EVALUATING THE INTEGRATION OF LEARNING TECHNOLOGY IN QUEENSLAND STATE SCHOOLS: A CASE STUDY OF THE QUEENSLAND SUNRISE CENTER

GLENN D. FINGER

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This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Glenn Finger
THIS PH.D. THESIS
IS DEDICATED TO
PATSY, JAMIE AND PAUL
AND MY MOTHER AND FATHER (DECEASED)
ABSTRACT

This thesis provides information, implications, and recommendations, derived from an evaluation of the Queensland Sunrise Centre (QSC), which will assist educational policy formulation, implementation, and evaluation strategies for integrating learning technology into the school curriculum. In addition, the thesis makes a theoretical contribution to school level evaluations through the development, implementation, and appraisal of an evaluation model based on fourth generation evaluation (4GE) principles by directly involving stakeholders in the evaluation process. Further, the evaluation study provides a response to the demands made by Worthen and Sanders (1988) and Fishman (1992) for the development of evaluation case studies using 4GE principles.

New and emerging technologies hold significant challenges for schools. The Department of Education, Queensland recognises that there are possibilities and problems which need to be identified, examined, and addressed. The establishment of the Queensland Sunrise Centre (QSC) in 1990 involved the creation of innovative ‘technology-rich’ learning environments for students and teachers in which each of them had been given the use of personal laptop computers which were used at school and at home. The evaluation became perceived as having the dual role of providing feedback to the participants, as well as identifying and analysing issues which would aid the formulation, implementation, and evaluation of further learning technology initiatives in schools.

An unproductive search for an existing model, derived from the evaluation literature that had been used elsewhere for evaluating learning technology initiatives and which would have been suitable for use in this evaluation, highlighted the lack of evaluation studies in educational computing. Following a review of evaluation models and the successive generations of evaluation leading to constructivist inquiry, referred to as 4GE (Guba and Lincoln, 1989), a model, based on the Augmented Stake-Batchler model (Thorne, 1990) and Owen’s (1992) concept of evaluation Forms, was developed in which the evaluation activities occurred through continuing negotiations with the relevant stakeholders. That
process involved the key participants in formulating the evaluation questions which the study addressed. The evaluation headings - Situational Analysis, Project Management, and the Impact of the Project to which the evaluation questions related provided important organisational headings in the model. Multiple sources of evidence were used and a variety of data collection procedures were employed. During the data collection phase, both quantitative and qualitative data were collected and organised according to the evaluation headings and the evaluation questions. Significantly, the model provided for a post-evaluation check strategy which gained information about the utility, feasibility, propriety, and accuracy of the evaluation as well as enabling an appraisal of the model itself in terms of its perceived suitability, effectiveness for identifying key components, and the contribution the evaluation made for program improvement.

The findings are reported as they relate to Situational Analysis, Project Management, and the Impact of the Project. The situational analysis revealed that there was significant overlap between the pre-project, Department of Education endorsed goals of the project, and the views held by key stakeholders directly involved in the QSC in 1992. Consistent with the early planning intentions, most of the students and teachers had remained with the project over the three years of its operation. Following a restructuring in the Queensland Department of Education, there was evidence of uncertainties regarding the continuation of the QSC Project throughout 1991 and 1992. However, much of the tension generated by this uncertainty was dissipated when support was received at the local district level for the completion of the project, as planned, in 1993.

The perceived strengths of the project management related strongly to the initially generous budget and to the additional teaching and project support made available. The use of Logowriter as the main tool of inquiry was seen as a major advantage. The perceived weaknesses were the inadequate teacher inservice support, uncertainties generated during a departmental restructuring and the non-replacement of the Project Officer who had worked closely with the teachers in 1990 and 1991.
Findings and implications relating to the *impact of the project* were reported in terms of classroom organisation and management, curriculum implications, changes in student learning, the advantages and disadvantages for students of having been involved in the QSC, gender differences, the technical and professional support requirements for teachers, and the concerns and perceptions of parents of students involved in the QSC. Substantial changes in classroom organisation and management, teaching approaches, and relationships with their students were reported by many of the teachers. For example, teacher perceptions and classroom observations revealed that students had learned to work more collaboratively with other students as well as with their teachers. The theoretical curriculum implications which emerged were that curriculum goals required redefining, technology provided the catalyst for exploring non-disciplinary approaches to curriculum in secondary schools, and assessment and reporting procedures needed revision to appropriately reflect changes resulting from the use in schools of the new and emerging technologies. Gender differences were identified between the Year 8 boys and girls. The thesis findings suggested that, while each student had the use of his or her own personal laptop computer, a more sophisticated notion of equal access needed to be employed in which both boys and girls were equally participative in a range of curriculum applications both at school and at home.

The results of the meta-evaluation examining key stakeholders’ views reflected very strong levels of agreement with the various staements relating to the utility, feasibility, propriety, and accuracy of the evaluation. There was also strong agreement reported in relation to the suitability and effectiveness of the model developed, and to the contribution which the evaluation could make to program improvement.

Recommendations derived from the QSC evaluation are presented in terms of specific recommendations for the QSC Project and, subsequently, in terms of general systemic recommendations to provide guidelines for managing and supporting learning technology initiatives in schools. There was evidence provided of utilisation of key findings, implications, and recommendations at the school, regional, and state level.
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assisted the evaluation. The support from parents and the active participation by the students involved has been exceptionally positive. I thank them for their contributions and trust that they gained a great deal from their involvement.

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The process of compiling this thesis proved to be a professionally challenging endeavour. Working with the people whom I have acknowledged reaffirmed my belief that it is the contributions by people, individually and collectively, that ultimately determine success.
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<tr>
<td>ACCE</td>
<td>Australian Council for Computers in Education</td>
</tr>
<tr>
<td>ACER</td>
<td>Australian Council for Educational Research</td>
</tr>
<tr>
<td>BEC</td>
<td>Business Education Centre</td>
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<tr>
<td>CAF</td>
<td>Computer Access Factor</td>
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<tr>
<td>CAI</td>
<td>Computer-assisted Instruction</td>
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<tr>
<td>CAL</td>
<td>Computer-assisted Learning</td>
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<td>CEANT</td>
<td>Computer Education Association of the Northern Territory</td>
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<td>CEGACT</td>
<td>Computer Education Group of the ACT</td>
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<tr>
<td>CEGQ</td>
<td>Computer Education Group of Queensland</td>
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<td>CEGSA</td>
<td>Computers in Education Group of South Australia</td>
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<tr>
<td>CEGV</td>
<td>Computing in Education Group of Victoria</td>
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<tr>
<td>DES</td>
<td>Department of Education and Science</td>
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<td>ECAWA</td>
<td>Educational Computing Association of Western Australia</td>
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<td>ELC</td>
<td>Electronic Learning Centre</td>
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<td>FCQS</td>
<td>Follow-up Questionnaire for Students</td>
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<td>GUGC</td>
<td>Griffith University Gold Coast</td>
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<td>ICQS</td>
<td>Initial Computer Questionnaire for Students</td>
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<td>IPT</td>
<td>Information Processing and Technology</td>
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<td>ITIS</td>
<td>Individual Teacher Interview Schedule</td>
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<td>LSP</td>
<td>Learning Systems Project</td>
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<tr>
<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
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<tr>
<td>MLC</td>
<td>Methodist Ladies College</td>
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<tr>
<td>NGT</td>
<td>Nominal Group Technique</td>
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<tr>
<td>NSW</td>
<td>New South Wales</td>
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<td>NSWCEG</td>
<td>New South Wales Computer Education Group</td>
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<tr>
<td>NUDIST</td>
<td>Non-numerical Unstructured Data Indexing, Searching and Theory-building</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>PCM</td>
<td>Practical Computer Methods</td>
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<td>PEC</td>
<td>Post Evaluation Check</td>
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<td>QSC</td>
<td>Queensland Sunrise Centre</td>
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<td>QSITE</td>
<td>Queensland Society for Information Technology in Education</td>
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<td>QSP</td>
<td>Queensland Sunrise Project</td>
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<td>Sunrise Central Group</td>
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<td>SD:CSS</td>
<td>Site Description: Coombabah State School</td>
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<td>SD:CSHS</td>
<td>Site Description: Coombabah State High School</td>
</tr>
<tr>
<td>TCE</td>
<td>Tasmanian Certificate of Education</td>
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<td>4GE</td>
<td>Fourth Generation Evaluation</td>
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The following publications related to the research undertaken for this thesis were produced during the period of candidature.

**Evaluation Reports**


**Journal Articles**


**Contributions to Books**

"It is certainly possible to coerce people into compliance, but it is impossible to coerce them into excellence - by anyone's definition. Only empowerment can invest people with a sense of self-efficacy, which enables them to act in productive ways.

...Fourth generation evaluation is a means of empowerment, both because of its process aspects and because it shares information (which is itself power)."

CHAPTER ONE

INTRODUCTION

Chapter One provides an introduction to this thesis by stating the purpose of the research, and formulating and identifying the evaluation questions to guide the study. The context of the study is then described and the significance of the study established. A background to the establishment of the Queensland Sunrise Centre (QSC) is outlined including the broad purposes of the QSC and the implementation of the computer-based curriculum innovation funded by the Queensland Department of Education. Finally, the organisation of the thesis is outlined and the assumptions and limitations of the investigation undertaken are presented.

1.1 Purpose of the Study

The QSC was a major curriculum undertaking by the Department of Education in Queensland aimed to explore and identify system implications emerging from the integration of learning technology in schools. The purpose of this thesis is to provide a critical program evaluation of the QSC featuring an evaluative case study. Hence, the study represents a significant innovative investigation of the potential of new and emerging technologies through the establishment of innovative learning environments within a primary school and a secondary school. The research aims to make a significant theoretical contribution by developing a model for evaluating the integration of learning technology in schools using fourth generation evaluation (4GE) principles through directly involving the key participants in the QSC in the process of stakeholder influenced program evaluation.

As a result of the research, information, implications, and recommendations are provided that have the potential to assist educational policy formulation and implementation strategies for integrating learning technology into the school curriculum for a variety of
audiences; i.e. school, regional and system administrators, teachers, students and parents. Specifically, the research provides program evaluation information and analysis about the QSC Project through providing a situational analysis, and examining project management, and the impact of the project.

Essential to the development of a theoretical framework underpinning this study was the use of 4GE principles through the identification of, negotiation with, and involvement of the key people in the program in the evaluation process. Teachers and the students involved in the QSC were identified as the fundamental components of the program to be evaluated in an application of the evaluation framework. Parents of the QSC students were also identified as key stakeholders in the evaluation. Consequently, together with the researcher in his role as the evaluator, the teachers, students, and their parents were actively involved in the evaluation process. In addition, other stakeholders were identified. These included personnel from Central Office, South Coast Regional Office, Gold Coast North School Support Centre, Educational Advisers (Learning Technology) from South Coast Region, the administration teams from both Coombabah State School and Coombabah State High School (i.e. Principals, Deputy Principals, Registrars), Heads of Departments from Coombabah State High School, and personnel who had been associated with the QSC but no longer were directly involved (i.e. QSC Project Officer). These stakeholders being involved in the process of evaluation at various stages of the program evaluation was fundamental to the model formulated to guide the evaluation.

1.2 Evaluation Questions

The QSC was established with the purpose of answering the question - "What kind of classroom will be needed to best equip our children to live in an age which will be increasingly reliant on the use of technology?" (Department of Education, Queensland, 1990a, p.1). Using the QSC as the focus for a case study, this evaluation study aims to provide knowledge in terms of program management and the implications which can be drawn from examining the impact of the project. A brochure, outlining information about
the QSC, indicated that the QSC Project would enable important knowledge relating to curriculum, in particular, to be gained for assisting schools in taking up the challenges being presented by the new and emerging technologies as we approach the year 2000.

"By the year 2000, today's children will be completing tertiary education and be part of a very different 21st century workforce. They will be entering an information age which will require them to analyse and interpret information, to present it to others in various forms, to form opinions and to make judgments and decisions based on information from a wide variety of sources. They will need to be prepared to work cooperatively and productively in flexible ways and be ready to accommodate change in all aspects of life...

...The QSC children are developing new approaches to learning. They are exploring the use of computers as personal tools to enhance thinking skills, to extend their capabilities in accessing and processing information, and to increase their productivity as learners.

What is learnt from the QSC experience will be applied to schools across Queensland." (Department of Education, Queensland, 1990a)

The research was guided from the outset by key evaluation questions. These were formulated through a process involving three stages. The following stages were implemented by the researcher in consultation with the key stakeholders using the guiding principles of the 4GE approach.

In Stage 1, the researcher formulated a set of questions relating to three major issues - namely, Situational Analysis of the Project, Project Management, and Impact of the Project. These emerged through synthesising issues arising from a literature review. A model was developed for guiding this evaluation through using the Augmented Stake-Batchler Model developed by Thorne (1990) and Owen's (1992) evaluation Forms to assist in its formulation (see Chapter Three, pp. 103-111). An integral feature of the model formulated is to allow for the examination of the suitability and effectiveness of the model for evaluation of the QSC Project. To enable the development of a model for evaluating the integration of learning technology in schools, further modification to the model developed to guide this study is suggested through an appraisal of the model itself (see Chapter Three, pp. 112-113). Through that appraisal, the evaluation model can be assessed as to its potential application for use in evaluating other innovative programs.

In the second stage, the tentative questions developed by the evaluator were presented to the QSC teachers at a workshop session (see Appendix A) designed to involve them in...
helping to identify the evaluation questions as well as providing them with an overview of the planned program evaluation. Furthermore, the workshop session enabled a test of the validity of the evaluation questions through checking with the participants. Also present was the Deputy Executive Director, South Coast Region, the Gold Coast North School Support Centre Coordinator, and an Educational Adviser (Learning Technology). Using Nominal Group Technique (Department of Education, Queensland, 1991) to take advantage of both individual creativity and group process (see Appendix B), the following questions were ranked by the group as being the questions considered by them as the five most important:

**Table 1.1: The Five Most Important Questions As Perceived By Participants**

1. What are the implications of new and emerging technologies for curriculum design?

2. How did the teachers come to grips with the new technologies?

3. In what ways have the students been advantaged and/or disadvantaged by being involved in the program?

4. At the end - Are the students different in any way? Have there been any changes in relationships - student/student? - student/teacher?

5. Gender differences; e.g. do girls react differently to technology compared with boys?

The questions were checked with those formulated by the researcher. After examining these, it appeared that there was considerable congruence between those tentatively posed by the researcher and those identified by the workshop participants. The third stage in the process meant that several questions were reframed and modifications were made so that they focused more directly on the questions raised by key participants. The major guiding evaluation questions which resulted from this process are presented in Table 1.2 on the following page.
Chapter One

Introduction

The Altair microcomputer, which appeared on the market in 1975, has become more sophisticated in terms of what it can do and has become more accessible to schools because of reductions in cost. This changed educational context has had significant implications for schools. For example, Anderson (1984, p. 1), in outlining the history of microcomputers, noted that the first computer using a chip was the Altair microcomputer which appeared on the market in 1975. Anderson went on to note...

