then this syllabus will be listed separately on the Tasmanian Certificate of Education, provided that no award for a neighbouring syllabus has been listed for the same year. A recommendation by a school for such inclusion should be based on a global judgement of the student's performance and should not be related to ratings on individual criteria.

Resources and References

Chapman, P. (1988) *Real Applications of Maths* (Coghill) Series of 4 books of reproducible masters. [RAM1-4].

Lovitt, C. and Clarke, D. (1988) *M.C.T.P. Activity Banks 1 & 2* (Curriculum Corporation).

Lowe, Ian (1988) *Maths at Work- Modelling Your World* (Australian Academy of Science).

Lowe, Ian (1991) *Maths at Work- Modelling Your World Vol. 2* (Australian Academy of Science).

Paulos, J (1990) *Innumeracy* (Penguin). Shell Centre for Mathematical Education (1987-88)

The Language of Functions and Graphs (Longman / Shell Centre). [The Red Box].

Shield, M.J. (1986) *Maths in Society Finance* (Jacaranda).

The Spode Group, (1983) *Solving Real Problems with CSE Mathematics* (Cranfield Press).

The Spode Group, (1988) *The Problem-Solving Pack* (Australian Edition, by Galbraith, P. and Carr, A.) (Edward Arnold Australia).

The Spode Group, (1988) *The Decision Maths Pack* (Australian Edition, by Galbraith, P. and Carr, A.) (Edward Arnold Australia).

Subject Description

11 EN617 B English

This is the most demanding of three syllabuses designed principally for year 11 but which may also be taken in year 12. It aims to help students function effectively and confidently as language users, develop increased critical awareness and take greater responsibility for their learning. In consultation with their teachers, students will set goals for their own language development, and negotiate tasks of increasing complexity. They will extend their communication skills in each of the language modes through practical experimentation with language used for a variety of purposes.

11 EN616 B English

This is the second most demanding of three syllabuses designed principally for year 11 but which may also be taken in year 12. It aims to help students function effectively and confidently as language users, and take greater responsibility for their learning. In consultation with their teachers, students will set goals for their own language development, and negotiate tasks of increasing difficulty. They will extend their communication skills in each of the language processes through practical experimentation with language used for a variety of purposes.

11 EN615 B English

This is the least demanding of three syllabuses designed principally for year 11 but which may also be taken in year 12. It aims to help students function effectively and confidently as language users, and take greater responsibility for their learning. With assistance from their teachers, students will set goals for their learning and extend their communication skills in each of the language processes through practical language tasks in a range of contexts.

Previous Experience**11 EN617 B English**

It is assumed that students will have studied *11 EN416 B English*, or *11 EN417 B English* or equivalent.

11 EN616 B English

It is assumed that students will have studied *11 EN415 B English*, or *11 EN416 B English* or equivalent.

11 EN615 B English

It is assumed that students will have studied *11 EN415 B English* or equivalent.

Neighbouring Syllabuses

This set of syllabuses has been written for students in year 11 studying English. It consists of:

11 EN617 B English;

11 EN616 B English;

11 EN615 B English.

Learning Objectives

11 EN617 B English

Through studying courses derived from this syllabus it is intended that students will:

- improve their ability to communicate effectively, accurately and appropriately for a variety of purposes and audiences, using a range of methods;
- extend their capacity to use oral and written language to reflect on and explore increasingly complex ideas;
- extend their skills in drafting and revising their own writing;
- develop further the habit of reading and viewing for information and understanding, as well as interest and enjoyment;
- extend their skills in reflecting analytically on texts and recognising the stylistic techniques employed in them;
- extend their skills in locating, synthesising and evaluating information, using established and emerging technologies;
- develop understanding of the experiences, beliefs and values of others and challenge some of these in critically informed ways;
- develop their engagement with a variety of literary, mass media and everyday texts in order to:
 - explore issues and feelings,
 - interpret experience,
 - recognise texts as socially constructed,
 - be critically aware of some of the techniques involved in their construction;
- develop their skills in the imaginative and creative use of language;
- work cooperatively and productively with others; and
- become increasingly responsible for their own learning, through setting realistic goals and negotiating appropriate tasks.

11 EN616 B English

Through studying courses derived from this syllabus it is intended that students will:

- improve their ability to communicate effectively, accurately and appropriately for a variety of purposes and audiences, using a range of methods;
- extend their capacity to use oral and written language to reflect on and explore increasingly complex ideas;
- extend their skills in drafting and revising their own writing;
- develop further the habit of reading and viewing for information and understanding, as well as interest and enjoyment;
- extend their skills in locating, synthesising and evaluating information, using established and emerging technologies;
- develop understanding of the experiences, beliefs and values of others and challenge some of these in critically informed ways;
- develop their engagement with a variety of literary, mass media and everyday texts in order to:
 - explore issues and feelings,
 - interpret experience,
 - recognise texts as socially constructed,
 - be aware of some of the techniques involved in their construction;
- develop their skills in the imaginative and creative use of language;
- work cooperatively and productively with others; and
- become increasingly responsible for their own learning, through setting realistic goals and negotiating appropriate tasks.

11 EN615 B English

Through studying courses derived from this syllabus it is intended that students will:

- improve their ability to communicate effectively, accurately and appropriately for a variety of purposes and audiences, using a range of methods;
- extend their capacity to use oral and written language to reflect on and explore ideas;
- extend their skills in drafting and revising their own writing;
- develop further the habit of reading and viewing for information and understanding, as well as interest and enjoyment;
- extend their skills in locating, synthesising and evaluating information, using established and emerging technologies;
- develop understanding of the experiences, beliefs and values of others and discuss some of these in informed ways;
- develop their engagement with a variety of literary, mass media and everyday texts in order to:
 - explore issues and feelings,
 - interpret experience,
 - recognise at least some texts as socially constructed,
 - be aware of some of the techniques involved in their construction;
- develop their skills in the imaginative and creative use of language;
- work cooperatively and productively with others; and
- become increasingly responsible for their own learning, through setting realistic goals and negotiating appropriate tasks.

Content

The previous objectives build on the principles of language and learning processes, and areas of experience set out in the year 10 English syllabuses. The terms used below are explained there. A modified extract is included as Appendix B.

Teachers, in planning sequences of work for their classes, should ensure that opportunities are provided for students to:

- participate actively in each of the three main *language process* categories:
 - speaking, listening and performing,
 - writing,
 - reading and viewing;
- be involved in the following *learning processes*:
 - negotiation,
 - reflection,
 - collaboration;
- work with a variety of material drawn from the range of contexts in which language is used (*areas of experience*):
 - literature,
 - mass media,
 - everyday texts,
 - life experience.

<p>Text is defined as any communication, written, spoken, or visual, involving language. Text, then is more than print on a page. It also refers to all those visual conventions which can be interpreted by readers and viewers or which can modify or shape their understanding and feelings (McCann & Boam, 1996).</p>
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As well as building on previous experience in English, these syllabuses have a particular focus on developing increasing independence in the students. For this to occur, students need opportunities to identify and work on particular areas of interest and need, and set appropriate goals for their own language development. Much of the course content could arise from this process. Also, classroom organisation needs to be flexible enough to allow students to work at their own pace and level of ability.