1.3 Context of the Study

Issues and implications for schools relating to the impact of new technology, in particular the microcomputer, have emerged during the last twenty years. Since its inception in 1975, the microcomputer has become more sophisticated in terms of what it can do and has become more accessible to schools because of reductions in cost. This changed educational context has had significant implications for schools. For example, Anderson (1984, p. 1), in outlining the history of microcomputers, noted that the first computer using a chip was the Altair microcomputer which appeared on the market in 1975. Anderson went on to note...

Table 1.2: Evaluation Headings and the Evaluation Questions

<table>
<thead>
<tr>
<th>Program Evaluation of the Queensland Sunrise Centre: Situational Analysis</th>
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</thead>
<tbody>
<tr>
<td>Why was it initiated?</td>
</tr>
<tr>
<td>What is its setting and context?</td>
</tr>
<tr>
<td>Who participates in the program?</td>
</tr>
<tr>
<td>What is the program’s history? How long is it supposed to continue?</td>
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<table>
<thead>
<tr>
<th>Program Evaluation of the Queensland Sunrise Centre: Project Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was intended and what happened in terms of program management?</td>
</tr>
<tr>
<td>What are the implications for the management of further initiatives to integrate learning technology in schools in terms of personnel, resources, budgets, and training and professional development?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Program Evaluation of the Queensland Sunrise Centre: Impact of the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>What impact did the Queensland Sunrise Centre Project have upon the teaching and learning context in terms of classroom organisation and management?</td>
</tr>
<tr>
<td>What are the implications of the new and emerging technologies for curriculum design?</td>
</tr>
<tr>
<td>Have there been changes in student learning through the use of laptop computers and immersion in a technology-rich environment?</td>
</tr>
<tr>
<td>In what ways have the students been advantaged and/or disadvantaged by being involved in the program?</td>
</tr>
<tr>
<td>Were there any gender differences; e.g., do girls react differently to technology compared with boys?</td>
</tr>
<tr>
<td>How did teachers come to grips with the new technologies?</td>
</tr>
<tr>
<td>What are the implications for the training and professional development of teachers?</td>
</tr>
<tr>
<td>What were the concerns and perceptions of parents?</td>
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</table>

<table>
<thead>
<tr>
<th>Appraisal of the Model for Program Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the model used suitable for evaluation of the Queensland Sunrise Project?</td>
</tr>
<tr>
<td>How effective was the model for identifying the key components of the Queensland Sunrise Project?</td>
</tr>
<tr>
<td>What contribution does the program evaluation make for program improvement?</td>
</tr>
</tbody>
</table>
that in 1981 IBM had entered the personal computer market. According to Anderson (1984, p.1), this was mainly the result of the recognition of the impact which microcomputers were having on business, education, and home fields. The impact was such that Time magazine nominated the computer as major newsmaker for the preceding year - the first time that the award had been given to anything other than a human.

Toong and Gupta (1982, p.89) cited the following analogy to highlight attention to the remarkable developments with microcomputers:

"If the aircraft industry had evolved as spectacularly as the computer industry over the past 25 years, a Boeing 767 would cost $500 today, and it would circle the globe in 20 minutes on five gallons of fuel."

Since that time, changes have continued to occur and proponents for computer use in schools have been strong in their advocacy for the implementation of the technology. Vockell and Schwartz (1988, p. 106), for example, argue that:

"Computers are an important component of the instructional process. If possible, you should not teach without them. You should use them whenever they can enhance education."

For Vockell and Schwartz, computers are here to stay and their comments are indicative of the international scene in terms of the growing recognition of the impact of technology on schools. Vockell and Schwartz also note that while computers can solve many problems, they create others. They indicate that, while computers have become more affordable, they are expensive and might take scarce money away from other important projects. They ask the following questions - How many computers does a school need? If a school buys computers, how long will it be before they become obsolete? If it were possible to do so, would it be a good idea to provide a computer for each student in a school? In addition, Papert (1990), while on a visit to Australia as speaker at the World Conference on Computers in Education warned on talkback radio (2BL, 13.7.90) "that the computers are going into schools not as part of a concerted effort to rethink what education would be like in a society that is technology rich". Walker (1983) argues that schools are faced with major challenges in integrating computers into classrooms. According to Walker there are enormous practical, pedagogical, and technical problems which must be overcome before the educational potential of computers will be realised. He indicates that:
"Mistakes will be made. Failures will occur. Critics will have plenty to criticize. The pioneers will bear the burdens and endure the dangers of exploration, and all of those who come after will benefit from their experiences...

...The microcomputer and its relatives, the other information technologies, are the new tools that happen to have been invented in our time. Learning to use them wisely and well is one of the major challenges we face. We have the opportunity to explore a new and very powerful medium of education and expression. How can we let the chance slip away?"

Very little impact was evident in Australian classrooms throughout the late 1970’s and the early 1980’s. Caelli (1979), while indicating that there were implications for education, reported that no technological revolutions were happening in Australian classrooms. Sandery (1982,1) also reported that "the average Australian classroom is still largely untouched by the 'impact of the computer'". Anderson (1984, p.1) noted that the interest in the use of computers and information technology in schools accelerated in 1983-84. In 1983, the Commonwealth Schools Commission (1983a) strongly argued that computer education was vital to Australia’s future and major reports were published relating to computer education; e.g. Computers in Education (Shears and Dale, 1983), Computer Education (South Australia. Territory Education Authority, 1983), Teaching Learning and Computers (Commonwealth Schools Commission, 1983b). These and subsequent reports from various Government sources within Australia emphasised the need for schools and school systems to examine the implications of new technologies for education (House of Representatives Standing Committee on Employment, Education and Training, 1989).

This need has also been further accentuated by an emphasis being espoused that Australia should become 'the clever country'. According to the then Federal Minister for Education, Mr John Dawkins (1990, 22),

"The clever country will be one which works; one which thinks; and one which has the energy and commitment to overcome the unnecessary differences caused by the colonial mentality of a century past."

Dawkins argued further by issuing the warning cited by the US Secretary for Productivity, Technology and Innovation that "any (enterprise) that is not either developing new technology or adapting advanced technology to their present business, has made a decision to be out of business in five to ten years". In relation to education, Dawkins indicated that
he was saddened at State Governments' apparent inability to take sound strategic steps in this regard.

The reported growth in acquisition of microcomputers by schools in Queensland throughout the early 1980's is presented in these figures from the Commonwealth Schools Commission (1983b):

- February 1981: 160 schools - 310 computers
- February 1982: 228 schools - 643 computers
- February 1983: 420 schools - 1550 computers

Since those figures were released, there has been a continuation of that growth in acquisition and provision of computers in Queensland State Schools. The number of computers in Queensland schools obtained from the Department of Education's Reportable Equipment Register (28 March 1995) shows the enormous increases in the provision of computers in schools when compared with the Schools Commission's 1983 Figures; viz.

<table>
<thead>
<tr>
<th>March 1995</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschools</td>
<td>225</td>
</tr>
<tr>
<td>Schools of Distance Education</td>
<td>370</td>
</tr>
<tr>
<td>Special Education</td>
<td>637</td>
</tr>
<tr>
<td>Primary schools</td>
<td>12,724</td>
</tr>
<tr>
<td>Secondary Schools</td>
<td>14,535</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28,491</strong></td>
</tr>
</tbody>
</table>

That growth has largely come through government funding. For example, the Queensland Government funded the Learning Systems Project injecting $20 million over three years (1988/89 - 90/91) for the provision of appropriate technological resources in schools. The Learning Systems Project personnel made a decision that a high proportion of that $20 million "should be made available to schools for the acquisition of hardware, software, and services, and that most infrastructure and administration costs to support the project would come from other sources. Only $140,000 of the $20 million was spent on 'overheads' " (Queensland Treasury Department and Department of Education, 1991, p. 14). This represented a substantial injection of computers in schools.

The focus of this study, the QSC Project described later in this Chapter (see pp. 11-14), provided each of the 120 students involved in the project with his or her own laptop.
computer for use at both school and at home. To have asked teachers in Queensland schools in the early 1980’s if they could envisage a classroom of the future in which everyone of the students in their classroom would have a portable ‘notebook’ computer which they would be able to use on their desk, in groups on the carpet, in the library, and even take home for use would have produced responses bordering on the realms of science fiction. As well as using personal ‘notebook’ computers, the students had access to powerful desktop computers, CD-ROM units, scanners, computer-controlled construction materials, keylink, and a range of software programs.

1.4 Significance of the Study

The study is significant for two important reasons. Firstly, the development and use of 4GE principles at the school level is undertaken through creating and appraising a conceptual model for evaluating learning technology initiatives in schools. Thus, the research provides a response to the demand by Worthen and Sanders (1988), and Fishman (1992) for the development of case studies using 4GE methodologies. In so doing, the research enables a review of the advantages and limitations of the 4GE approach for school level evaluation. Secondly, as the QSC was initiated as a site for a major innovative investigation to explore practical ways in which to enhance and extend learning for young Queenslanders through the use of emerging information and communication technologies, the thesis provides a substantial contribution to knowledge about implementing learning technology initiatives which can be used in other schools.

Whilst major curriculum initiatives have been undertaken in Queensland in recent years, what has been missing from those initiatives has been any thorough evaluation of them. For example, in a recent review of the Learning Systems Project in Queensland (Queensland Treasury Department and Department of Education, 1991), the Officers of Research Services reported that there were two components of their role in the Learning Systems Project - firstly, the acquisition of information relating to program implementation, the support provided to schools and teachers, and whether the program goals were being achieved, and, secondly, they were required to generate research rather than evaluation information. As Patton (1986) indicates:
"The difference between research and evaluation... is the difference between conclusionoriented and decision-oriented inquiry. Research is aimed at truth. Evaluation is aimed at action."

According to that report, enquiries of the project leaders revealed that project decision-making was not assisted. This research, therefore, gains significance as the purpose of the study is to focus on the QSC Project using contemporary program evaluation techniques in order to provide information, implications, and recommendations for the integration of learning technology in schools across the state which will be useful for a variety of audiences such as teachers and administrators at the school, region, and system levels.

This study provides program evaluation used "in the sense of appraising the worth or value of something, so that areas for improvement may be identified and actions undertaken to bring this about" (Hughes, Russell, McConachy, 1981, p. 9). The Learning Systems Project Report (Queensland Treasury Department and Department of Education, 1991, vii) suggested that there should be a State Government vision for information technology in education and proposed that a new learning technology program for Queensland schools focus on upper primary school (Years 6-7) and early/mid secondary school (Years 8-10). The report indicated that this program should also support current Government and Department of Education initiatives in the areas of literacy, numeracy, and languages. The projected total expenditure required to satisfy those recommendations was $50 million over five years. That report recommended a level of access for students requiring the provision of one computer system for every three students. The resulting program initiated in 1993 was the Primary Computer Program which aimed to provide Year 6 and Year 7 students throughout Queensland with a ratio of one computer to every ten students. That would provide students with access to learning technology resources similar to those experienced within the QSC. This thesis, therefore, provides insights and implications for schools, regions, and systemically in formulating policies and strategies for implementing that program.

An evaluation of a major 'lighthouse' initiative such as the QSC Project provides a unique opportunity to gain essential knowledge for assisting future policy formulation and
implementation strategies to assist in the realisation of the goal that "Information technology for learning is integrated into educational programs" as stated in the Department of Education's Development Plan (1992-96) (Department of Education, Queensland, 1992). Currently, the Department of Education in Queensland has not developed comprehensive evaluative frameworks for facilitating informed decision making about integrating learning technology in schools.

In the Status Report and Recommendations: Documentation and Implementation of the P-10 Curriculum (Studies Directorate, Department of Education, Queensland, 1991, 14), were recommendations for action to be considered by the Department of Education. One of those recommendations reported was to "investigate and document strategies which school communities could use to effect change...such as...utilisation of technology with an interactive component." The report recommended that strategies be developed "for leading, managing and sustaining curriculum change for use in schools by administrators". This study provides very useful information and implications related to those recommendations.

1.5 The Queensland Sunrise Centre

This section provides background information regarding the establishment of, and the broad purposes of the QSC Project.

1.5.1 Background to the Establishment of the Queensland Sunrise Centre

By examining the background leading to the establishment of the QSC Project outlined elsewhere (Vogler, 1989; Nevile, 1990a; Grimmett, 1991; McGaw, 1991) a deeper understanding can be gained about the nature of and the reasons for initiating the QSC. McGaw (1991, pp.(iii) - (vi)), in the foreword to The Queensland Sunrise Centre A REPORT OF THE FIRST YEAR (Ryan, 1991), indicates that from July 1987, the Australian Council for Educational Research (ACER) adopted Education and Technology as one of its research
and development themes for the three-year period to June 1991. ACER had appointed Ms Liddy Nevile in May, 1987 to establish and develop the work of that theme. The notion of a Sunrise Project emerged from discussions among computer using groups in the early 1980s. Nevile (1990a, pp. 2-5) in the Sunrise Notes, traces its evolution through a range of papers and reports which were presented as the Project developed. This provides a valuable insight into the early thoughts which shaped the Sunrise concept. Essentially, that concept began from concerns that:

"There is not an educational institution in Victoria, probably Australia, which considers the use of technology from the students' point of view, and is able to provide this information to those who are responsible for curriculum planning, teacher-training, or equipping schools... Unless the missing information is gathered and made available to those who need it, the momentum of the commercial infiltration of computer technology into schools will continue to shape the use of technology at the expense of education and the community." (Nevile, 1990a, p.2)

In collaboration with the Museum of Victoria, Nevile undertook the establishment of the School of the Future. McGaw (1991, p. (iii)), observes that during the planning stages, the name of the proposed centre was changed from School of the Future to Sunrise School and was launched at the beginning of 1988, physically located within the Museum of Victoria. The key participants were the students from a Year 8 class and three teachers from Princes Hill Secondary College in Melbourne. They worked two half days per week at the museum throughout the school year. The Princes Hill program went for two years until the end of 1989. McGaw (1991, p.(iii)) reports that at the official launch of the Sunrise School, the Principal of Methodist Ladies College (MLC) in Melbourne, Mr David Loader, became enthusiastic about the possibility of establishing a similar initiative within his school. Loader (1990, p. 23) recalls that his interest was aroused when he received an invitation to the launch. In the accompanying information to the invitation he discovered the reason why the 'School of the Future' was located in the Museum of Victoria.

"Students and teachers in conventional schools are subject to the culture of their schools and generally this does not support autonomous learning by the students or teaching by the teachers. For this reason, a school was not considered to be a suitable site for this project." (Nevile, 1988, p. 2)

Loader refers to this as 'the audacity of the challenge to schools'. In particular, Loader (1990, p. 23) suggests that after attending the opening function, listening to the speeches, and
meeting and talking with the people involved that
"it was clear that the challenge to existing schools was not just in the re-establishment of autonomous learning by students but in a challenge to what is the nature of the curriculum, the relationship between teacher and student and even a new role for parents."

Consequently, following negotiations between staff at ACER and at MLC, plans were developed for a Sunrise Centre to commence at MLC with a Year 7 class in 1989. Subsequent to this, the program was expanded considerably in 1990 and 1991 (McGaw, 1991, p. (iii)).