Since for some students this may be their last year of formal study of English, it is particularly important that gaps in knowledge and skills be identified and remedied, and that the course has an orientation towards students' present and future needs as individuals, citizens, and participants in the world of work. In some cases it would be particularly appropriate to address these concerns, totally or in part, through the *Major Negotiated Learning Task*, described later.

Students are also required to develop management skills which will allow them to maintain a variety of tasks concurrently, such as an independent reading program, a range of writing tasks, and a major negotiated learning task.

Organisation

While these syllabuses allow for a wide variety of ways in which teachers can organise and negotiate course content, there are two strands in the syllabuses: continuous class work and an extended negotiated activity. Both strands should address the course objectives, and should not be seen as separate.

1. Continuous class work

Continuous class work includes:

- those aspects of English which have ongoing importance (eg a personal reading program, a personal writing program);
- particular topics or programs which the teacher may wish to introduce (eg study of a class or group novel; some specific aspects of literacy); and
- teaching of skills which are necessary for successful study of the course, such as: organising and managing work, study and time management skills, cooperative learning skills, research skills).

Continuous class work should address all the language processes (speaking, listening and performing; writing; reading and viewing), in the areas of experience (literature, mass media, everyday texts, life experience).

Classwork in this strand can be organised in a variety of ways: on an individual, small group, or whole class basis; negotiated or teacher-directed. Teachers may find it fruitful to adopt one or more of the following approaches to planning, according to appropriateness, student need or student ability:

- a focus on specific criteria, eg
 - teaching library, internet and/or community-based research techniques (criterion 3),
 - an individual reading program (criterion 8);
- a focus on specific skills, eg
 - introduction to word processing,
 - strategies for editing and proofreading written work;
- thematic units, eg
 - relationship between the individual and society,
 - genre study (mystery, comedy, horror, soap opera, etc);

-
- literature or media study, eg
 - small group study of a text,
 - units studying the production and presentation of news and/or current affairs in the media; advertising in the media,
 - film study.

2. Major Negotiated Learning Task

This section of the course allows the teacher and student to negotiate an area of study. It will allow students to focus on a particular area of the course that needs extra attention, on developing a new skill, on improving skills in an area of weakness, or giving particular emphasis to an area of interest.

While the *Major Negotiated Learning Task* could develop students' skills in researching and presenting information on a topic of interest, the possibilities range much more widely. In these syllabuses, particularly when a student wishes to progress to pretertiary English in the subsequent year, extra negotiated reading, writing, novel or film study can form an appropriate focus. Students studying this course while engaged in the concurrent study of a VET course may wish to negotiate a learning task that relates directly to future employment or aspects of workplace life, culture or communication. Other students may wish to work on such tasks as class or school newspapers, or on specific areas to enhance literacy and reading skills etc.

A minimum of 15 hours of class time and an appropriate amount of homework time should be allocated to this aspect of the course.

The *Major Negotiated Learning Task* will ideally give students significant opportunities to determine aspects of their own learning, in consultation with their teacher. It may also be appropriate for teachers themselves to specify some 'study briefs' according to the needs of particular students or groups of students, according to perceived needs in the class.

Because the major negotiated learning task is individual and particular to a student or group of students, they may need particular help and encouragement to plan their work, set goals, reflect on progress and evaluate outcomes. This may be done individually or in groups, with or without the direct input of the teacher.

The demanding nature of this kind of work means that many students will need opportunities to practise some of the necessary skills before launching into an extended task, particularly if working individually. Thus, teachers may need to build into 'continuous class work' activities designed to foster skills in such areas as planning, time management, working cooperatively in a group, research, interviewing, presentation to an audience, self assessment, etc.

Work Requirements

In planning specific learning tasks, teachers should use the assessment criteria as a framework for planning their program. However, as a general guide, students should be able to demonstrate that they have:

- reflected on their strengths and weaknesses as language users, set appropriate goals, and monitored their progress towards these goals. As far as possible, goalsetting should have taken students' future intentions into account - employment or further study in year 12;
- maintained a personal reading program, and responded to a variety of print and non-print

texts (including fiction, non-fiction and other students' writing), using a range of methods (formal, informal, and creative);

- maintained a personal writing program, covering a range of purposes and forms;
- participated in formal and informal oral activities; and
- completed a Major Negotiated Learning Task of at least 15 hours' duration.

For final assessment it is recommended that students submit a folio of finished material, selected from coursework, which can be used at the teacher's discretion in determining a student's final award. The phrase 'finished material' implies that students be given the opportunity to rework the material before submitting the folio. This may be particularly appropriate for students intending to enrol in *12 EN825 C Writers' Workshop* in year 12. Individual schools or colleges may require students to submit a folio for internal moderation purposes. A student must have fulfilled the Work Requirements and met the criteria to obtain an award.

A note on the place of technology

Students are encouraged to use traditional and newly emerging technologies as part of their learning - in their research, and in the presentation of their work. This does not exhaust the possibilities of appropriate use of technology; students could be encouraged to use appropriate and educationally sound software to improve language skills and spelling, to communicate with peers in other schools, to work on a cross-campus collaborative writing task etc.

Assessment

Assessment should be used to give students continuing feedback about their progress, as well as summarise what they can do on completion of the course. The assessment criteria outlined below should be made explicit to students. Evidence for assessment could take many forms and be collected in a variety of situations. It could be formal or informal; written, oral or observed during learning activities. It could be obtained from interviews, student journals, class presentations, assignments, self and peer assessments, or folios. The particular evidence required will often be indicated by the assessment criteria.

Students' achievements on these syllabuses are to be assessed against pre-determined criteria. For each criterion a wide range of achievement is possible and students' individual achievements will be rated using a four point scale.

The four ratings are 'A', 'B', 'C', or 'D' where each rating represents a range of achievement with respect to that criterion.

- A rating of 'D' is used when a student has offered work for assessment but there has been little evidence of achievement.
- A rating of 'C' represents the range of achievement which is considered to be at an acceptable standard for this syllabus.
- A rating of 'B' represents the range of achievement which exceeds the standard considered to be acceptable for this syllabus.
- A rating of 'A' is the highest rating that a student can attain on a particular criterion.
- Where no work has been offered for assessment no rating will be given against that criterion. Standards for each criterion are established and reviewed through a process of consultation between all teachers of the syllabus. Advice on these standards is available through the Tasmanian Secondary Assessment Board.

Schools offering this syllabus must participate in the moderation process through attendance at meetings and completion of the moderation requirements determined by the State Moderation Committee.

Criteria

11 EN617 B English

The assessment of *11 EN617 B English* will be based upon the degree to which the student can:

- 1 take responsibility for own work and learning;
- 2 work cooperatively and constructively with others in a variety of team and group situations;
- 3 collect, analyse, organise and synthesise information drawn from a variety of sources including print and non-print media;
- 4 speak and listen effectively in a range of formal and informal situations;
- 5 demonstrate control of a range of forms and styles of writing (including analytical writing) in communicating ideas and information;
- 6 draft and revise writing to improve content and overall effect;
- 7 use accurate spelling, punctuation, paragraphing and appropriate syntax;
- 8 engage with a range of reading and viewing material and respond in a variety of ways (including analytical and creative); and
- 9 produce work that is original, interesting and imaginative.

Award Requirements

11 EN617 B English

The student must have fulfilled the Work Requirements and satisfied the Award Requirements to receive an award.

The minimum requirements for an award in this syllabus are as follows:

Satisfactory Achievement (SA)

7 'C' ratings, including criteria 5 and 8, and 1 'D' rating.

High Achievement (HA)

6 'B' ratings, 2 'C' ratings including criteria 5 and 8, and 1 'D' rating.

Outstanding Achievement (OA)

6 'A' ratings, 2 'B' ratings and 1 'C' rating.

11 EN616 B English

The assessment of *11 EN616 B English* will be based upon the degree to which the student can:

- 1 accept responsibility for own work and learning;
- 2 work cooperatively and constructively with others in a variety of team and group situations;
- 3 collect, analyse, organise and collate information drawn from a variety of sources including print and non-print media;
- 4 speak and listen appropriately in various formal and informal situations;
- 5 write effectively using a variety of forms and styles in communicating ideas and information;
- 6 rework writing to improve content and effectiveness;
- 7 use accurate spelling, punctuation, paragraphing and syntax;
- 8 engage with and respond to a range of reading and viewing material in a variety of ways; &
- 9 produce work that is interesting and imaginative.

11 EN615 B English

The assessment of *11 EN615 B English* will be based upon the degree to which the student can:

- 1 display responsibility for own work and learning;
- 2 work cooperatively with others in a variety of team and group situations;
- 3 collect and present information drawn from a range of sources;
- 4 speak and listen appropriately in different situations;
- 5 write in different forms and styles to communicate ideas and information;
- 6 revise writing to improve content;
- 7 use appropriate spelling and punctuation;
- 8 engage with and respond to a range of reading and viewing material in a variety of ways; and
- 9 use language creatively.

Award Requirements

11 EN616/615 B English

The student must have fulfilled the Work Requirements and satisfied the Award Requirements to receive an award.

The minimum requirements for an award in this syllabus are as follows:

Satisfactory Achievement (SA)

7 'C' ratings and 1 'D' rating.

High Achievement (HA)

6 'B' ratings, 2 'C' ratings, and 1 'D' rating.

Outstanding Achievement (OA)

6 'A' ratings, 2 'B' ratings and 1 'C' rating.

When a student has completed a course by satisfactory attendance in class and by making a conscientious attempt at the tasks related to the syllabus and set by the teacher, but where the requirements for an SA award have not been met then either:

- (a) the student's achievements should be re-assessed against the criteria of a less demanding neighbouring syllabus if one exists, or
- (b) where no less demanding neighbouring syllabus exists the least demanding syllabus can be listed separately on the Tasmanian Certificate of Education as having been completed but no award achieved (AC).

Appendices

Appendix A - EN617/616/615 and VET

English 11 B allows considerable flexibility in the choice of the particular learning experiences that comprise the course. Where students are enrolled in both a vocational course and English 11B, it is quite possible that amongst these learning experience would be ones that could provide the basis for assessment both in this course and in appropriate National Communication or other Broad Base modules (eg NCS001, NCS002 and NCS004 or NBB01).

Not only appropriately designed Negotiated Studies, but particular oral and group tasks, as well

as other selected activities could lend themselves to such double assessment.

Whenever learning experiences are shared, the following must be borne in mind:

- although some learning experiences may be common to English 11 B and to the National modules, separate assessments will still need to be made;
- there is no transferability or portability of credit for results in any English 11 B criterion to any of the markers for National modules, or vice versa;
- all the conditions applying to National modules will need to be met when assessing any task for National module accreditation;
- English 11 B is a wider course than the sum of any National modules. When National modules are presented in conjunction within an English 11 B course, there will be many tasks that are essential for providing evidence of attainment on English 11 B criteria, but are irrelevant to any National module;
- whereas it is possible to support National modules in an English 11 B course, the reverse is NOT possible;
- where it is impractical to offer all the required learning experiences for the selected National module(s) in conjunction with the English 11 B course, it will be necessary to extend the time allowed for the composite course beyond the 100 hours required for English 11 B.

Appendix B - Explanation of some of the terms used

Language Processes

In this syllabus, this term encompasses

- speaking, listening and performing,
- writing
- reading and viewing.

In using language, it is difficult to separate the processes. The development of each is enhanced and supported by development of the others. It is in the context of engaging closely with a variety of texts, including their own writing, that students can develop an awareness of some of the characteristics of effective language use and acquire the language to discuss it.

Key Learning Processes

Of the various learning processes, three - negotiation, reflection and collaboration - are fundamental to this syllabus.

Negotiation

In the context of planning and organising for learning, negotiation involves making judgements and decisions, discussing plans with others, reflecting on progress and seeking and responding to advice when appropriate. Negotiation skills enable students to assume increasing responsibility for their own learning and at the same time enhance associated language skills, such as conveying opinions, giving credit to the views of others, reaching conclusions or consensus decisions. Those involved in negotiation need information about the aims, resources, assessment procedures, possibilities and restrictions that may have an impact on their decision making. Successful negotiation depends on a high level of communication between teacher and student so that both contribute to decision making. Negotiation requires students to be familiar with the syllabus, including the objectives and assessment criteria. Students who are unfamiliar with negotiation need to be assisted in gradually assuming increased control over, ownership of and responsibility for, their learning.

Reflection

Reflection implies a willingness and ability of students to make judgements about their own learning, identify areas for further work, and plan for future learning. It also enables students to think about and review their own opinions, attitudes and beliefs, particularly in the light of their exploration of their experience and of texts. The teacher may need to demonstrate ways of reflection, by such means as modelling the use of a reflective journal and sharing examples of reflective writing. Student reflection will also be enhanced by discussion of assessment criteria, course objectives etc.

Collaboration

Collaboration (including cooperative learning) involves students working together constructively as pairs, small groups or large groups to discuss, plan, respond, create texts or prepare presentations. Working in groups is particularly important for the development of the language skills involved in explanation, exploration, and problem-solving. In a program that incorporates cooperative learning, students learn to consult one another or the teacher when appropriate, and to share experiences, feelings and beliefs. It is not necessary for the outcome of collaboration to be a group product; the students may work cooperatively in the process of producing and refining their own texts.

Areas of Experience

It is the interaction of the learning processes referred to above (speaking, listening, performing, writing, reading and viewing) with the areas of experience, which include:

- literature;
- mass media;
- everyday texts; and
- life experience;

that provides students with opportunities to develop language competence and, at the same time, leads them to a deeper awareness of self, others and of the world around them.

Literature

Literature is fundamental to any English curriculum. Typically, literature involves the use of language and the imagination to represent, recreate, and explore human experience. In this syllabus, literature includes classic texts (those recognised over time as excellent examples of their type), contemporary texts (those recent works considered to be significant, exploring complex ideas in complex ways) and popular texts (which aim to entertain without attempting to explore issues or ideas in complex ways).

Mass Media

Forms of mass media of relevance to this syllabus include:

- television;
- feature film;
- documentary film;
- radio;
- newspapers;
- magazines;
- cartoons and comics;
- information brochures, posters;
- CD Roms; and
- the Internet.