1.5.2 The Establishment of the Queensland Sunrise Centre

McGaw (1991, p. (iii)) indicates that throughout 1988 and 1989, participants from throughout Australia were invited to and attended seminars and discussions organised by ACER. The idea was generated for establishing a centre in Queensland. The development of the QSC Project was a collaborative effort between the Department of Education, Queensland, ACER and the Faculty of Education at the University of Queensland.

"Following a meeting between principals representing the project partners, the Director-General of Education approved in principle the establishment of the project. A management structure for the implementation of the project was also approved at that time." (Vogler, 1989, p.2)

The criteria for the selection of an appropriate primary school and secondary school, teachers and student groups accommodated the following issues:

* Possible secondary school/primary school pairs will be nominated from which the final selection will be made. It will be easier if these are all within one region as this will reduce the need for additional briefings and endorsement procedures.

* The primary-secondary school pair will be chosen such that most students (80%) exiting the primary school at the end of Year 7 will enrol in Year 8 at the high school, thereby enabling the group to be held together. This will assist in preserving the class culture and style of operation.

* The secondary school will need to be prepared to make special arrangements for the QSC timetable in Year 8. At present, the view is that two general 'home' teachers may be required along with other specialist teachers brought in to the class (from within the school and/or from outside as required).

* Personal and professional attributes of the teachers concerned; for example teachers who are prepared to examine and modify their practices, where necessary - disposition, background, training, familiarity with use of information technology, creativity, ability to cope with change, ability to
implement innovative learning systems.

Close proximity to Brisbane - easy access to Head Office and regional support and co-ordinating agencies; access to Sunrise Central Group (SCG) staff, interstate and overseas consultants; and easy access to University of Queensland and Brisbane College of Advanced Education researchers.” (Vogler, 1989, p.7)

The result of the selection process was that Coombabah State School and Coombabah State High School in the South Coast Region of the Department of Education, Queensland (Appendix C) became the locations for the QSC.

The project, which began in 1990 with 60 Year 6 children at Coombabah State School, was planned to operate over four years from 1990-93. The first group of students would complete Year 6 and Year 7 at Coombabah State School and then proceed to Year 8 at Coombabah State High School. A second group of 60 Year 6 students at Coombabah State School joined the project in 1991. After completing Year 7 at Coombabah State School in 1992, they would also move on to Year 8 at Coombabah State High School in 1993 which would be the final year of the project. In order to preserve the class culture and style of operation, the transition of students from the primary to the secondary school was designed so that the groups could remain together as much as possible (Vogler, 1989; Grimmett, 1991).

1.5.3 The Broad Purposes for the Establishment of the Queensland Sunrise Centre

According to Vogler (1989, p.2), the broad purposes for the establishment of the QSC were:

“star bullet to investigate ways in which new information and communication technologies can be used to enhance and extend the learning of young Australians; and

star bullet to enable active participation within an educational technology research community in Australia which is evaluating critically the practices developing around new technologies, investigating innovative learning environments and charting a path for future use.”

The preceding discussion of the background leading to the establishment and the broad Purposes of the QSC provides an essential context for understanding the importance of the QSC Project.
1.6 Clarification of Terms Used in This Thesis

This section clarifies terms used in this thesis as there has been a proliferation of terms used in relation to the new and emerging technologies. New product releases and upgrades occur almost daily and potential clients are now immersed in a highly complex and competitive environment filled with 'technospeak'. For example, in an edition of *Australian Personal Computer* (January, 1992, pp. 57-62), the Toshiba T4400SX was featured under the title "Toshiba's lean and mean 80486SX notebook". The lead paragraph indicated that:

"Never before has so much been crammed into so little space for so few dollars. Launching the T4400SX at the end of the year, Toshiba has made a last-minute dash to claim the 1991 mips-per-kilogram crown by cramming a 486SX CPU into a full function notebook PC. Ian Robinson benchtests the mighty beast."

In 'benchtesting the mighty beast', the review was saturated with technical jargon. For example:

"The combination of a fast hard disk and the 25 MHz 486SX CPU make the system impressively fast, and provide an ideal environment for Microsoft Windows (or OS/2 2.0 for that matter), assuming a PS/2 - style mouse is connected. It is also preferable to run packages such as Windows applications on an external VGA monitor wherever possible, although the standard LCD or gas plasma screens will suffice when necessary." (Robinson, 1992, p. 58)

If the reader required more information, the technical specifications provided information about the computer type, processor, clock speed, RAM, memory slots, disk drives, display type, screen size, DOS Version, keyboard, keypad, interfaces, expansion, power, battery life, case, system board, dimensions, and options.

To clarify all of the terms which emerge throughout any examination of the new and emerging technologies is neither possible nor desirable. The purpose here is to clarify the meanings assigned to the commonly used terms in this thesis. Initially, reference is made to the Policy Statement, *Computers in the Curriculum* (Department of Education, Queensland, 1983) to provide an understanding of the 'official' meanings assigned to computer awareness, basic computer skills, and computer-assisted learning. A framework is then presented for considering the role of the computer as tutor, tutee, or tool. Following this, clarification is made of the terms, computer literacy and the computer literate teacher,
information technology, and learning technology as they are used in this thesis. Terms such as curriculum, syllabus, curriculum design, curriculum development, curriculum implementation, and innovation are defined to provide a basis for analysis in relation to examining the curriculum implications of integrating learning technology in schools.

Throughout this thesis, further clarification of terms will be dealt with as they emerge. Terms referring to initiatives such as Electronic Learning Centres (ELC's), Practical Computer Methods (PCM), and Information Processing and Technology (IPT) Programs are described in some detail in Chapter Two since they require definition within the context of initiatives undertaken to integrate learning technology in Queensland State Schools. A summary of abbreviations is also included at the beginning of this thesis. Evaluation and program evaluation, which are important concepts in this study, are defined in Chapter Three.

1.6.1 The Queensland Setting - Computer Awareness, the Development of Basic Computing Skills, and Computer-Assisted Learning

The Department of Education, Queensland in the policy statement Computers in the Curriculum (1983, p. 3) stated that it "will ensure that its schools and colleges of TAFE take account of and use computers and computer-related technologies, as appropriate, in achieving the recognised aims of their educational programs". According to the policy statement, this will be realised through four major kinds of planned development:

"(a) the preparation and authorisation of educational programs designed to promote computer awareness and the development of competence in the basic computer skills required to function in today's society;
(b) the review of existing educational programs to determine the extent to which computer-assisted learning might be incorporated;
(c) the revision of certain educational programs to take into account the effects that computers and computer-related technologies may have on the scope and sequence of such programs; and
(d) the provision of educational programs of a vocational nature across the range of levels for which the Department has responsibility." (Department of Education, Queensland, 1983, p. 3)
The terms, computer awareness and basic computer skills, are used in this thesis in the same manner as that stated in the policy statement as they refer respectively to the acquisition of knowledge and understanding of the social and technical aspects of computers and computer-related technologies, and to the acquisition of skills and abilities with computers and computer-related technologies. Educational programs to achieve computer awareness and the development of basic computer skills can be designed to integrate within existing curriculum areas or offered as separate programs.

1.6.2 The Computer as Tutor, Tutee, or Tool

Taylor (1980) presented a useful framework for classifying software in which the software can enable the computer to be used as a tutor, tutee, or a tool. With software which emphasises the learner as a recipient of knowledge and skills through drill and practice situations, the computer becomes a teaching machine or 'tutor'. Software of this kind is often referred to as computer-assisted instruction (CAI). Software which enables the learner to use the computer as a 'tool' allows the learner to use the computer as a medium for self-expression or as a means for processing and organising information. In computer-assisted learning (CAL), the user becomes the tutor. CAL refers to situations in which the computer is used as an aid to learning as the learner is required to exercise a degree of control over the learning. This raises the idea of the computer as a 'tutee'. In the computer as tutee mode, according to Anderson (1984, p. 70), users teach the computer, in contrast to the user being taught by the computer or using the computer as a tool. Papert (1980a) and Luerhmann (1980) have been more interested in the computer as tutee than in the computer as either tutor or tool.

"In many schools today, the phrase 'computer-aided instruction' means making the computer teach the child. One might say the computer is being used to program the child. In my vision, the child programs the computer and, in doing so, both acquires a sense of mastery over a piece of the most modern and powerful technology and establishes an intimate contact with some of the deepest ideas from science, from mathematics, and from the art of intellectual model building." (Papert, 1980a, p.5)

Logo, for example, uses a turtle which students can not only draw pictures with instead of a pen ('turtle graphics'), but they can use this microworld to solve problems. According to
Anderson (1984, p. 42), the real power of Logo is that the turtle can be taught new commands from a few primitives. In describing the advantages of Logo, Anderson (1984, p. 45) indicates that if the child enters, for example, "rectangle", the message is "I don't know how to rectangle". This carries with it the implication, according to Anderson, that the message is not that "You have made a mistake" but rather the notion that "(the computer) lack the knowledge". That is, the child is in control of the computer whilst with many other programming languages (e.g. BASIC) the computer directs the learner. For Papert, "The best learning takes place when the learner takes charge" (Papert, 1980a, p. 214).

1.6.3 Computer Literacy and the Computer Literate Teacher

Rowe (1992) noted that the term computer literacy shares the same semantic ambiguity as language literacy. She indicates that widely accepted definitions can be classified into comprehensive and narrow definitions. According to Rowe, comprehensive definitions describe literacy in terms of the knowledge and skills which ordinary, educated people need to have in a particular domain in order to function effectively at work and in their private lives in their culture or society for the remainder of the century. She cites the following as examples of the comprehensive type:

"Whatever a person needs to be able to do with computers and know about computers in order to function in an information-based society." (Hunter, 1983, p. 9)

"That compendium of knowledge and skills which ordinary people need to have about computers in order to function effectively at work and in their private lives." (Haigh, 1985, p. 161)

These definitions go beyond the narrow definitions which relate to a body of basically technical information and include knowledge of how computers work, how they are used, and their impact on society. This study refers to computer literacy within a comprehensive orientation.

In relation to teachers, this thesis adopts the definition of the 'computer literate teacher' provided in the document *Computer Literacy for Teachers in Queensland Schools - competencies, strategies and resources* (Department of Education, 1988, p. 10) which states that the
"computer literate teacher is aware of a range of educational computer applications, has a positive attitude to the use of computers, and is able to undertake computer-related teaching/learning activities with students to achieve educational objectives". This is by no means a narrow definition of computer literacy as it is made very clear that "technical competencies alone are not sufficient for teachers to be considered computer literate" (Department of Education, Queensland, 1988, p. 10). The document goes further and outlines essential, extension, and specialist competencies in computer literacy as shown in Table 1.3 below. For the computer literate teacher, there is the important implication that a knowledge base is acquired which includes curriculum knowledge, teaching competencies, and specific competencies for skills with hardware and software operation.

Table 1.3: Characteristics of the Areas for the Computer Literate Teacher

<table>
<thead>
<tr>
<th>Area</th>
<th>Teaching Competencies</th>
<th>Specific Competencies</th>
<th>Knowledge Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>essential</td>
<td>replication of demonstrated computer-based lessons</td>
<td>using software without detailed knowledge of its operation</td>
<td>curriculum area</td>
</tr>
<tr>
<td>extension</td>
<td>modify a lesson prepared by another teacher or design a lesson</td>
<td>applying software with detailed knowledge of its operation to achieve educational objectives</td>
<td>curriculum area</td>
</tr>
<tr>
<td>specialist</td>
<td>develop teaching units or CCPs that incorporate specialist computer applications</td>
<td>advanced knowledge of hardware and software</td>
<td>curriculum area knowledge and computer knowledge</td>
</tr>
</tbody>
</table>

1.6.4 Information Technology and Learning Technology

The term technology itself requires some clarification before proceeding to make the distinction between information technology and learning technology. According to Anderson (1990, p. 186), technologies are ways or methods of doing things. That is,
"Technologies are the tools, machines, materials and techniques designed, generally, to reduce labour, to increase production, or otherwise improve the value of our lives" (Anderson, 1990, p.186). Anderson warns that new technologies are often wrongly identified with information technologies based on microelectronics. He presents a simple portrayal of new technologies through the ages.

"Two million years ago, long before the Alphabet, when Man grunted and Woman grunted back, was the time of crude bone, pebble and stone tools. Then came the first of the earth shattering breakthroughs in communication - the development of language. Humans became talking animals and stone and clay were the common tools. The second revolutionary milestone in human communication was the development of writing which occurred about 5000 years ago. With the invention of the alphabet, humans began talking and writing animals. Papyrus was the new medium of communication. The third evolutionary milestone was the invention of the printing press (c.1440). The printed word in the form of pamphlets and books spread to the masses: the human species had now become a reading animal as well. Paper and books were to become more common. The fourth, most far-reaching milestone of all, was the development of telecommunications which might be dated from 1837 when Morse sent the first message by wire. Since that time, people have been bombarded with more and more information - we have become multisensory beings. The new communication tools were wire, the air waves, tape and disc. We have become a multiliterate society." (Anderson, 1990, pp. 186-7)

The OECD (1986) defines information technology now as "techniques, particularly new ones, for communicating, storing, acquiring, modifying, manipulating and generating information of all kinds". This technology commonly refers to such things as computers, word processing systems, and communications networks. Information technology in this thesis refers to the definition provided by the OECD. Some writers also use the term communication technologies. In terms of the OECD definition, communication technologies are viewed in this thesis as a component of information technology. Also, the distinction is made between learning technology and information technology. Learning technology, in this thesis, refers to information technology that can be utilised in the teaching and learning context of schools.

1.6.5 Curriculum and Syllabus

Jenkins and Shipman (1976, p. 4) suggest that it is important to understand the relationship between the intended curriculum and the implemented curriculum. Similarly, Stenhouse
(1975, p. 1) indicates that:

"We appear to be confronted by two different views of the curriculum. On the one hand the curriculum is seen as an intention, plan or prescription...On the other it is seen as the existing state of affairs in schools...And since neither intentions nor happenings can be discussed until they are described...curriculum studies rests on how we talk about these two ideas..."

Thus, curriculum can be equated with either a written prescription of what is intended should happen in schools or less with intention but more with what actually happens in real situations. In essence, we have two distinctly different views. In the first, a curriculum is seen as an intention, plan or prescription, an idea about what one would like to happen in schools and secondly, a curriculum is seen as an existing state of affairs in schools, what in fact does happen (Stenhouse, 1975, p. 2). The definition adopted here sees curriculum existing across time, beginning as a statement of intent, being put into practice and giving rise to learning experiences for pupils. This is the notion of curriculum presented also by Jenkins and Shipman (1976) and is used for the purposes of this thesis:

"...a curriculum is the formulation and implementation of an educational proposal, to be taught and learned within a school or other institution and for which that institution accepts responsibility at three levels, its rationale, its actual implementation, and its effects." (Jenkins and Shipman, 1976, 6)

The term syllabus does not have as broad a meaning as curriculum. A syllabus describes a statement of the planned formal studies to be undertaken in a particular subject. For example, the formal curriculum for Queensland state primary schools includes the subject areas of English Language Arts, Mathematics, Social Studies, Science, Art, Music, and Health and Physical Education. Syllabuses have been prepared for each of these subject areas, though some of these are called 'curriculum guides' or 'program' rather than syllabus.