Everyday Texts

Everyday texts are those spoken and written texts that are part of people's daily lives, both personal and public. Examples are personal letters, telephone conversations, messages, brochures, catalogues, diaries, interviews, job applications, reports, formal letters, etc.

Life Experience

The term 'life experience' refers to both the student's own experience of life and to the aspects of life which are explored texts. Reflection on and exploration of life experience encompasses personal interests and concerns, shared experience related to the school and the community, and wider social issues. Each area may be explored through incidental discussion, reading and other activities related to texts. The student should be encouraged to make connections between the world of the text and their own worlds of experiences, as appropriate.

All correspondence should be addressed to:

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Appendix 4 Minuted Meeting Example

TAPE 2 – PILOT MEETING JULY First few pages transcribed

Anyway who wants to go first?

Well when I came 3 years ago I was confronted with a problem of beginning French and pre tertiary French on the same line. Now that took some working out and the technology at that stage was a lifesaver because there had to be teacher directed time and non teacher directed time with some useful activities that back up what I was teaching. With things like CD Roms in conjunction with the language laboratory, with good text books and exercise work that they needed to do as well as.

I want to be able to fix things on the spot but we have to remember we are teaching, our time is better put into using the technology and there are some things in there I think we have a right to expect that the technology is set up so we can actually teach with it. I think some of the danger that we are expected to become a jack of all trades. It's a bit like using a microwave oven if it isn't working I don't expect to fix it myself, same with computers I don't see that as my role. I think that I've been well I know I have been this year actually improving my IT skills but I want to improve them in terms of how I can teach better, not in terms of how I can get the equipment up and running and I think that's been really important this year.

Gee I agree with that. I really do.

This is something that Greg and I have actually been talking about a lot lately, he would like to see things where you could just press a button and then that did whatever, or you press this button and it did. But to program everything like that would take a lot of time and be very, very expensive.

But one day it will probably be like that but we will be dead by then.

Part of my argument is people like to be able to, if you look at some of the comments that I've got and you will see these next week, some people still feel like because they have been able to put a short cut in they feel really good about it, that they've moved a step forward, that this is their tool, that they've got some control over it, that it's not some foreign thing that every time something goes wrong someone else has got to touch it.

I agree with that too.

But you've got to have a bit of a balance there so people can be able to play around with it to have it suit their own needs without having to call someone all the time. I mean it's the same with your VCR or your microwave or whatever you want to know how to use the basic things but you should be able to rely on them and some things that you don't want to.

The distinction I'm prepared to make is that I'm prepared to do anything with a computer that I can stand at the front of the computer and do, once you've got to get behind the computer I think that's somebody else's role.

Yes.

You've also got to take into account that teachers needs are different at different times. Like sometimes you're just absolutely hassled and the whole thing won't work and all you want is for someone to fix it and you don't want them to sit down and explain to you how to do it.

No.

Because you're so hassled you're not in any frame of mind to learn and you've got a class in front of you. The technicians have to be flexible but we've also got to be prepared to say what we want at the time. Do we just want you to fix it or would you please stand there for 5 minutes.

Let me give you an example. If your computer's freezing all the time and it needs to be fixed and that's inside technical needs resetting up. You don't want to know how to do that and hope that it never happens again so it doesn't have to be done again so you shouldn't be. But if you're having problems with an attachment then you should actually know that that's the cords and dah, dah, dah and next time this happens. I came and fixed up one of yours and you weren't there with that attachment and I probably, if you'd been there I'd have showed you what you needed to do.

What an ...

Yeah so you know how you couldn't send any mail, kept trying to find an attachment well all I did was delete all the ones that ... attachments because some corrupted. Now that's the sort of thing you probably need to know so that next time you could fix it but you weren't there so I just fixed it.

Delete... back to normal, otherwise it would block.

**So some things you can learn from but there are so many things I feel that. But if you
Just did dah, dah, dah and that sort of thing.**

Its because we're at the beginning of it.

There might be some sort of little aspect of email which you've never really had any dealings with you've been sending and receiving and sending attachments but then there's something like decompressing and all of those sorts of things.

It was probably like centring things and putting things in italics which is all so easy to us now which once upon a time we were looking for the icon for it and that sort of thing.

But no that was easier Nina because that was sort of looking at the icon, with this sort of thing a lot more things can go wrong you know.

Tool bar, when tool bar is hidden for some reason. It disappeared. I mean I could bring the tool bar up and use it that wasn't a problem.

No it wasn't that was it.

To get it to work, nobody else could get it to work either. Including the technician and it was just my lap top, nobody else's. You can get confused.

There's lots of little things like when you start using the internet and you think oh good yes I think I've finally found something I want and then it will say now to access this you will have to. Now you can download this from and then it directs you somewhere and you think oh good yes I will do that and I will just go in now. And then it says now which of these would you like and it gives you all this and I think I wouldn't have a clue what I would like why don't you just read what's in my computer and down load what I need.

We probably need to bookmark the site, leave it and say look I need someone to come and go through this and explain what these things are.

Well that's what I've been doing, I've been usually sending them to Michael with a little note saying going to this address and find out how. But then he says it was just a matter of doing this, and yet I'm sure it wasn't as simple as that when I tried to do it.

I don't like to say it probably was reasonably simple, but you need someone to sit with you and say this means you're going to do it with this file or this means you're going to do this or whatever. That this is the one you would use as standard or.

All those things like saying you've got to enable Java script or something like that when you've got to do things and I mean I don't know what any of that means.

And how do you know which things to use to open your file and you get the menu selection and its got all the things that the laptops got on it and so I try and then it says no it won't open it with this one and I try 3 or 4 and then I don't know what that was then and I forget it.

PD day. Maybe we ought to have a session where people come with all these different things that we've encountered and we're actually taught.

But I can't find them again.

There's a lot of incidental things that you learn and its probably where don't want a PD session you want to be able to call someone and do it right then.

Exactly and then next time hopefully if you need to call them again, call them again.

Rather interesting. A lot of us have gone through this stage where we've almost felt we've got to do it on are own and yet most of us would actually probably

prefer to learn in a kind of cooperative learning. I know I wanted to use the ... I know I probably just collared Robin. I actually quite like experimenting, I get a real buzz if things work but I actually want someone holding my hand beside me. So Robin came in and that was great and that is my preferred learning style and I think that, that obviously takes time. Its almost like ... as you need it when you need it kind of thing. It takes time. But what you've mentioned here I'm actually finding quite encouraging that you can use somebody and say I want to do this, I actually need to know it, but I want you to stand there and hold my hand for the first time so I am confident I'm not making the wrong decision.

And if it goes wrong you can fix it.

Yes because that's been the worrying element that worries me, I draw the line with all of this because the most important thing is still those students and doing our preparation as well as we can and teaching them as well as we can. And all of this at times takes over and there are other things that we are responsible for that still need to be done really well. I mean there is a danger that it all takes over.

And then you feel bad because you say I'm drawing the line at this, I'm not going to do that because I'm going to place my emphasis there. And then you feel well I'm going to be left behind as a result and I have that dilemma.

Its like a roller coaster too of emotions, all these new skills because you can be feeling overwhelmed, then you feel some joy when you get and then I've even gone back to despair and do it by hand. And I have I have done things by hand again.

It even effects your teaching at times because you go into a class feeling.

People that come anywhere near me when I'm down here oh.

You've got to be really careful that sometimes doing by hand is the right way to do it. I mean you don't have to always use a computer.

Yes.

But I think this is possibly one of the traps that we've possibly fallen into to. We used to hand write an assignment. You'd sit there and quickly write up an assignment you'd run to the photocopier and you'd do it. Now because we've learned so many skills I think we all feel that we sort of ought to present something that looks professional and then you get really picky don't you because you print it and you think oh no. That should have been.

Different font.

Now if you've hand written a whole page and you recognise a typo you'd white it out or you'd cross it out and you'd just let it go. You'd no more rewrite the whole page because of one error whereas now we just sort of.

But then you've got to think of the advantage of it. Back then for the next students you've just got to change the date and a couple of things and that's that. I think we

put a lot of pressure on ourselves because of some of the skills that we've learned. We try and do everything.

The thing that I think has really encouraged me I sat back .. the other day and used .. scanning and I was able to .. and it took me an hour and I had a few false starts and a few blind corners but when I think now. That took me an hour to do it is going to save me hours and hours and hours of time so sometimes you've got to say yes it has taken me 4 or 5 hours but actually that is a skill now that I have got. But sometimes when you've a class at 1 o'clock and a class at half past one, that's when I get frustrated, especially if something goes wrong.

You have to be far ahead don't you to try to find enough time to learn the skills to then be able to get it ready to then review them in your class and you've really got to be sort of I'm going to need that next month therefore I'd better start doing it now and most of it well I don't know about the rest of you but I'm usually a last minute sort of person. I never seem to be able to get ahead, I'm always sort of preparing for tomorrow or today.

And as Marie said that means while you're doing that there's something else you're not doing and is that the marking or is that reading of the new novel or whatever and something else does have to go. There's only so many hours in a day.

Yes.

I find that the most worrying for me.

Or your relaxation time. What's that.

Frustration ... DA news by Chris, the letters almost there I could not get it to load onto the disk, I could not get it to print out on the printer and I felt a complete idiot. I carried my laptop into the room where the printer is on the desktop machine there. I copied the whole item. I mean you know you might as well sent it to be written in pencil or something for the use of getting it on the ..

There is lots of little things like.

So all the time I spent trying and other people spent trying to help me to try to get the bloody item to go somewhere.

Did you ever find out what the problem was?

No I haven't had to do one since, I now have the GA News.

Well a laptops a laptop. So it wasn't a word 7 problem.

No. No. We tried that.

Little things that technology seeks, well is on the verge of improving but it is not quite getting there like I think we set up earlier this year the general news sheet so that we

would be able to type into it but its not open at the beginning of the day so when you come it to type something in if you want to put a new sheet notice on for tomorrow, there's not one there for tomorrow yet and so you think oh well in that case because I want to do it now I'll have to email it and send it that way.

What do you mean its not there.

Well when you open it up they have a file with each date on it and they obviously have to setup one for each day well I think they really need to be set up a day or two ahead.

Appendix 5 Minuted Interview Example

24th November 1998

Okay we'll just sort of work through some of these questions and some of them are repeats so you will probably answer them in the first bit. So the first bit there is looking at pedagogy which is basically all the bits below, so rather than saying how has its changed pedagogy, how do you think its changed the curriculum?

Well I suppose its just created another avenue for the person to be able to present information and for students to be able to obtain information. In the curriculum there has been new subjects based specific to like ... to Information Technology so technology has come into all the subjects in one way or another so its not just subject specific.

But in LOTE is there criteria anything specifically?

No, absolutely none. No in fact in this specific course when I saw one of the things people from Bendigo had done which would have taken hours and hours for the students to do my question was why would I do that, why would I ask the students to spend hours and hours presenting something like that?

What was it?

Oh they'd been out on an outing and it was a video clip and presenting what they had done in a day and granted there was some language in it, like in German but it was about 10 lines worth and it would have taken hours and hours to present and you can do that obviously in other ways.

Was that one of these haves, that all kids have to do?

I don't know, well I don't know I'm not sure. I don't know whether in Victoria, I don't know whether one of the criteria does have an IT component I don't know, it certainly doesn't here though.

So its not anything that's sort of been discussed.

No certainly not in moderation in any those meetings, has anything ever come up about it. I don't know. So for that reason certainly in the language teaching its more incidental and IT is used just as another tool rather than something for ...

Yes.

I was just going to work through these. So with the classroom management and like you've always had issues of classroom management because of the many levels so from what I prefer absolutely, the incorporation of IT has been easier in a way than others because they're working on a ...

For the other languages French and German in particular who have stages 1 – 4 beginners through to advanced in my class and if I were to have that situation I

would use it a lot more with small groups working on different things. But for Italian it's a bit different because I have one whole level group together, I don't have the split levels. So they're all working basically, although at the same level they're not really specifically, some people are well advanced to others but its not quite the same as stage 1 –4 in the same class. But it sort of makes classroom management easier in the sense if you need it because it allows for different activities to be going on a once when you're helping someone who might be struggling with something. They've got other things to do as well. I've never had a great shortage of things to be able to get the kids to do anyway in small groups but this adds another thing.

Assessment, has it made any changes to assessment?

Well not in the fact that you know we have to assess anything formally to do with IT but it makes, in other subjects certainly not in mine but it makes their work look more professional doesn't it. So once upon a time where two students could have the same quality of work as in the content one student sometimes would have got a better mark because it looked better. So perhaps with assessment in some areas but that doesn't happen .. its not effected in that sense. Assessment must be harder with some people with keeping an eye or making sure that teaching is happening. But it doesn't happen in Italian.

What I've discovered so far is probably we're not at the stage where its having a great impact on assessment partly because its not there in the criteria and we're just not at that level where staff are starting to think about assessment with IT but it ... happen, and you've always had the policy of .. makes so much easier for them ... and hand, can't recognise it by the handwriting as to whether its really there's or not.

Yes that will be picked but in the same ... its not an issue. With the planning for the lessons my worksheets and all the comprehensive questions obviously look more professional typed up using Word and I've saved time by doing things like when I'm listening to a TV program in Italian like sometimes to do with, write out the script for them so they're familiar with the script before they hear it. Now once upon a time I would have to watch the TV, write it all our by hand, take it to a typewriter or computer and type it out. But now what I can do if I put the laptop next to the TV is actually just pause it and do it straight on so that's been a great lifesaver, timesaver, so that's been a very positive thing and the students appreciate that because they like to be familiar. I mean sometimes I come straight from the TV just to develop those skills but other times its too advanced for them and all it would do would be discourage them and make them feel disheartened because its just way over the top. So its been good for that.

So you've enjoyed having a laptop?

Well I've only had it recently but even in the language lab where I had the desktop near the TV I've been able to do that too, so it has been really good from that sense. I use the pause button a lot.

So what about the time that you find you require to be prepared

Sometimes it saves time, sometimes it ends up taking longer and I, that happens where there are things that go wrong or I don't understand why something has happened as it has. So I suppose the time oh and I've spent a lot more time doing things like at the end of the class when I sit down and do my email messages to students they've actually made my lesson a lot longer because where at 9.30 once upon a time I would talk to anybody who needed last minute ... and then go home, now I sit down at the computer and do these things while they're fresh in my head, the questions that came from the class. I don't leave here til after 10 o'clock some times at night. So without me realising it. So although I've thought it's a wonderful idea and it's a great concept and it is I'm starting to wonder whether its worth all that effort, time and effort because the novelty of it for the students was fantastic to start off with but like most things that wears off too.