1.6.6 Curriculum Design and Curriculum Development

Saylor, Alexander and Lewis (1981, p. 199) indicate that "by design is meant a particular shape, framework, or pattern of learning opportunities". Thus, for any particular population, the scope and types of learning opportunities identify a curriculum design. This conception of curriculum design is adopted here. Moreover, in this study, curriculum
development refers to a process and encompasses the tasks of constructing and implementing curricula.

1.6.7 Curriculum Implementation, Adoption and Innovation

Curriculum implementation refers to putting into effect the curriculum. This is not synonymous with adoption. Adoption refers to the decision taken related to the choice among program alternatives. That decision, in itself, provides little evidence about the program's subsequent implementation. Fullan and Pomfret (1977, p. 336) define implementation as "the actual use of an innovation or what an innovation consists of in practice".

Innovation is used in this study to refer to a new structure, process, or program. As such, it is more specific than change as innovation is used in the context of specific, identifiable products or processes. The definition provided by Owens and Steinhoff (1976, p. 22) that innovation "is a form of change that represents some new relationship between ideas or concepts, the outcome of which may be predictable but contains some element of the unknown and is not generally regarded as standard practice" suggests that the innovation might contain some 'element of the unknown'. In the context of this thesis, the QSC Project is viewed in this way as an innovative investigation which explores teachers and students working in technologically-rich classroom environments.

1.7 Organisation of the Thesis

For the purposes of clarity, ease of access to information, and to be consonant with the evaluation model, this thesis is organised in seven chapters.

Chapter One provides an introduction to the thesis. The purpose of the study is outlined, and the evaluation questions to guide the program evaluation are identified. The context of the study is described, and the significance of the study is established. In addition, a summary of the background to the establishment of the QSC is provided. Terms used in
the report are clarified, and the assumptions and limitations of the study are examined.

Chapter Two and Chapter Three present a review of the literature and related theoretical issues. Chapter Two, through a review of the literature, provides an account of initiatives aimed at introducing technology in schools. Following a presentation of emerging issues internationally, an overview of developments in the Australian scene is summarised. A description of some of the major initiatives which have been undertaken to integrate learning technology in Queensland State Schools is then provided. Chapter Two also provides summaries of previous research of the QSC undertaken in 1990 and 1991. That chapter concludes with a synthesis of the literature review and the evaluation questions. Chapter Three provides a theoretical background in evaluation. Educational evaluation is defined, and various evaluation models are examined. A justification for the development of a new evaluation model based on the Augmented Stake-Batchler Model is provided before the selection and formulation of a model for guiding the program evaluation is undertaken.

In Chapter Four, the research design of the study is described. That chapter outlines the research design for this study by describing the study sample, the research methodology and the program evaluation data collection procedures employed. The data collection instruments used in the study are described and the strategies employed for ensuring internal validity, reliability, and external validity are outlined. The treatment of the data is discussed including the strengths and weaknesses of the methodology.

The findings of the program evaluation are presented in Chapters Five and Six. In those chapters, the evaluation questions presented in Table 1.2 are addressed. Chapter Five reports findings related to the Situational Analysis and Project Management. The following questions are examined - Why was it initiated? What is its setting and context? Who participates in the program? What is the program's history? How long is it supposed to continue? What was intended and what happened in terms of program management? What are the implications for the management of further initiatives to integrate learning
technology in schools in terms of personnel, resources, budgets, and training and professional development? Chapter Six reports findings about the Impact of the Project. Findings about the teaching and learning context in terms of classroom organisation and management are reported and examined. Findings are also reported which address the following questions - What are the implications of new and emerging technologies for curriculum design? Have there been changes in student learning through the use of laptop computers and immersion in a technology-rich environment? In what ways have the students been advantaged and/or disadvantaged by being involved in the program? Were there any gender differences? How did teachers come to grips with the new technologies? What are the implications for the training and professional development of teachers? What were the concerns and perceptions of parents?

Chapter Seven provides the concluding chapter to the report in which a summary of the study is presented. The results of a meta-evaluation are summarised. Recommendations based on the findings of the study together with a review of the evaluation is presented. Also, suggestions are made for further research.

1.8 Assumptions and Limitations of the Study

This thesis assumes that there are important implications for schools which the new and emerging technologies present. The study assumes that information in our society is becoming increasingly accessible through advances in technology and that this process will at least steadily continue and possibly accelerate. The critical assumption made throughout this thesis is that schools should be investigating ways of providing teachers and students with opportunities to acquire knowledge, skills, attitudes, and strategies to operate with new and emerging technologies and of investigating ways in which teachers and students can integrate the use of learning technology to enhance the teaching and learning context. The educational assumption emerges here that technology can provide schools with the opportunity to re-examine some essential questions; e.g. How do students learn with technology? What implications does the injection of technology have for
student-teacher and student-student relationships?

The assumption is held that the QSC represents a unique situation due to the innovative technologically-rich environments provided for the teachers and the students involved in the project. There is no other Government primary school situation in Queensland in which almost 120 students have been given the use of their own laptop computer which they can use at school and at home. Indeed, whilst other schools will undertake initiatives and increase their learning technology resource base, it is doubtful that a project of similar intensity as that of the QSC will be undertaken in the near future. Thus, whilst it could be argued that the study has limitations in that it focuses on only 120 students in two schools, this study presents insights, findings, and implications which might be useful for others planning and implementing initiatives aimed at integrating learning technology in schools.

As outlined later in Chapter Four, this program evaluation of the QSC Project utilises a naturalistic and participant-oriented approach utilising 4GE principles. In undertaking this approach, quantitative and qualitative methods are regarded as complementary in addressing the evaluation questions guiding the program evaluation. Worthen and Sanders (1988, pp. 152-155) suggest that the limitations of this approach are that it can be non-directive, the evaluator can be attracted by the bizarre or atypical, it can have potentially high labor intensity and cost, be hypothesis generating, and there is the potential for the failure of the study to reach closure. The researcher in his role as evaluator was very aware of these limitations. Some of them were dealt with directly. The awarding of a scholarship by the Department of Education, Queensland from 27 April 1992 until 4 December 1992 enabled the researcher to undertake an intensive program evaluation of the QSC. One of the conditions of the scholarship was the presentation of a report at the end of the period of the scholarship. This thesis extends and reflects upon that evaluation.

1.9 Conclusion

This chapter has provided an introduction to this thesis which undertakes a program evaluation of the QSC Project which was established by the Department of Education in Chapter One.

Introduction
Queensland as a major innovative initiative to investigate the uses of the new and emerging technologies for education. The purpose of the study was presented and the evaluation questions developed for guiding the investigation were identified. The organisation of this thesis was outlined. Subsequently, the context of the study was described and the significance of the study was established. Background to and the broad purposes for the establishment of the QSC were then examined. Terms used in this thesis were clarified and the assumptions and limitations of the thesis were addressed.

The following two chapters together provide a review of the literature and related theoretical issues. Chapter Two presents a review of the literature relating to technology and education and Chapter Three presents the theoretical background to evaluation.
Chapter Two presents a review of the literature for the purposes of establishing frameworks for examining technology and education, for outlining developments that have occurred internationally, nationally, and within Queensland, and for identifying important issues related to technology and education. Following an introductory review of technology and education, frameworks for examining the impact of the new and emerging technologies on schools are presented and reviewed. The views of Papert are outlined and discussed through distinguishing between technocentrism, scientism, educology, and constructionism. A brief summary of research relating to the use of Logo and the need to investigate and illuminate the 'areas of silence', which are claimed to exist in discussions about educational computing in schools, follows.

This chapter describes key trends and issues emerging nationally and internationally, provides a summary of developments in the Australian context with particular reference to computer applications in Australian schools, national reports, and the development of policies throughout the Australian States. A description and analysis of the major initiatives which have been undertaken to integrate learning technology in Queensland State Schools is then presented. Following that description and analysis, a summary is presented of the previous research of the QSC which was undertaken by ACER in 1990 (Ryan, 1991) and 1991 (Rowe, 1992; 1993). Finally, important issues which emerge from the literature are synthesised with the evaluation questions guiding this program evaluation which were described in Chapter One.

To enhance and better facilitate the understanding of the organisation of this review of the literature, an overview was constructed to present a conceptual plan of the chapter. Table 2.1 provides a conceptualisation of that overview to enable the reader to clearly establish the context in which the summary presented of the previous QSC research (Ryan, 1991; Rowe, 1992; 1993) is located.
Table 2.1: Overview of the Review of the Literature

Technology and Education

Frameworks for Examining the Impact of Technology
The 'technochoice' perspective (Sachs, Russell, and Chataway, 1990)
Technocentrism, Scientism, Educology, and Constructionism
Logo in Classrooms

Investigating and Illuminating the 'Areas of Silence'

The International Scene

The Australian Scene
Teaching, Learning, and Computers
Computer Applications in Australian Schools
Recent National Reports
Policies in the Australian States
New South Wales Victoria South Australia
Western Australia Tasmania
Other State and National Initiatives
Summary

Integrating Learning Technology in Queensland State Schools
Some Early Developments
The Learning Systems Project
Other Recent Initiatives

The Queensland Sunrise Centre
- Research Findings
(Ryan, 1991; Rowe, 1992; 1993)

Synthesis of the Literature Review and the Evaluation Questions
Although much has been written about the educational potential of the new technologies, this has only emerged in relatively recent years. For example, the first computers only started appearing in Australian schools in the 1970's. The pace of technological change since the 1970's has been great. There has been the proliferation of new gadgetry, products, devices, and information. Moreover, Schwartz (1992, p. 80) suggests that:

"A new wave of technology is coming as the fields of computers, consumer electronics and telecommunications blend together. The result: an explosion of new supergadgets and services that could change all our lives."

Two trends driving this revolution are that powerful computers are shrinking to palm size and that information is going digital. Schwartz indicates that some of the devices which Apple and other electronic companies have in store for customers are the electronic secretary, machines that read handwriting, the pocket communicator, and cut and paste movies. Anderson (1992, pp. 91), in examining the history of books, points out that the new papyrus is not paper but plastic in the form of plastic CD-ROM discs coated with aluminium. They can store sound, text, still and animated graphics, and other data. Anderson also indicates that:

"The newest form of encyclopaedia comes not in 21 hardback volumes but on a single 12cm disc, a round piece of plastic smaller than a paperback page and not much thicker than its cover. It also incorporates sounds. So you want to hear the full-throated roar of a tiger, the call of a sandpiper, or perhaps the sound of a balalaika? With this encyclopaedia you can read about musical instruments like the balalaika and see it while you listen to it. You can even hear speeches such as Martin Luther King's 'I have a dream...' or John F. Kennedy's 'Ask not what your country can do for you. Ask what you can do for your country...""

Complementing that proliferation of technology has been the proliferation of information. For example, Forester (1992, p.9) notes that 14 000 book publishers in the United States release 50 000 new titles every year, at least 40 000 scientific journals publishing more than a million new papers every year - about 3 000 a day - and scientific literature is doubling every ten to fifteen years. Forester suggests that what we now have is 'infoglut' - so much new information that we are overwhelmed by it all and we can't distinguish between what is useful and what isn't. Also, says Forester, we have 'technobabble' - language invented..."
by computer people who can't explain in plain English what they or their systems do.

Even the current technological, social, and economic context, issues relating to the response and impact upon education should be addressed. Frameworks for examining these issues are presented in the following section. Moreover, Papert's (1980; 1987; 1990) reference to technocentrism, scientism, educology, and constructionism is then discussed to provide a theoretical background within which developments internationally, and in Australia can be described and analysed.

2.2 Frameworks for Examining the Impact of Technology

Cerych (1985) suggests that it is possible to distinguish three factors as key agencies in the education and information technology 'interface'. The three factors Cerych (1985, p. 225) identifies are pedagogical, sociological and economic. Firstly, according to Cerych, information technology has entered education as a new pedagogic tool and it has subsequently been pushed as a learning tool as it can involve active and enjoyable participation in learning. Secondly, the introduction of information technology into education has been often accompanied by sociological pressure from various groups; e.g. parents, Governments, and local authorities. Thirdly, there has been economic pressure for introducing information technology into education. Wellington (1990, p. 61) notes that this pressure has come from statements on the 'needs of industry', skill shortages, and on the growing demand for information technology skills.

Sendov (1986), provides a framework in which he identifies three 'waves' in the development of information technology in education. In the first wave, Sendov refers to computers being introduced into schools as a new educational facility in a similar manner as the overhead projector, the tape recorder, or the film projector (Sendov, 1986). In this way, the computer emerged as an object of study in its own right. In the second wave, the value of the computer and more generally information technology began being recognised and developed as an educational resource in which its use became spread across and into existing
In this wave, more teachers begin seeing it as a valuable resource with potential for use in their subject areas. The third wave, which Wellington (1990, p. 61) suggests is still largely hypothetical, will occur when the new technologies influence the content and aims of education itself, as well as the method and the system of teaching. Sendov (1986) suggests that this might occur with the 'mass presence of the computer in the social environment'.

Sendov's three waves reflect a perspective in which technology ultimately impacts upon the aims, content, and pedagogy of education. Cerych, similarly, in outlining the pedagogic, sociological, and economic factors, presents a perspective in which education inevitably responds to those factors. Papert (1980; 1987; 1990) provides an alternative framework, which is discussed in the following section, for examining the potential for education through his concept of educology which challenges the technocentric view that technological change will determine how we think. The approach adopted in this study is at suggested by Sachs, Russell, and Chataway (1990). They propose a 'technochoice' approach, which

"...accommodates the process of evolution and continual selection from a spectrum of technological alternatives; the selecting creates tension and leads to opportunities for exploring and experimenting with alternative institutional and organising forms and actions." (Sachs, Russell, and Chataway, 1990, p. 53)

The 'technochoice' perspective rejects the determinism and linear process of the perspective which suggests that society must adapt, and it rejects the perspective that technology is dependent on society. Papert (1987) provides an additional framework for thinking about technology and education by formulating and defining the terms - technocentrism, scientism, educology, and constructionism. These are elaborated upon in the following discussion as Papert's ideas and work were influential in the development of the QSC philosophy.

Review of the Literature
2.3 Technocentrism, Scientism, Educology, and Constructionism

Technocentrism, says Papert (1987, p. 3) is "the fallacy of referring all questions to the technology". An example of this, according to Papert, has been the way in which the term computer-aided instruction has so easily been accepted in schools. He argues that is illustrative of the emphasis in the minds of specialists in computers in education on the computer as an instructional device. Papert suggests that while questions such as "Will technology have this or that effect?", and "Will using computers to teach mathematics increase children's skill at arithmetic?" and similar questions are interesting, they are not fundamental ones. Those kinds of questions reflect technocentric thinking.

Scientism is "the attitude that sees all questions as scientific ones: resolvable by scientific studies. This point of view evaluates educational methods by measuring their effect on test scores" Papert (1987, p. 5). Again, Papert indicates that these kinds of studies do help answer certain kinds of questions if you are thinking about a small change in which you can do a little experiment. However, Papert argues that we cannot produce measurements through scientific experiments to "decide whether you would like empowered citizens or instructed, disciplined automata. This is not a matter of science, it is something much deeper than that" (Papert, 1987, p. 6).