Is it something they could start to pick up themselves that they are given 5 minutes at the end of the lesson to email one other person in the class about something, in a way the questions that you would be asking?

Yes that's a good idea, I certainly wouldn't be able to do it with all of the students because not all have access to a computer and I'm talking about some of the adults that come in and that would exclude them so I have to be careful not to exclude some people but then I could always be giving them something different to do at the same time.

Yes. Alright the next question looks at all the support aspects of support, professional development, what you've had from other staff, what you've had from other students?

Yes, the technical support has been really good, mind you I was still nervous, no not nervous, I know that Mark and his crew are so willing when you ring up to say, but I just feel oh I can't ring them again.

Courage.

Yes so it's a personal thing rather than a and I think they must think the LOTE department's a pain in the because they can never get anything right and I don't know whether its. Because our particular printer seems to be causing so many problems and I don't know what it is.

Hopefully we'll have solved some of those in the next year because they're going to swap computers around ... and .

And so although in principle the technical staff we have to go to, its nothing to do with them, its more my own education to impose too much I suppose really.

But you've got to get the things running and students are there.

And that's where its really hard to rely on the technology when sometimes you think I've only got 15 minutes to do this, I should have done it yesterday however I didn't get a chance and so you do it today and you go and type something up and then it won't print or something goes wrong. So that's where the greatest difficult lies.

The more that happens, the less you start to want to use it.

Yes and I have had some bad experiences that way. Which knock your confidence around in using it I suppose.

Alright what about professional development?

That's fantastic. The time that we had, the period of productivity time that we had at the end of last year with the 3 different modules was the best but I've really appreciated that and I've kept on thinking wow people pay money to go to courses at night to be able to do what we're being offered here so I found that really positive and I really appreciated that and then the same with module 4 which I'm doing at the moment. During the year its really hard to try and gain new skills on top of what you're doing because its not as though you're learning those new skills instead of, you're picking up another bag. So as you're walking along the airport with 4 suit cases all of a sudden you're expected to take another one and if you take on that other one, you're very likely to drop all the others, you can't manage them. But if you can put one down you can manage the others, or not pick up the other one. So having this period of productivity time where you could juggle things around and you know that you're not. The worse thing is to think that you are making a student come second because you're spending time learning new skills and we should never do that. If we do that then that's wrong I think.

Students .. some people do want it as they need it and a lot of people do say well we'll do it at the end of the year because I have the time then. How you go about it I don't know. What Bendigo did was not have staff meetings and have PD once a week.

Now that's a great idea. Because having said that what I said about the end of the year that's one side of it, but then you reminded me of another. Sometimes when you need to be able to do something you need to learn it and then do it straight away, so learning it all at the end of the year for some people and myself sometimes is not so great because if we don't use it straight away then you forget how to use it or what you're doing.

Yes it's a difficult one.

But I think that maybe if it was even alternate weeks or something like that. But that's a really good idea.

We have to be careful though, I know that everything's going IT orientated but we also have to be careful not to jump into the river just because its flowing fast before we see where the river leads you know.

IT is only one component of what we're doing here. Its one that needs so much resources, so much professional development, so much technical support, is that really being realistic?

That's right and when you're looking at the holistic thing of school, when we were just talking about image and things like that its not just the one and all, we do tend to, as human beings we tend to get on to a bandwagon a bit. I think we should just be careful. Look on maybe and have a look at other people's mistakes as well before we throw too much money and energy and resources into just one area.

I've certainly had fantastic although ... kids .. at home and they've got.

But we must remember that too, nearly all of them have computers at home.

And that's what ..

In fact I wonder whether we need to be. As I said before its not so much a novelty anymore, whether we need to put them incorporated so much in the classroom that we're spending all of our time and resources.

No it should be as you say a tool I mean you get the appropriate tool to use to use it, if you don't you don't. You certainly don't use it all the time. It's a bit like when video's first came out, the kids thought they were fantastic and how you put a video on and unless its really, really good they're going to fall asleep in the first 5 minutes.

That's right.

Other staff Other staff been good within your own department?

Other staff are good, but then again you ask them a question and that means its pulling them away from whatever they were doing, their lesson planning or whatever so sometimes again there's this problem of imposing

That's always been there of course with, and what about the students?

Oh the students are fantastic and they actually love to be able to, because that's really important and they feel as though they're offering you something and that's. And I think that's a yes for lots of reasons, because of their own, I mean their self esteem goes, if you see the ... come out when you write some of the questions when they know that they're helpful to you. So yes.

Alright big question what is your visions for education in the future in relation to IT, how do you see it?

Oh in my own area I mean obviously for Italian and LOTE, more and more contact with native speakers, that is like ideal. And its another chance for some more communication, because really learning a foreign language is all about communication and so it just makes it more possible. In general for the school I suppose again just to have IT incorporated gently .. throughout the school, being aware of different people's learning, whether its teachers or students. Apart from that I haven't given it a great.

What about the sort of open learning contacts ... situations can you see IT changing what was traditional ... classrooms?

I haven't thought of that a great deal. I don't know how it effects the one contact a week. Certainly with the classes that have 3 contacts a week, more chance for students to have to come in less. I don't know, I'm not convinced that, that's a great thing. I always remember, now these is ... I always remember as a student teacher somebody telling me, maybe it was my lecturer at the time, your most important role as a teacher is not to teach Italian or French or this or whatever else you might teach but to make a positive difference to that person's life and to help them to become a good citizen and a good human being. And that has always stuck in my head and I think it is very true.

Yes very important.

Now once we give more and more contact, less and less contact of our own being with the students we have less chance to do that and I think that's a sad thing.

I suppose some students ... lifelong learning they feel that they don't have .. but then they can come

Again you have to be very careful and you have to screen with who you are using different techniques, you can't, you wouldn't be able to just lump one of them in the class not coming in on whatever day I think you'd have to be really careful. ...

Have you got anything else you want to add?

Yeah across the curriculum probably more chance, maybe not so much in a college situation but certainly in a high school and primary schools to have more cross curriculum class things going on because of IT and for example with LOTE, in a lot of schools now that teach some other subject even phys ed in Italian because they've taught them when they play games, they can do it. So a lot more cross curriculum so that's just not necessarily because of IT, I think its in general.

Alright the difficulties.

The difficulties come when it comes to time, learning new skills and problems with. Yes.

Not being reliable enough.

That's right.

You've sort of answered this one as well. Well it's a continuation of the support one. Direction to incorporate IT in the curriculum, so if that's one of the directions what ... should the department be putting in to ensure that happens.

With the man power as in the Mark's team. I think if I had to give you a priority that would be it for me. Even more than having computers in every room I think.

What about the professional development aspect?

Yes that's also important too but then if we've got the manpower there and they're prepared to come and teach us things as we're going along maybe that would be ... I know I've almost contradicted about what I said earlier about the time at the end of the year but its not that's the only way of doing it, they have been, what I wanted to say is that was fantastic doing that but if you've got the group and if you can get past the problem I have of imposing and you know that they're available then I think they're a great resource.