Educology, says Papert (1987, p. 6) reminds us that we need a theory of education. He suggests that we need a methodology different from those relating to technocentrism and scientism. To justify this, Papert cites sample questions experimenters have asked. For example, experimenters have examined questions such as "What is the effect of Logo on learning mathematics - or on planning skills or whatever?" and some come up with very positive answers and some with negative ones. According to Papert, "they are barking up the wrong tree" (Papert, 1987, p. 6) because they are utilizing a methodology of studying the effect of something by varying one thing while keeping everything else constant. Papert indicates that this is inappropriate in the case of Logo because the whole point of Logo is to make everything else change.
"One doesn't introduce Logo into a classroom and then do everything else as if it weren't there. Such an approach completely misses the point. Logo is an instrument designed to help change the way you talk about and think about mathematics and writing and the relationship between them, the way you talk about learning, and even the relationships among the people in the school: between the children and the teacher, and among the children themselves." (Papert, 1987, p. 7)

Educology focuses on two kinds of questions, when examining new technology. How does the society appropriate the technology? And how does the individual appropriate the technology? This is because Papert argues, there are two sides of educology in which one side faces toward society and the other faces the individual. Papert (1987, p. 8) believes that very often we are still at a technocentric stage in that we think that the technology will determine how we think. Papert's view here is similar to the 'technochoice' position which challenges the technocentric position and provides a perspective in which educational, technological, and sociological choices can be made through a process of selection and experimentation rather than through technologically or socially determined responses.

Constructionism, is regarded by Papert (1987, p. 13), as "our other branch of the theory of educology". He refers to the psychological theory which he learned from working with Piaget which indicates that knowledge is not transmitted, but that it is constructed. Papert assures us that while this means that each individual must reconstruct knowledge, "everybody needs the help of other people and the support of a material environment, of a culture and society" (Papert, 1987, p. 14).

In his book Mindstorms: Children, Computers and Powerful Ideas, Papert (1980a) envisaged the computer as becoming a medium that would assist children in taking greater charge of their own learning. However, the most significant part of Papert's vision of the child as a new kind of learner was the importance he placed upon the cultural context and the role of the teacher in guiding and assisting children as they learn. He states:

"But 'teaching without curriculum' does not mean spontaneous, free-form classrooms or simply 'leaving the child alone'. It means supporting children as they build their own intellectual structures with materials drawn from the surrounding culture." (Papert, 1980a, p. 31)

Through the notions of educology and constructionism, Papert indicates that there emerges
A very important cultural perspective, as opposed to technocentrism, to examine the role of the computer. Papert (1990) asserts that:

"People often ask what is the effect of the computer on how children think or how children learn and they want to do experiments on how inserting a computer into a rigid school structure will change the way children will learn there. I think that is putting things backwards...

...What we are interested in is not what will happen if you bring in the technology and change nothing else, what we are interested in is how having that technology allows us to rethink everything else...

...We have to move into cultural perspective that says what can that new culture do, what is the culture of the new school and by culture I mean intellectual standards, ways of thinking, senses of humour, language, social relations and all of the rest." (Papert, 1990, p. 9)

According to Papert (1987), the way that the computer enters learning will play a determining role in the way that both technology and the larger culture evolve in the coming generation. He asks - so we are entering a computer future, but what will it be like? What sort of world will it be? He suggests that the Utopians promise that we will have a wonderful world in which the computer will solve all of our problems, while the computer critics warn us of the dehumanizing effect of too much exposure to machinery, and of disruption of employment and the economy. In reply to posing the question - Who is right?, Papert suggests strongly that both are wrong. He goes on to suggest that the question is not "What will the computer do to us?" The question is "What will we make of the computer?" Our future, says Papert, will not be determined by the nature of technology, but by a host of decisions by individual human beings. Logo, which has been a central feature of Papert's work is described in the following section.

2.4 Logo in Classrooms

Logo is a programming language developed at the Artificial Intelligence Laboratory at Massachusetts Institute of Technology (MIT) in the late 1960's and early 1970's (Papert, 1971; Papert and Solomon, 1971). Papert, who developed Logo, was critical of the ways in which computers were being used in education. Papert wrote that:

"In many schools today, the phrase ‘computer-aided instruction’ means making the computer teach the child. One might say the computer is being used to program the child. In my vision, the child programs the computer and, in doing so, both acquires a sense of mastery over a piece of the most modern and powerful technology and establishes an intimate contact with some of the deepest ideas from science, from mathematics, and from the art of intellectual model building." (Papert, 1980a, p.5)
Logo uses a turtle which students can not only draw pictures with ('turtle graphics') instead of a pen, but they can use this microworld to solve problems. Papert describes a microworld as

"A subset of reality or a constructed reality whose structure matches that of a given cognitive mechanism so as to provide an environment where the latter can operate effectively. The concept leads to the project of inventing microworlds so structured as to allow a human learner to exercise particular powerful ideas or intellectual skills." (Papert, 1980b, p. 204)

During the mid-1980's the use of Logo became increasingly evident in classrooms. Moreover, McDougall (1985a, p. 143) indicates that, during that period, many books and resource materials for teaching Logo programming became available and a variety of approaches to teaching Logo programming were outlined in many of these (for example, Abelson, 1982; Adams et al., 1984; Allan, 1984; Aylsworth, 1984; Bailey, 1984; Bearden, 1984; Bearden et al., 1983; Berentes, 1984; Bitter and Watson, 1983; Burnett, 1982; Conlan and Inman, 1984; Gascoigne, 1984; Martin et al., 1984; McDougall et al., 1984; Miller and Horkildsen, 1983; Moore, 1984; Nevile and Dowling, 1983; Nevile and Dowling, 1984; Ross, 1983; Sharp, 1984; Sparrowhawk, 1984; Watt, 1983; Webb et al., 1984; Winter, 1984; Yule, 1984). She also noted that Logo use had spread widely through the Australian States (McDougall, 1985a, p. 142).

In reviewing findings of studies of the use of Logo, McDougall provides a summary of the use of Logo for learning programming, for learning mathematics, Logo and writing, Logo and special education, and Logo and education research. Many of the studies McDougall discusses within this context suggest generally positive outcomes. For example, in relation to mathematics, McDougall cites the study by Howe et al. (1980) which reported that students learning mathematics through Logo show improvements in performance over students in control groups. In addition, Howe et al. (1980, p. 5) found that the pupils who used Logo in the study "gained in self-confidence, became more positive in their attitude to school mathematics and were much more willing to talk and argue about maths problems with their teacher". McDougall also refers to studies of secondary school students (Hoyles et al., 1985) and primary school students (Maxwell, 1984) which support the evidence of improved mathematical communication among students and between students.
Studies of Logo have provided insights and investigations related to Papert's claims. Despite Logo's claims and raising high expectations, Fitzgerald, Hattie, and Hughes (1986) indicate that empirical studies have yet to provide substantiation for these claims. They suggest that too often, "reviews of literature conveniently leave out studies that provide negative evidence but instead highlight views shared by the reviewer" (Fitzgerald, Hattie, and Hughes, 1986, p. 3). Moreover, they cite the study by Krasner and Mitterer (1984) who reviewed the effectiveness of studies relating to Logo and they concluded that "there is as yet no good evidence that the Logo experience with turtle geometry [would] facilitate the development of general problem-solving skills" (Krasner and Mitterer, 1984, p. 137). Reviews of later studies reveal that learning to program with Logo has produced changes to the ways users think about their worlds (Underwood, 1989; Underwood and Underwood, 1990). More recently, Nevile (1993a, 1993b) has suggested positive features of the use of Logo in developing problem-solving and thinking skills in children.

Rowe (1992, 1993), in reviewing some of the studies of the use of Logo, is not entirely convinced that the studies support the claims for educational benefits for children. She refers to the early evaluations of the Brookline Project (Papert, Watt, disSessa and Weir, 1979) and the Bank Street studies (Pea and Kurland, 1983; Pea and Sheingold, 1987). While the Brookline Project report contained positive evaluations, Rowe (1993, pp. 26-27) found those evaluations themselves difficult to assess. Moreover, she indicates that the Bank Street research found no differences between a Logo group and a control group on a non-programming planning task. According to Rowe, the failure to find improvements in planning is important as this is one of the claims regularly made for children learning to

Rowe (1993, p.109) cites studies which have found benefits and reported positive effects. For example, she refers to studies by Finlayson (1984) and Clements and Gullo (1984) which found clear benefits for the development of mathematical thinking skills and subsequent studies which have demonstrated the positive effects of Logo programming for the early development of mathematical concepts (Hughes and Macleod, 1986; Robinson and Uhlig,
1988). However, Rowe (1993, p. 109) points out that "not all evaluations have found positive effects". She supports that statement by locating numerous reports and studies which together question the claims for the educational benefits to be derived by children using Logo. For example, the report by Pea and Kurland (1984) concluded that the idea that programming experience can transform children's minds is a form of naive technoromanticism. Similarly Simon (1987) agrees, after reviewing some Logo evaluations. Rowe cautions against accepting all of the claims by the proponents of Logo. She indicates though that one of the greatest attractions of Logo is the motivation that it creates in the children using it (Lepper, 1985; Hughes and Macleod, 1986) but she notes that mostly this is measured by time on-task. Thus, Rowe (1992) argues that:

"claims for educational benefits must be based on measures that are more profound than the latter if we are to improve the quality of students' cognitive skills and not only their powers of concentration."

In attempting to identify the contributions which computers might make to education, Ylemic and Walberg (1991) synthesised the results of more than 250 individual research studies and showed that the typical and average effect of computer-based instruction was that it raised learning outcomes by .42 of a standard deviation.

2.5 The International Scene

At the international level, the literature indicates that, throughout the 1980's and into the early 1990's, many school systems are still in the early stages of exploring the potential that technology can provide. Pacey (1990, p. 75) points out that when computers first appeared in schools, interested teachers began to learn about them, and to explore the possibilities of using them in their classrooms. In addition, she indicates that Postman (1983) identifies two groups of people who have theories about computers in schools - the technological determinists and the technological somnambulists. The technological determinist believes that:

"... there is nothing much we can do about the future except to surrender ourselves to the new technologies... The school of the future ... will derive its agenda from the demands of television, the computer, satellites, and other technologies. The role of the educator is to develop philosophies that will rationalise the uses society makes of these technologies and that will prepare us to accept the ways in which the technologies use us. Above all, the educator must not stand in the way of the future, whose direction is determined by the shape of technology."

(Postman, 1983, p. 18)
The *technological somnambulist* believes that:

"...the new technologies raise no important challenges, that the effects of such technologies are vastly overrated, and that the future of the school is secure." (Postman, 1983, p. 18)

Whether or not the motivation for introducing computers in schools has been mainly driven from either a *technological determinist* or a *technological somnambulist* position, it is undoubtedly true that there has been an increase of the provision of computers in schools.

Collis (1989) indicates that:

"computers themselves now are to be seen in schools in virtually every country in the world... There is no doubt that computers have become an established part of the educational scene." (Collis, 1989:1-2).

However, it appears that while there is a growing awareness of the need to explore the implications for education being posed by the new and emerging technologies, some very fundamental educational questions are yet to be addressed. Fluck (1990, p. 365) admits that while computer technology is taking off in schools, we have yet to properly assess its impact on learning and teaching. He indicates that few researchers have had the opportunity to study the impact of the new technologies upon the education process itself.

"In some cases we can see a sweeping change coming into schools, as the possibilities and potential of the new devices increases. On the other hand, the fundamental social organisation of schools and their rationale for existence has changed very little." (Fluck, 1990, p.365)

Increases in student access to computers in schools is well illustrated in the following information provided by Wellington (1990, p. 62) about access in the United Kingdom. Wellington, who uses the term 'computer access factor' (CAF), refers to the ratio in a school of the number of pupils to the number of microcomputers.


In relating these levels of access to Cerych's framework, Wellington speculates that the *economic* curriculum pressure on information technology in which the perceived vocational significance of computers plays a major role might explain why the 'access factor' in secondary schools is more than twice that of primary schools. In addition, though, Wellington notes that the *pedagogic* factor of information technology in the curriculum has grown with more teachers now perceiving the computer as a valuable learning resource (Macdonald..."
and Wellington, 1989). However, Wellington points out that this pressure has been largely confined to primary teachers. Finally, Wellington suggests that there has been a potent but largely hidden sociological pressure from parents of students in primary schools. A very important funding source for computers in the primary schools has been "from school-raised funds, and almost three-quarters of that money comes from parent-teacher associations of some kind" (Wellington, 1990, p. 62).

An additional perspective is provided by Wellington in referring to Sendov's (1986) three waves of information technology in education. Wellington observes that many schools in the United Kingdom are now into the second wave in which the computer is viewed as a learning tool, its use has been integrated into existing subject areas and a more critical view is being taken of the vocational value of computing in schools.

In asking - what of the third wave?, Wellington (1990, pp. 62-63), states a powerful force preventing the emergence of the third wave is the influence of a vertical, subject-based national secondary curriculum. He poses the possibility that the future progress of information technology in both society and education might result in an examination of not only how we teach but what we teach. For example, information technology might enable questions to be asked about the nature, aims and content within traditional subject areas such as History, Geography, Science and Mathematics. Then, says Wellington, the diffusion of information technology across the existing curriculum might change the structure of that curriculum that might entail a more 'horizontal' view of the entire secondary curriculum. Ironically, indicates Wellington (1990, p. 63), "the greatest influence of information technology on education may be to make the curriculum in the secondary sector more closely resemble that of the primary school".

Developments in various international settings are consistent with this examination by Wellington. The studies reported here effectively provide evidence that countries are undertaking many initiatives and that they are exploring the technology and education interface. Those countries, it would appear, are in the first and second waves in terms of Sendov's framework.
In a survey of computer use in twenty-two countries, Plomp and Pelgrum (1991) examined both primary and secondary schools. They indicated that the process of introducing computers into education, despite initiatives and policies being formulated at national, state, regional and local levels, is in its very early stages. In India, according to Banerjeet (1990, p. 938), the same old 'chalk and talk method' still dominates the Indian classroom. Watson (1990, p. 1075) suggests that many primary schools in the United Kingdom are failing to harness the power of microcomputers to enhance pupil learning. His statement is supported by the finding by Jackson et al (1986) in *A Survey of Microcomputer Use and Provision in Primary Schools* in the United Kingdom that there are few schools that use information technology for any activity other than drill or practice. Furthermore, Watson refers to the commentary by Flux (1989) that:

"The ways in which computers are used at present (in primary schools) suggests that they have not had the impact that many educationalists predicted. Instead of initiating new practices computers have been used to maintain existing ones, supporting a traditional curriculum with new technology."

In commenting on the trends in computers in schools in the Netherlands, Plomp (1990, p. 853) notes that during the middle of the 1980's, curricula in relation to computer literacy showed a shift away from teaching computing to teaching applications, information handling and problem solving. This represented a recognition that computer use was no longer seen as an end in itself, but was introduced "as a powerful means of fulfilling information needs and the performance of other learning and instructional tasks" (Plomp and van de Wolde, 1985). The approach in the Netherlands moved away from the teaching of programming to the teaching of applications and information handling.

This approach is consistent with that advocated by Hunter (1984) and Collis (1988) that computer usage should be integrated within the existing curriculum of the schools. Hunter (1984), for example, argues from a technological determinism perspective that schools have no choice but to adapt to the information age, and that learning about computers is only part of that adaptation. According to Hunter, there is no need for a separate computer literacy course. Rather, computer-related objectives and activities should be integrated in the curricula and thus computer literacy is viewed as a means, not an end. Collis (1988) notes
that there has been an underutilization of computer resources resulting from an inappropriate view of educational computer usage.

The frameworks developed by Cerych (1985) and Sendov (1986) and the distinctions made by Papert (1987) between technocentrism, scientism, educology, and constructionism have provided theoretical perspectives from which the review of the international scene has been undertaken. In terms of Cerych's three factors, there is evidence that pedagogical, sociological, and economic factors are evident in the education and information technology interface. Using the framework of Sendov's waves, most countries are now in the first and second waves. That is, they have made attempts to introduce computers into schools as a new educational facility (first wave), and have moved to value the computer as an educational resource (second wave). In addition, the issues raised by Papert in which he discusses technocentrism, scientism, educology, and constructionism, and the subsequent outline of Logo in classrooms provides an essential context for identifying the need to further examine what is happening in schools in relation to the new and emerging technologies.

2.6 Investigating and Illuminating the 'Areas of Silence'

As indicated earlier in this chapter, a significant aspect of Papert's work is in drawing our attention to the cultural perspectives and in highlighting the fact that many of the issues and questions being raised throughout the world have largely come from technocentrism and scientism perspectives. Bowers (1988) also identifies a predominance of what he refers to as 'procedural thinking' in relation to educational computing. He cites the 1987 National Educational Computing Conference in the United States in which he could only identify two papers out of some 150 papers which could be said to deal with cultural issues, and with "the conceptual, ideological, and cultural side of the technology" (Bowers, 1988, p. 2). According to Bowers, the proceedings were dominated by the 'technical aspects' of technology to which he refers to as "the technological mind-set". Green and Bigum (1990, p. 370) suggest that, while Bowers is far from critical about the "dazzling proliferation of innovative richness" in the research on educational computing and other forms of educ-
ational technology, as they impact on the school", they strongly argue that Bowers (1990) points to "areas of silence within the mainstream of educational computing in the United States" which they are convinced can be generalized to other countries where computing schools has become big business and a major educational priority. Green and Bigum State that:

"It is these 'areas of silence' - the 'unsaid' - which must be investigated, those unsymptomatic absences in the discourse of educational computing that speak to its investments and secret impulses and that must be interrogated and illuminated. What other stories might be told about the field as it currently understands itself? More strongly, what stories have been actively suppressed? Whose stories? What would it mean to formulate different stories, and to tell them on occasions such as this, and elsewhere, in the great forums of the culture?" (Green and Bigum, 1990, p. 370)

These arguments support the need for studies to focus on the educational and cultural questions rather than approaching the new technology from technical and procedural questions. Moreover, Green and Bigum put forward the case for the need to reframe our way of thinking about microcomputers. As an example, they use the arguments put forward by Schon (1982) and Boomer (1988) concerning the practical-professional knowledge of classroom teachers. Green and Bigum (1990, p. 373) indicate that in contrast to the current dominance of 'technical rationality' in accounts of classroom practice and teacher education, Schon and Boomer argue that there needs to be more accurate descriptions of the complexity of classroom reality.

Many of the decisions about how, when and why computers are used in classrooms will inevitably be made by teachers. Nias (1989) points out that even though teachers are considered to be at the centre of the educational process, very little research on computers schools has focused on teachers. Rather, most of the research has centred on children's learning. In addition, Pacey (1990, p. 47) indicates that:

"teachers are shaping the computer-using curriculum, yet to date there has been little attempt to understand the computer-using teacher".

In examining initiatives which attempt to integrate learning technology in schools, studies should assist in the investigation and illumination of the 'areas of silence' which exist. There needs to be studies which investigate and illuminate what really happens in classrooms

Review of the Literature
through highlighting teachers' work and listening to teachers' words.

### 2.7 The Australian Scene

In reviewing and analysing developments in the Australian setting, this discussion outlines the major implications which emerged from the Commonwealth Schools Commission report, *Teaching, Learning and Computers* (1983b), describes briefly findings from *Computer Applications in Australian Schools* (1986), summarises issues emerging from more recent national reports, and outlines the computer education policies of the Australian States.

Throughout the late 1970's and the early 1980's very little impact of computers was evident in Australian schools. As indicated earlier in Chapter One, Caelli (1979) reported that no evolutions were happening in Australian classrooms. In addition, Sandery (1982, p.1) also indicated that "the average Australian classroom is still largely untouched by the impact of the computer". As Anderson (1984, p.1) noted, the interest in the use of computers and information technology in schools increased dramatically in 1983-84.

In providing a summary of notable developments in computing in schools in the Australian scene, Anderson (1984, p.25-32), indicates that it was not until 1982 until reports were presented which specifically examined the question of computing in schools across States. For example, the report of the *Committee of Enquiry into Education in South Australia* (Keeves, 1982) strongly encouraged the provision of new courses to provide an introduction to new technology. Some of the courses suggested included technological studies, engineering science, computing, and computer science. The various States had commenced examining computing in schools to varying degrees. As Hoffman (1982, p.81) indicated:

"...it is quite obvious that there are already significant differences amongst the Australian States in the priority that each assigns to information technology, the resources allocated and the policies being implemented."

Anderson (1984, p.25) notes that in 1982, the Education Research and Development Committee commissioned a review "to consider where computers are relevant to the
Education systems" (Brownell et al., 1982). Several months later, an OECD sponsored review on education and the new technologies followed (Brownell, 1982). During 1983, two important reports were published. The first of these was a report to the Minister of Education in Victoria (Shears and Dale, 1983) and the second was the report of the National Advisory Committee on Computers in Schools to the Commonwealth Schools Commission (1983b).

2.7.1 Teaching, Learning and Computers

The Commonwealth Schools Commission (1983b) report, Teaching, Learning and Computers resulted from the Commonwealth Schools Commission being asked by the Commonwealth Government to make recommendations on how the Computer Education program should be implemented. The Computer Education Program was established by the Commonwealth Government in June, 1983 with $18.7 million committed for its support in 1984-86. The Commonwealth Schools Commission appointed the National Advisory Committee on Computers in Schools to provide it with advice.

A national program concentrating on secondary schools was being established for three main reasons. These were:

"- to ensure that schools and systems have adequate resources to provide all the students with access to computers;
- to encourage the exchange of information and curriculum materials between states; and
- to encourage the sharing of resources especially in the slow and expensive process of writing, assessing and disseminating software and in adapting curriculum and teaching techniques to the changing needs of society." (Commonwealth Schools Commission, 1983b)

while the Government's guidelines for the Computer Education Program required resources to be concentrated on secondary schools, the Government directed the Commonwealth Schools Commission to provide advice for the extension of the program into primary schools. The National Advisory Committee established a Primary Education working Party, whose brief included reference to all students in primary, infant, and special schools. Of interest here is the contextual features of primary schooling which the Commonwealth Schools Commission indicated were to be carefully considered in relation...
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### 7.1 Teaching, Learning and Computers

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troducing computer technology. These features were:

"(a) Most primary teachers are generalists. They have more opportunity than secondary teachers to break down traditional subject barriers and provide integrated learning experiences for their pupils. They are less restricted by timetabling in organisational, management and curriculum decisions.
(b) Greater numbers of primary teachers and administrators are still largely isolated from both the technology and the knowledge to adopt it. Despite this lack of information they are, however, generally enthusiastic about becoming involved.
(c) The magnitude of the professional development task is immense. Because of geographical factors the professional development of all teachers working in primary education (98 000) is difficult to achieve by existing methods within a reasonable time-frame.
(d) Innovation by primary teachers is a result of their degree of enthusiasm and flexibility. Teachers are often hindered by the demands of their job and the lack of support services."

(Commonwealth Schools Commission, 1983b, p. 3)

In addition, the report identified features related to the nature of teaching and learning and the organisational features of primary schools which required consideration. The report also noted that the capacity of primary schools to incorporate innovations related to the application of computing technology should be taken into account. It reported that

"more of what is currently occurring in primary schools is based on intuition and the direction provided by a small number of 'successes' with particular applications. There is an urgent need for research on a wide range of issues associated with the use of computers in teaching and learning" (Commonwealth Schools Commission, 1983b, pp. 3-4).

This report, therefore, identified contextual factors related to primary schools which needed to be considered in introducing computers into schools. In addition, it signalled the need for a national approach to computer education and was an important factor in the change process.

"Since that report by the Commonwealth Schools Commission and the implementation of the Computer Education Program, all of the Australian States have embarked upon developing policies and guidelines for programs which vary from State to State. Anderson (1984), for example, notes four major differences between the States. Firstly, some States have been supporting initiatives for computing in schools longer than others. Secondly, some States have adopted a coordinated centralised approach to computing in schools. According to Anderson (1984), the States which have been involved longest have more centralised approaches. Thirdly, differences exist in relation to the range of computer
equipment in schools. Fourthly, there are differences in the extent to which the purchase of equipment is subsidised or supported across states. During the last ten years Government budgets have injected funds for improving the provision of technological resources schools, professional development programs for teachers have been provided, programs and policies have been implemented, and a great deal of interest has been evident in examining the implications for schools.

7.2 Computer Applications in Australian Schools

In 1985, the Australian Education Council's task force on education and technology requested research to be undertaken to assist in the development of policy advice. The general aim of the project was "to examine and report on the use of computers in Australia in learning programs and on the attitudes of students, teachers and parents to possible uses of computers to support the learning process" (Fitzgerald, Hattie, and Hughes, 1986, p. 1). In the resulting report, Computer Applications in Australian Classrooms, it was found that computers were more likely to be found in secondary schools with 98% of those surveyed reporting computer applications, than in primary schools with 57% of those surveyed reporting computer applications. The report notes that given that the sample studied presented 10% of the total number of schools in Australia, "it is estimated there are about thirty-five thousand computers in Australian schools. This represents an investment in hardware of approximately $57 million" (Fitzgerald, Hattie, and Hughes, 1986, p. 19).

That report (Fitzgerald, Hattie, and Hughes, 1986, p. 19) indicated that computers were mostly being used for word processing, drill and practice, simulation, and gaming, computer awareness courses, and in maths and science. Computers were being least used for data base applications, specialist courses in computer studies, and computer-managed learning. Moreover, it was reported that word processing was the activity that Principals considered to be increasing the fastest. Other increased activity was reported with Logo, data base applications, learning in subjects other than mathematics or science, simulation and gaming, spreadsheets, and the use of graphics, the declining uses were computer-managed learning, programming, drill and practice, school computer clubs, computer...
Awareness courses and specialist courses in computer studies. The pattern of computer use was found to be quite different in primary and secondary schools. The findings indicated that in primary schools, the most frequent activities were drill and practice (in 72% of schools where there were computers), word processing (64%), simulation and gaming (63%), Logo (48%), use in mathematics and science (48%), and computer awareness (45%). In secondary schools, the main activities reported were programming (83%), word processing (76%), computer awareness (71%), databases (61%), simulation and gaming (59%), and in Year 11 and 12 specialist courses (52%) (Fitzgerald, Hattie, and Hughes, 1986, p. 23).

Four general themes emerged from the research findings of Fitzgerald, Hattie, and Hughes (1986). Firstly, they noted that there is "a very positive reaction from principals, teachers, parents and students to the use of computers to support learning in classrooms" (Fitzgerald, Hattie, and Hughes, 1986, p. 45). A second theme which they reported was the comparison of male and female achievement and attitudes and respect to computers and the use of computers by girls. Their study "demonstrated significant differences between boys and girls in the use of computers..." (Fitzgerald, Hattie, and Hughes, 1986, p. 45). Furthermore, they noted that while there "were no substantial differences between boys and girls in the use of computers in primary schools", in secondary schools it was found that "many more boys than girls used computers" (Fitzgerald, Hattie, and Hughes, 1986, p. 45).

The third theme that emerged was the need for upgrading teacher education provisions in computer applications in education. Both teachers and Principals indicated that they believed there was inadequate provision for in-service courses on the use of computers. In addition, similar inadequacies were believed to be made in teacher education institutions for specialised training in computer applications.

The fourth theme related to the uncertainty with respect to the impact of the technology on the way children learn. Fitzgerald, Hattie, and Hughes (1986, p. 45) indicate that Principals, parents, and teachers believe that "one of the problems of developing computer applications in education is that little is known about how children learn when using computers".

Review of the Literature
Despite these initiatives and growing interest, a Report of the House of Representatives Standing Committee on Employment, Education and Training (1990) titled An Apple for the Teacher Choice and Technology in Learning, concluded that it was convinced that the opportunity exists for a greater use of technology in Australian education. It went on to indicate that:

"It [technology] offers a potential to extend access to education throughout Australia, to broaden the range of courses available to students and to improve the quality of student performance. Realisation of this potential requires clear vision, cooperative effort and persistence on the part of those responsible, beginning with the Commonwealth Government and the Australian Education Council." (House of Representatives Standing Committee on Employment, Education and Training, 1990, p. 4)

The report makes fourteen recommendations. All of the recommendations reflect the need for the development of mechanisms to achieve cooperation for the development of national strategies for the educational uses of technology. The report indicates that it can see the prospect of considerable progress if the Ministers for Education on the Australian Education Council can achieve common approaches and ensure that their officers act together in the use of technology. More specifically, the third recommendation of the fourteen recommendations made states that:

"All students in all schools be provided with increased opportunities for 'hands on' computer experience; and further, that sufficient government funds be provided to enable schools to meet the OECD target of one microcomputer per 10 students by the commencement of the 1992 school year." (House of Representatives Standing Committee on Employment, Education and Training, 1990, p.4)

The Australian Education Council published the Common and Agreed National Goals of schooling in Australia in 1989. Among those goals were the statements to develop in students:

"... (d) skills of information processing and computing;
(e) an understanding of the role of science and technology in society, together with scientific and technological skills;... " (Department of Education, Queensland, 1991, p.8)

It is abundantly clear that technology is high on the agenda of government and education authorities alike. The recommendations cited above provide substantial evidence of emerging challenges for those involved with schools at all levels.
8 Policies in the Australian States

The National Statement on Technology Education for Australian Schools was released and approved by the Australian Education Council (AEC) in May 1992 in Interim Form. The publication of this statement had earlier been postponed "due to concerns from several states over some of what is contained in it" (Webb, 1992, p.2). In an Overview of Information Technology Curricula in Australia and the Implications of the National Statement on Technology education, Clark (1992, pp. 3-6) presents a summary of the general thrust of information technology courses in Australia, and discusses the implications of the National Statement on technology Education for courses in the future. According to Clarke (1992, p.5), The National statement on Technology Education for Australian Schools, provides a context for providing students with technology related experiences. Moreover, it provides a catalyst for change and it represents change in the right direction as the emphasis on design in the draft statement is "essential to developing a creative atmosphere where students learn to develop their own solutions and not 'import' the correct one, ready-made by the teacher or someone else" (Clarke, 1992, p.6).