I have found there was one lady in my class for example who really needed to do some extra work at home and she found it really hard because we do most of it in class is ... its virtually speaking and listening nearly whole of the time and she found some software that I let her buy and Out of the time. It was an old ... grammatical type activity but it suited her so by having different things. As I said before with the tools, the more different tools the better chances of ... learning. The s.... might be good but the hoe is handy some times too and.

Alright well is there anything else you'd like to add?

No I think that's about all.

Appendix 6 IT Views Survey

For our own internal planning and for our reporting as a lighthouse school please fill out the following survey. If you wish to fill it out anonymously then please pass it to the office to have your name ticked off. If you wish to put your name on it then can you place it directly in my pigeon hole. It is important that every staff member have their say.

Please complete by Friday 31st July.

1. Do you have a computer at home, other than the laptop?	Y/N
2. When you had a desktop computer in your staffroom how many other staff did you share it with?	0, 1, 2, 3, 4, 5, more than 5
3. Do you use your laptop at home?	Y / N / NA
3b If Y how many times per week?	1, 2, 3, 4, 5, more than 5
4. How many times per day would you access your email?	1, 2, 3, more than 3, at every available opportunity
5. Do you use your laptop at work?	Y / N / NA
5b If Y how many times per day ?	1, 2, 3, 4, 5, more than 5
6. Do you find it useful being able to access SACS for student details?	Y / N
7. Have you taken your laptop into the classroom to access email, SACS, for classroom demonstrations, student use etc?	Y / N / NA
7b If Y how many times?	1, 2, 3, 4, 5, more than 5
8. Have you used the encoder (averkey) to connect your laptop to a big screen for classroom demonstrations?	Y / N
9. Have you used one of the scanners in the college?	Y / N
10. Have you used the digital camera?	Y / N
11. Do you have all three modules?	Y / N
12. If your laptop was taken away would you miss it?	Y / N / NA

13 What do you find as the advantages and disadvantages of having a laptop?
Advantages

14 What IT PD have you received this year?

15. What IT PD do you think you need and how would it best be offered, ie during staff meeting, after school, free line, off campus etc?

16. What are the major IT problems that you have had this year? (personal and classroom teaching)

17. What are some of the good things about your use of IT this year

18. Please prioritise the following from most important to least important

PRIORITY	TASK
	Staff as competent IT users
	Students as competent IT users
	e-mail access for all students
	Charging students for printing
	Establishing and maintaining LA web pages
	Storage access for all students
	Maintenance of classroom computers
	Maintenance of staff computers (laptops)

19. Any other comments about IT that you would like to make?

Appendix 7 IT Skills Survey

Self-evaluation in computer use for teachers

Note: For copyright reasons Appendix 7 has not been reproduced.

**(Co-ordinator, ADT Project (Bibliographic Services), Curtin University of
Technology, 30/09/03)**

Appendix 8 Results from IT View Survey

1. Do you have a computer at home, other than the laptop?	11 Y:47 / N:10
2. When you had a desktop computer in your staffroom how many other staff did you share it with?	21 0:10, 1:7, 2:5, 3:10, 4:5, 5:7, more than 5:11
3. Do you use your laptop at home?	31 Y:45 / N:8 NA:4
3b. If Y how many times per week?	41 1:7, 2:6, 3:10, 4:2, 5:4, more than 5:8
4. How many times per day would you access your email?	51 0: 4,1:8, 2:7, 3:18, more than 3:8, at 61 every available opportunity:15
5. Do you use your laptop at work?	71 Y :46/ N:5, NA:5
5b. If Y how many times per day ?	81 1:4, 8:7, 3:8, 4:4, 5:3, more than 5:14
6. Do you find it useful being able to access SACS for student details?	91 Y:45 /N:1 other:10
7. Have you taken your laptop into the classroom to access email, SACS, for classroom demonstrations, student use etc?	101Y: 25/ N:23 NA:9
7b. If Y how many times?	111:4, 2:4, 3:4, 4:3, 5:1, more than 5:8
8. Have you used the encoder (averkey) to connect your laptop to a big screen for classroom demonstrations?	121Y:7 / N:48
9. Have you used one of the scanners in the college?	131Y: 18/ N:38
10. Have you used the digital camera?	141Y :15/ N:41
11. Do you have all three modules?	151Y:37/ N:19
12. If your laptop was taken away would you miss it?	161Y:42 / N:7 NA:6

13 That do you find as the advantages and disadvantages of having a laptop?

Advantages

- X32 Able to work anywhere, at shack, where the family is
- X19 Don't have to share with anyone, sitting on desk ready at all times, instant access
- X7 Use in classroom
- X2 No queuing for computer at home
- Quick and easy means of storing info, excellent communication, email web, SACS is brilliant, don't have to pester APs for Student Details
- Size, plenty of space on desk with computer as well.
- None

14 Disadvantages:

- X22 Ergonomics
- X12 Unreliability
- X10 Security (pack, unpack)
- X8. Movement between home and school(lugging it around)
- X7 Different software versions
- X6 Printing locally
- X5 No access to NW from home
- X2 Not having one (part-timer)
- When my laptop isn't working then neither am I
- Trying to acquire the necessary knowledge and expertise quickly
- Frustrating when things don't work
- None

15. What IT PD do you think you need and how would it best be offered, ie during staff meeting, after school, free line, off campus etc?

- X18 Staff meeting time
- X5 End of year, only time we have to experiment
- X4 Off campus
- X4 Someone on call to help as needed, software issues (phone help, or booking system)
- X2 Should not be an expectation that IT staff take PD they need PD too!

16. What are the major IT problems that you have had this year? (personal and classroom teaching)

- X11 Problems with laptop
- X7 Equipment not fixed as quickly as needed
- X7 Not enough computers for students during class time
- X6 Time, never enough, it is 'survival mode' keeping up with the required skills on top of all other stuff we need to do.
- X3 None!!!
- X2 Still using acorns is an embarrassment
- I don't have the confidence to take it into the classroom yet.

17. What are some of the good things about your use of IT this year**SELF**

- X10 Ready access to email and its use by colleagues
- X2 Am able to fix some of my own problems, increased understanding of computers
- X2 Web authoring
- It is the way of the future it is good to be able to keep up with it and see the potential.
- I know I am a better teacher due to IT skills, presentation, student presentation and research skills also improved.
- Being involved in the PILOT IT program, Lyn's support, opportunities for Co-operative learning with my students and team teaching.
- Typequick has improved my typing, giving me confidence to type tests etc.
- This year there has been a transition to seeing IT as a friendly tool rather than a cumbersome learning obstacle. The prospects for further competency are exciting not frightening.