Clarke (1992, p. 3) notes that the policies relating to information technology vary considerably from State to State. He suggests that while all States would probably agree on the general directions and outcomes for information technology, the various State education authorities appear to be at differing points down the path to articulating those views in policy documents. For example, according to Clarke (1992, p. 3), New South Wales appears to be furthest along in respect to the national directions while Victoria and Western Australia have clearly articulated policies on schools' computer use. Although the Australian Capital Territory has no system-wide policy on technology, Clarke believes that one is likely after the release of the National Statement on Technology Education. Clarke suggests that the release of the National Statements in each of the eight curriculum areas might expedite this process as the States align their thinking with the national frameworks. The following analysis provides discussion about significant policy developments in New South Wales, Victoria, Western Australia, South Australia, and Tasmania to enable a clearer picture of policies developed throughout Australia. Particular reference is made...
to the policies as they impinge upon primary schools. Following that analysis, an overview of those policy developments is formulated and presented in Figure 2.1. Developments in Queensland will be described in the following section of this chapter.

2.8.1 New South Wales

In the preface to the Using Computers in Primary Schools Guidelines booklet, Healy (1989) indicates that since the NSW Department of Education released Computers in Schools: A general Policy Statement in 1983, much innovative and exciting work has been undertaken introducing computers into the primary school curriculum. The earlier document Computer in Schools: A General Policy Statement (1983) stated the following as minimum goals which students should acquire before they leave school:

- Every student should have an awareness of the implications of computers for the individual and society.
- Every student should experience and be able to assess the uses of a computer as a tool for investigation and discovery.
- Every student should have an understanding of the wide range of areas in which a computer may be used.
- Every student should have practical experience in using appropriate computer programs in simple, well-structured, problem-solving situations.
- Every student should be made aware of the nature of a computer program. This does not necessarily mean that the student would be able to write the program.

(NSW Department of Education, 1983)

The guidelines document (1989, p. 2) clearly states that "it is not sufficient simply to assume that by using computers a good learning experience will result. The successful use of computers must be based upon sound curriculum practice, incorporated into appropriate learning environments and combined with good teaching practice". Furthermore, in providing a framework to assist schools in developing their computer education policies and programs, it suggests that these policies should reflect all of the policies of the NSW Department of Education, whether or not they are directly or indirectly concerned with computers. The guidelines statement indicates that a school policy should have a framework which consists of a rationale, underlying principles, aims and objectives, and organisational Procedures. Components of the policy should make reference to professional development, curriculum development, resource management, and evaluation.
According to the guidelines document (1989, p.25), the evaluation of the effectiveness of programs in schools should include an investigation of the degree to which they fit into the total curriculum, provide across-curriculum perspectives, provide continuity of learning experiences, consider resource realities and needs, and are appropriate and sensitive to the needs of all students. In a similar manner, the *Computers in Education: K-12 Statement of Principles* urges that:

"Special attention will need to be given to evaluating the effectiveness of programs for Computer Education in terms of the degree to which they:
- enhance the curriculum;
- facilitate and create appropriate teaching/learning environments;
- create a student population aware of computer technology and its social implications and capable of responding to and influencing change;
- recognise and cater for the importance, pace and scope of technological change."

The *Science and Technology K-6 Syllabus* released in June, 1991 was the first syllabus issued to schools in New South Wales under the direction of the Board of Studies. The document has two parts. There is the *Syllabus* consisting of thirty-five pages and the *Support Document* of almost two hundred pages. The aim of the *Syllabus* is to develop in students competence, confidence and responsibility in their interactions with science and technology leading to an enriched view of themselves, society and the environment and the future, and an enthusiasm for further learning of science and technology. The *Support Document* provides constructive advice on the implementation of the *Syllabus*. According to Wesley (1992, p. 22), the "Science and Technology Syllabus is a user friendly document offering tremendous assistance to the teacher "and it provides computer education in the primary school with heightened direction .

### 2.8.2 Victoria

The commitment of the Ministry of Education and Training in Victoria to providing learning environments in which information technology can be investigated for children across all year level from Prep to Year 12. Policy was initially stated in the document *computers in schools* (October, 1983). Subsequently, further policy documents have been issued - *Ministerial Paper No6 Curriculum Development and Planning in Victoria* (1984),...
The aim of the policy in Victoria is that students will leave school familiar with the basic elements and functions of information technology. Programs are to be provided which should allow students to:

"develop competence with computers and information technology and understand their social effects, and appropriate those aspects of technology which contribute to learning... [and]...be aware of the applications of science and technology, of their social and environmental impact, and of the responsibilities which are associated with having the power to alter environments."

(Ministry of Education and Training, Victoria, 1984, p. 19)

Curriculum Frameworks documents aimed at providing schools with support for planning, developing and reviewing their programs began being published in 1988. Nine Curriculum Frameworks areas from Years P-10 were developed. Information technology was to be taught in the context of these Frameworks areas.

### 2.8.3 Western Australia

As in the other States examined above, the Ministry of Education in Western Australia issued guidelines for the uses of computers in its primary schools. In its publication Computer Use in Primary Education Policy, goals and outcomes which then lead into specific achievements are described. Goals are outlined for both teachers and students. This policy indicates that all primary teachers are expected to be in a position to make decisions about the potential of computers to achieve their teaching objectives and enhance the learning of their students. In order to do this, teachers should incorporate the regular use of the computer in their own teaching and learning environment to achieve particular objectives. Furthermore, they are expected to use their knowledge about good teaching practice to identify potential software and to evaluate its objectives. This policy indicates that all primary school students and teachers are to become confident about using the computer as a learning tool across the curriculum to achieve learning objectives and to solve problems in the context of their daily classroom activities.
2.8.4 South Australia

The Education Department of South Australia policy documents "recognize the pervasive nature of computing in society, and the need for schools, as a part of that society, to use computing wherever appropriate" (Carter, 1992, p. 29). Carter (1992, p. 29) cites from the Schools Computing Policy (Education Department of South Australia) that it is the policy in South Australia that teaching and learning with, through and about computers be further developed, in junior primary, primary, and secondary schools. Furthermore, all students will be provided with the means to take advantage of computer technology for learning; and should acquire the skills, knowledge and attitudes needed to use, understand and control computers.

As there are only defined syllabuses for Senior Secondary School, Carter (1992, p. 30) indicates that there is a wide range of computing activities in junior primary, primary, and junior secondary schools in South Australia depending on each school's own focus, resources, staff expertise and interest. He notes that word processing and publishing, database creation and use, graphics and music packages, Logo, Hypercard, communications and CD-ROM are in use throughout the state.

2.8.5 Tasmania

In October, 1985 the Education Department in Tasmania published the COPE report which was a position statement on Computers in Primary Schools. Three further major policy statements had an impact upon computing in schools in Tasmania. These were Secondary Education: the Future published in 1987, followed by Our Children: Our Future (1991) which focused on primary education, and the introduction of the Tasmanian Certificate of Education (TCE) which was introduced in 1990 for grade 9 students and will become effective for all school leavers by the end of 1993. Our Children: the Future, which focuses on primary education, emphasizes 'the whole child' and the provision of an integrated and balanced curriculum. Figure 2.1 on the following page provides an overview of policy.
Developments throughout the Australian states.

<table>
<thead>
<tr>
<th>State</th>
<th>Has a policy on Computers</th>
<th>Policy / Document Title</th>
<th>Year Pub.</th>
<th>Summary of Policy Aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Policy Statements</td>
<td>✓</td>
<td>The National Statement on Technology Education for Australian Schools</td>
<td>1992</td>
<td>Declares that in the school curriculum students apply technology for particular purposes, develop skills in the use of technology, understand the principles of technology and explore the consequences of applying technology in different situations.</td>
</tr>
<tr>
<td>NSW</td>
<td>✓</td>
<td>i) Computers in Schools: A General Policy Statement</td>
<td>1983</td>
<td>Suggests that these policies should reflect all of the policies of the NSW Dep't of Education whether or not they are directly or indirectly concerned with computers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Using Computers in Primary Schools Guidelines</td>
<td>1989</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Science and Technology K-6 Syllabus</td>
<td>1991</td>
<td></td>
</tr>
<tr>
<td>Victoria</td>
<td>✓</td>
<td>i) Computers in Schools</td>
<td>1983</td>
<td>The overall aim is that students will leave school familiar with the basic elements and functions of information technology. Nine curriculum framework areas from Years P-10 were developed.</td>
</tr>
<tr>
<td>Western Australia</td>
<td>✓</td>
<td>Computer Use in Primary Education Policy</td>
<td></td>
<td>Students are expected to become confident about using the computer as a learning tool and to use computers regularly across the curriculum to achieve learning objectives.</td>
</tr>
<tr>
<td>South Australia</td>
<td>✓</td>
<td>Schools Computing Policy</td>
<td>1987</td>
<td>This policy statement had the broad objective of computer literacy. South Australia produced a set of booklets to assist schools to implement computing policy; included an expanded rationale for schools computing, computing activities for Years R-7, computing and equity issues, and the integration of computer based applications with the curriculum.</td>
</tr>
<tr>
<td>Tasmania</td>
<td>✓</td>
<td>i) COPE Report</td>
<td>1985</td>
<td>Our Children: Our Future focused on primary education and emphasised the 'whole child' and the provision of an integrated and balanced curriculum.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Secondary Education: the Future</td>
<td>1987</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Our Children; Our Future</td>
<td>1991</td>
<td></td>
</tr>
<tr>
<td>Queensland</td>
<td>✓</td>
<td>i) Computers in the Curriculum</td>
<td>1983</td>
<td>Emphasis was on developing computer-related skills. More recent policy includes emphasis on integrating learning technology in schools and computer application ideas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Guidelines for the use of Computers in Schools (Draft)</td>
<td>1994</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) Guidelines for the use of Computers in Schools</td>
<td>1995</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.1 Overview of Policy Developments throughout Australia
As well as the Government initiated developments, computer groups have been formed throughout Australia. The Queensland Society for Information Technology in Education (QSITE), formerly known as the Computer Education Group of Queensland (CEGQ) is an example. Other Australian States and Territories have similar groups: viz. New South Wales (NSWCEG), Victoria (CEGV), Australian Capital Territory (CEGACT), South Australia (CEGSA), Tasmania (CESIGT), Western Australia (ECAWA), and the Northern Territory (CEANT). These groups and the Australian Computer Society are affiliated groups of the Australian Council for Computers in Education (ACCE). These groups, individually and collectively produce publications and facilitate, co-ordinate and organise conferences.

2.8.7 Summary

The review of the Australian scene in relation to integrating technology in classrooms through examining a selection of state policies and summarised in Figure 2.1 enables analysis in terms of the frameworks presented earlier in this chapter. In particular, from the evidence gathered in the study of *Computer Applications in Australian Classrooms* Fitzgerald, Hattie, and Hughes, 1986), together with the recommendations and implications contained in the Commonwealth Schools Commission (1983b) report, *Teaching, Learning and Computers*, there is support for the contention that the overall pattern of computer use and policy suggests that Australian schools are firmly in Sendov’s second wave. There are instances of some thinking and applications which might allow some speculation that some exploration of the role of information technology is occurring at the third wave level.

In Terms of Cerych’s framework there is evidence from the views and attitudes of principals, teachers, parents, and students to suggest that there is strong sociological pressure for the widespread use of computers in schools. The pedagogic factor is evident through the use
If a variety of computer approaches and applications in Australian schools. Similarly, the policies of all Australian States emphasise the importance of children learning through using computers. However uncertainties still exist in terms of how the knowledge about how children learn using computers. A wide range of applications were reported which indicate that exploration of pedagogy is occurring and that computers are seen as learning tools. Economic pressure is very evident in the computer applications in the secondary schools which special courses in applied computer studies have been introduced in most the Australian States.

Furthermore, the influence of Papert through the use of Logo has impacted upon many Australian classrooms. Specifically, there was evidence that the use of Logo was among the computer applications being increasingly used in schools (Fitzgerald, Hattie, and Hughes, 1986, p. 19). McDougall (1985a, p. 146) also has noted that in Australia many investigative projects with Logo are being undertaken. She indicates that at least three universities, Monash and Deakin in Victoria, and Flinders in South Australia, have had Logo projects. She suggests that results from evaluative studies are beginning to appear and these will enable the assessment of "the extent to which the promises of earlier exploratory work are fulfilled in ordinary classrooms" (McDougall, 1985a, p. 146).

2.9 Integrating Learning Technology in Queensland State Schools

The literature review undertaken so far provides a framework which includes an examination of developments internationally together with an overview of computer applications and policy developments in the other Australian States. The review provides a context within which policies and initiatives aimed at integrating learning technology in Queensland State Schools can be examined. The following sections of this chapter provide descriptions of many of the initiatives that have occurred in Queensland. Reference is made to many of the initiatives so that background information can be provided to assist in further establishing the context in which the QSC Project is located.
The introduction of computers in Queensland schools largely reflected the general trend described earlier in this chapter. An examination of developments in Australia shows that early developments in Queensland were consistent with most of the other Australian States. There were very few schools in Queensland which were using computers throughout the late 1970's. The figures presented in Chapter One (p. 9) from the Commonwealth Schools Commission (1983b) showed that even in 1981 only 160 schools in Queensland had a total of 310 computers. However, the number of computers in schools and the activities associated with computers in schools began to increase rapidly during the early and mid-1980's. Many more schools began buying computers and the Department of Education in Queensland commenced several initiatives related to addressing issues emerging about computers in schools.

During 1981, a Microcomputers in Schools Curriculum Study was undertaken to investigate the use of microcomputers for learning in Queensland schools. Following that study, the Computer Education Curriculum Project was initiated and a four member Project Team was established within the Curriculum Branch of the Department of Education, Queensland. The initial brief of the project was to address three major concerns - computer awareness, computer studies, and computer assisted learning. In the Project Report - Computer Education Curriculum Project (Curriculum Branch, 1983, p. 1), the Project Team indicated that additional concerns emerged. According to the Project Team, the additional concerns were inherent parts of the three main areas of concern. These included software evaluation, software packaging and distribution to schools, dissemination of information to teachers within the system, and maintaining liaison with officers involved in educational computing in Queensland, in other States, and in other countries. As a result, the Project Team, in supporting the three main areas of concern, became involved in software evaluation, software distribution, the production of DOWNLOAD (a Curriculum Branch Newsletter), compiling a Directory of Computers in Queensland Schools (1982), involvement in inservice programs, and attendances at two conferences during 1982.
Interestingly that Project Report (Curriculum Branch, 1983) outlined concerns for further consideration. Included in this list was Logo as "this language offers much for a different conceptualisation of some mathematical topics and for the development of problem solving skills across the curriculum" (Curriculum Branch, 1983, p.10). Also, there was a strong indication that "little is presently known about how children learn with computers and how to construct effective learning programs with computers as an integral part" (Curriculum Branch, 1983, p. 10). Both of these concerns reflect an awareness identified by Cerych's pedagogic factor and provide strong suggestion of movement into Sendov's second and third waves even though the evidence clearly indicates that there were few computers in Queensland schools at that time.