- Production of more professional documents, file storage, sharing ideas with other staff, finding out how others use IT
- Doing reports, attendance
- I like having a scanner and digital camera on hand.
- Quicker return of attendance, SACS for student access
- Learning how to use the internet more efficiently
- Communication and information gathering

STUDENTS/CLASSROOM

- **X2** Getting students to use the internet as a resource.
- **X2** A wide range of possibilities within the classroom not possible before.
- **X2** Seeing enthusiasm of students using IT
- I feel more confident about using IT in the classroom.
- Powerpoint, classroom potential
- With averkey I have been able to make better use of CDs, internet.
- In the long run I'll have more teaching techniques at my disposal and students will have more learning techniques
- I am learning all the time, being able to pass learned things on to students and vice-versa.
- E-mail, satellite use, in my multi-level course, additional activities make it a better course.
- Simulated some excellent models using Excel in the classroom.
- Nothing

18. Please prioritise the following from most important to least important

PRIORITY	TASK
17	Staff as competent IT users
	Students as competent IT users
	e-mail access for all students
	Charging students for printing
	Establishing and maintaining LA web pages
	Storage access for all students
16	Maintenance of classroom computers
10	Maintenance of staff computers (laptops)

19. Any other comments about IT that you would like to make?

STAFF

- **X2** Too much emphasis on modules. Most staff needed PD to do the tasks they need to do now.
- **X2** Teachers should have a choice between laptop and desktop
- **X2** Staff are at different stages of acceptance, awareness and implementation. Certainly it will take quite a while to get to the next stage of embedding IT in the classroom.
- **X2** At times it causes stress but there is a deal of satisfaction when things work out.
- I look forward to using IT in the classroom and see the effects on the way I deliver the subject material etc.
- Any change causes some disruption, as well as stimulation, so I see it all as a learning experience and I'll eventually acquire the skills I need.

- Even though I have had frustrations IT is worth the effort. These skills are moving us into the 21st century. This is the way of the future. We must learn or be left behind. Needs problems working through in a positive way. It will get better and you will feel a great deal of self worth for doing it. There appears to be a threshold of knowledge, once gained then life becomes much better, unfortunately it takes a while to get to that threshold.
- It needs to be recognised that IT is causing a lot of extra work, though it is undoubtedly inevitable and necessary.
- It has assisted me greatly, would be lost without it, and I have survived a fairly steep learning curve(it is ongoing)
- Gradual improvement due to access to laptop

OTHER

- Now that all staff have computer access, can't we at least increase internal communication eg weekly newsheet, staff new electronically?

IT TEAM

- **X8** Although some whinge about the IT team I have been extremely happy with their IT skills and willingness to help.
- **X3** Improved level of staffing for IT dept, would help us to overcome maintenance delays which cause 'Angst'

Appendix 9 Results from IT Skills Survey

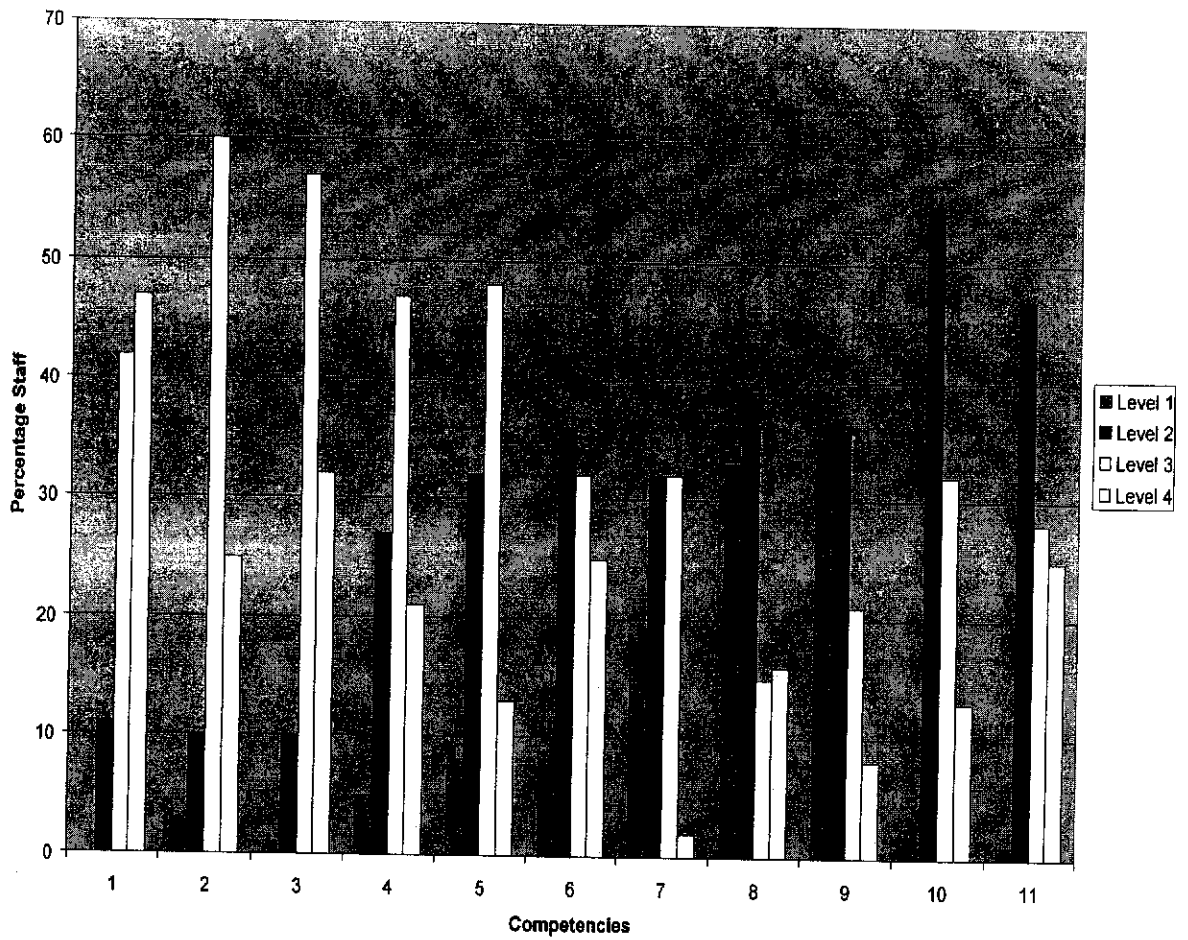
1 Basic Computer Operation

2. File Management

- 3. Word processing
- 5. Email
- 7. Graphics Use
- 9. Database Use
- 11. Technology Intergration

- 4. Netscape/Internet Research
- 6. Information Searching
- 8. Spreadsheet Use
- 10. Ethical Understanding

17/06/98



Appendix 10 College ECPD Data

Percentage of Study College staff Obtaining ECPD Modules in 1998

Modules	No. of teachers Start Term 1	No. of teachers End Term 1	No. of teachers August 98
All three	38%	50%	57%
1 or 2 modules	24%	23%	20%
0 modules	38%	27%	23%

Appendix 11 State ECPD Data

Percentage of All Teachers in the Tasmanian State Education system Obtaining ECPD Modules 1997-2000

Year	Modules completed	Module 1	Module 2	Module 3	Module 4
1997	2173	14%	12%	10%	0%
1998	7609	47%	41%	31%	5%
1999	8821	57%	49%	41%	7%
2000	14760	85%	74%	62%	17%

- 47 schools have over 75% of their staff with completed outcomes from the four modules.
- 122 schools (out of a total of 218) have over 50% of their staff with outcomes completed from the four modules.
- 49 schools have over 25% of their staff with completed outcomes from the four modules.