In 1983, the policy statement, Computers in the Curriculum was released by the Department of Education, Queensland. This policy statement has been revised and replaced by the guidelines for the use of Computers in Learning (Department of Education, Queensland, 1995). The earlier policy referred to the impact on our society being made by 'computers and computer-related technologies'. Throughout that policy statement, the terms computers and computer-related technologies are used consistently. It was stated in the preamble to the policy statement that:

"...the Department holds the view that all children, young people and adults, including those with special needs attending its schools and colleges, need opportunities to come to know and understand the impact of computers and computer-related technologies on society. They also need to develop such computer-related skills as are required to function effectively in today's society. Moreover, they need opportunities to develop the particular skills and confidence necessary to pursue interests and careers, either directly connected with computers and computer-related technologies or in fields where computer technology plays a significant role". (Department of Education, 1983, p. 2)

In terms of Cerych's framework, this statement clearly suggests the sociological factors in the education and technology interface through the reference to understanding the impact of computers on society. As well, it reflects the economic pressures through the emphasis on the provision of educational programs of a vocational nature. The quote above refers to the need for students to develop the skills and confidence to pursue careers that are either directly connected with computers and computer-related technologies or in fields where computer technology plays a significant role". 

Review of the Literature
Four major kinds of planned developments were outlined in that policy statement (Department of Education, 1983). They relate to the promotion of computer awareness, the development of basic computer skills, examining how computer assisted learning might be incorporated, the revision of educational programs to take into account the effects that computers and computer-related technologies may have on the scope and sequence of programs, and the provision of educational programs of a vocational nature.

The Commonwealth Government's *Computer Education Program* provided significant financial impetus for Queensland State Secondary Schools. The Department of Education, Queensland received more than $2 million for the triennium 1984-86. In addition to the Computer Education Program, the Queensland Government established the *Computer Literacy Project* which was "a major State-funded initiative to raise the skill-base of secondary school students" (Queensland Treasury Department and Department of Education, 1991, p.5). Through the period 1984-87, approximately $9.5 million was allocated to the *Computer Literacy Project*.

According to the report *Learning Systems Project: A learning technology program for schools* (Queensland Treasury Department and Department of Education, 1991, p. 5), several findings were identified from the *Computer Literacy Project*. Firstly, schools initially had little 'ownership' of the project and that learning technology initiatives will not have a significant impact on students' learning if they emphasise the acquisition of resources over the meaningful integration of information technology into curriculum programs and into the 'school culture'. Secondly, there was an implication that the use of information technology in schools requires changes to be made to the roles and relationships of teachers and students, teaching strategies, approaches to learning, classroom organisation, and school management. Thirdly, the *Computer Literacy Project*’s greatest effect was in raising students' and teachers' awareness to the potential of information technology to improve, enhance, and extend opportunities for learning.

In 1984, the *Microcomputers in Preschools Curriculum Study*, formerly known as the *Microcomputers in Preschool Education Project*, was initiated to investigate the use of microcomputers...
ers and related technologies in preschool education. Blemings (1985, p.2) states that:

"Many early childhood educators believe that the microcomputer is an innovative tool with the potential to enhance young children's learning. Some researchers have reported that the microcomputer has the potential to make a unique contribution to the development of abstract thought processes and problem-solving skills." (Blemings, 1985, p. 2)

The study by Blemings resulted in a series of reports being published. In one of those reports, *Microcomputers in Queensland Preschools A Study* (Blemings, 1988), findings were presented and recommendations were made. Blemings (1988, p. 30) reported that:

"The extensive trials of computer resources conducted as part of the Study indicated scope for the four broad areas of action listed below. The 1987 survey confirmed their importance.

- Implementation of a continuing program of professional development for personnel working in the area, focusing of knowledge and skills appropriate to the educational use of computers in early childhood education.
- Continuing evaluation of developments in computer resources, and dissemination of information about current trends in their use.
- Expansion of support services for teachers using computer resources in early childhood education.
- Provision of quality computer resources in sufficient quantities to enable teachers to become familiar with them and evaluate them, and to allow extended periods of borrowing for children's use."

Pacey (1990, pp. 75-83), in providing a comprehensive historical perspective of the Queensland scene, indicated that, by 1985, the emphasis changed away from 'computer awareness' to 'computer literacy'. She referred to the *Computer Literacy Project* outlined above (see Chapter Two, p.59) in which all secondary schools in Queensland were provided with computers housed in special rooms to teach computer literacy. Pacey also reported that in 1985, "a Primary Computer Project was commenced in Queensland schools" (Pacey, 1990, p. 78). To support this project, a variety of activities were conducted throughout the various Regions of the Department of Education throughout Queensland. Regional consultants visited schools and conducted inservice programs for teachers, and resources were developed.

Further support was provided for schools in 1986 in which a $500 subsidy was made available for each school for the purchase of computer hardware. By 1986, it was estimated that "there were over 2 100 computers held in primary schools. The provisions for secondary schools were estimated at over 4 500 computers" (Department of Education, Queensland 1988).
It is interesting to reflect on the Departmental guidelines for schools for obtaining the $500 subsidy. In a special edition of *Primary Viewpoint* which focused on *Computers in the Classroom* (Department of Education, Queensland, 1986), Eastment (1986) indicated that:

"...it is virtually impossible to acquire an unsuitable computer. A subsidy of $500 for the purchase of computer hardware is available provided prior approval of the Regional Director is obtained. Choice is limited to the following approved models: Apple IIe, BBC Model, Tandy Colour, Microbee, Commodore 64."

How rapidly the technology has changed. In the space of less than ten years, no schools now would seriously consider buying any of those models. More importantly, however, Eastment (1986) drew attention to the increasing emphasis on "curriculum applications involving the microcomputer as a teaching/learning resource integrated into school programs across the curriculum to support more effective teaching strategies". Also, during 1986, three documents were produced to assist teachers in using computers in their classrooms. These were *Computer awareness for primary schools: Three case studies* (Williams, 1986a), *Guidelines for Primary Schools COMPUTER AWARENESS* (Williams, 1986b), and *Writing With a Word Processor* (Guttormsen, 1986). In the overview to the curriculum paper, *Computer Awareness for Primary Schools: Three Case Studies*, Williams (1986a, p. 1) notes that "the key to the successful use of computers in the primary school is integration". Furthermore, he indicates that since the inception of the *Computer Education Curriculum Project* in Queensland, attention has been focused on:

"...the computer's potential to extend teaching and learning and on support for teachers wishing to incorporate computer-based learning activities into their classrooms". (Williams, 1986a, p. 1)

Williams (1986b, p. 31), while outlining a variety of applications and making suggestions for the use of computers in classrooms, warns that often when computers are initially introduced in schools, there is an initial enthusiasm, but this enthusiasm wanes due to inadequate teacher training and the lack of quality software. He suggests that "it is important that before computers are introduced to the classroom, teachers should feel confident about using them" (Williams, 1986b, p. 31). Other considerations suggested by Williams are that teachers need time to become acquainted with the technology, school communities must analyse the school's needs in relation to computers, and timetable the use of computers.
Guttormsen (1986) highlights the potential of computers as word processors. She claims that:

"As a writing tool, the word processor motivates students to write more often and at greater length than they might with only pen and paper. Because the drudgery of rewriting is removed, students are keen to edit and polish their writing, whereas previously they would have considered such revision a tedious chore. The polished, clean, final copy they are able to produce encourages them to take pride in their writing and heightens their self-esteem. Writing with a word processor also provides opportunities for discussion about writing, language, thinking and learning among students and their teachers." (Guttormsen, 1986, p. 1)

To realise this potential, Guttormsen (1986, p. 23) suggested that teachers provide models of good keyboarding techniques by introducing correct fingering and sitting position. Further, according to Guttormsen, teachers should allocate a minimum of ten minutes daily over a period of several weeks for students. Because many students in schools have only a few hours access to computers each semester, Guttormsen (1986, p. 23) notes that “there seems little purpose in specifically teaching keyboard skills”. However, she argues the case that, as children increasingly use computers, keyboarding skills become more important. Interestingly, the recently published draft copy of the Years 1 to 10 English Language Arts: Curriculum Guide (Department of Education, Queensland, Feb. 1991b, pp. 84-87) outlines the learning objectives, related knowledge, appropriate communicative procedures, and appropriate focused learning episodes for handwriting and keyboarding. The draft document indicates that informal activities which promote keyboard familiarity and computer awareness are appropriate for Years 1 to 3, and that during Years 4 to 7 the emphasis should be on learning correct keyboarding techniques. Given Guttormsen’s concerns about the ineffectiveness of learning keyboarding skills due to the lack of student access to computers in schools, it appears doubtful that many students will gain the keyboarding skills as stated in the draft Years 1 to 10 English Language Arts: Curriculum Guide (Department of Education, Queensland, 1991b).

A recurring theme throughout the early initiatives undertaken in Queensland to introduce computers and computer-related technologies in schools was the need to take into account and improve the training and professional development of teachers. A document, Computer Literacy for Teachers in Queensland Schools - competencies, strategies and resources...
(Department of Education, Queensland, 1988) addressed this issue. A framework was presented which referred to three identifiable areas of computer literacy competencies. This framework, presented in Table 1.2 in Chapter One, is based around the three areas—essential competencies, extension competencies, and specialist competencies. The research suggests that essential and extension competencies have a bias towards teaching with computers, while specialist competencies is biased towards teaching about computers. The importance of developing the computer literacy of teachers is clearly demonstrated in the statement that "all teachers shall have the opportunity to become computer literate" (Department of Education, Queensland, 1988, p. 21). Furthermore, the following recommendations which were made leave no doubt whatsoever of the central importance of improving the computer literacy of teachers (see Chapter One, Table 1.3, p.19):

"Recommendation 1:
That the three areas of competence - Essential, Extension and Specialist - be recognised.
Recommendation 2:
After 1993, the essential competencies will be a condition of employment.
Recommendation 3:
All currently employed teachers are to develop the essential competencies by 1993.
Recommendation 4:
That the Demand and Supply Model be adopted.
Recommendation 5:
That each Region develop a policy and a plan for the implementation of this computer literacy for teachers initiative.
Recommendation 6:
That the employing authority negotiate with tertiary institutions for provision of suitable courses in harmony with the Essential, Extension and Specialist competencies." (Department of Education, 1988, pp. 10-24)

In summary, the scene in Queensland from the period prior to the 1980's until 1988 has been one of heightening implementation of initiatives in integrating learning technology at all school levels. Documents to assist schools and teachers were produced, funds became available from both the Commonwealth and State Governments to supplement the schools' locally raised funds being used to purchase computer hardware and software, and policies were developed. As well as concerns about the acquisition of hardware and software, there was the emergence of curriculum concerns in that the classroom applications of computers moved from computer awareness to computer literacy and to questions about how computers might be used to enhance and extend the teaching and learning of students.
Very significant initiatives were introduced through the *Learning Systems Project* during late 1988. These are discussed in the following analysis.

### 2.9.2 The Learning Systems Project

The Queensland Government allocated $20 million over three years (88/89 - 90/91) to the Department of Education. The impetus came from a largely *economic* justification evident in the Premier's speech at the launch of the Learning Systems Project.

"The promotion and encouragement of technological innovation will be a cornerstone of the new State Economic Development Strategy. [It] is a long term strategy which will take Queensland to the year 2000 and beyond, and therefore, the children who participate in the Learning Systems Project will be key players in the delivery of that strategy. They will be coming out of schools into offices, factories and government at a time when we expect to see the real fruits of the economic strategy...

...Employers will benefit from this $20 million initiative, with a guarantee of potential employees with computer and keyboard skills. The workforce generally will be better able to help us handle a fiercely competitive global economic situation." (Queensland Government, 1988)

Learning Technology Services of the Department of Education in Queensland planned and managed the *Learning Systems Project*. The *economic* pressure influenced the decision to "devote the major proportion of the LSP [*Learning Systems Project*] appropriation to revitalising the Commerce subject area in secondary schools" (Queensland Treasury Department and Department of Education, 1991, p. 11). Four components of the *Learning Systems Project* were formed - Business Education Centres (BEC's), Electronic Learning Centres (ELC's), Learning Access Systems, and the information technology courses 'Practical Computer Methods' (PCMs) and 'Information Processing and Technology' (IPTs). Descriptions of these are provided elsewhere (Department of Education, Queensland, 1990b, pp. 2-4; Queensland Treasury Department and Department of Education, 1991, pp. 11-13).

Undoubtedly, this project impacted greatly upon schools in terms of increased hardware and software. In 1989, the first stage of the Business Education Centres saw 51 BEC's costing $3.1 million established in State secondary schools in Queensland. The second stage costing $5 million resulted in a further 106 BEC's in State secondary schools. The third year...
of the program extended BEC's to all State secondary schools in Queensland. Following a successful trial of four Electronic Learning Centres in 1988, ELC's were extended to a further 49 State secondary and primary schools in 1989. By 1990, 150 centres were established at a cost of $2.5 million. The technology-related courses, *Practical Computer Methods* and *Information Processing and Technology* provide students in State secondary schools with courses of study. The *Practical Computer Methods* course covers basic operations, word processing, spreadsheets, file-management programs, relational databases, graphics software and communications using Keylink. The *Information Processing and Technology* course provides a study for students who desire to enter tertiary courses or embark on technology-related careers.

A report titled *Learning Systems Project - A learning technology program for schools* (Queensland Treasury Department and Department of Education, 1991) was produced. In a letter accompanying that report, Richard Warry, who at the time was the Deputy Director-General (Resources), indicated that:

"The recent major Government initiative to enhance the use of information technology in schools, the Learning Systems Project, has been the subject of a collaborative review between the Department of Education and Treasury Department...

...relevant personnel were consulted on key aspects of the planning and implementation of the Learning Systems Project...

...A departmental strategic plan for learning technology is being prepared at present. Some of the report's recommendations will be implemented through this process." (Warry, 1991)

That report provided recommendations and conclusions related to the appropriateness and direction of the project, project management, impact of the project, and the learning technology resource base and finally made recommendations for future directions (Queensland Treasury Department and Department of Education, 1991, pp. (viii)-(xx)). In terms of direction, that report recommended that any future learning technology initiative must have sufficient 'lead time' to allow for proper planning. Moreover, it recommended that:

"Long-term vision and direction for learning technology, with regularly revised policy guidelines are required. Without such direction the full benefits of learning technology for student, and for Queensland, are unlikely to be realised". (Queensland Treasury Department and Department of Education, 1991, pp. (viii)-(xx))

In terms of the strategies for program management, the report (Queensland Treasury..."
Department and Department of Education, 1991, p. (v)) identified conditions which need to be applied to ensure the maximum benefit is obtained from any learning technology program. It stated that the program needs a clearly articulated rationale, goals and implementation plan which are understood and supported by all stakeholders. Fundamental for the long-term success is a 'critical mass' approach which refers to a level of resources for schools and students in which sufficient access for students to learning technology resources is necessary for there to be significant differences to learning outcomes. The report indicated that "there is no point spreading computers too thinly" and that there "have been examples where a strong emphasis on achieving equity has led to a limiting of the effectiveness of learning technology". The report suggested that it considers a more reasonable approach is to attempt to attain equity over time through continued efforts to enlarge the number of properly resourced schools. In addition, the report highlighted 'lighthouse' and 'bidding' strategies as effective means for reforming classroom practice and informing teachers. The 'lighthouse' strategy was defined as the development and promotion of 'model' centres which demonstrate particular applications of learning technology to other schools, while the 'bidding' strategy requires schools to prepare project proposals. According to the report, the latter strategy in which schools present submissions outlining the purpose and focus of the proposed school activity, the implementation plan, and a bid for funds might facilitate commitment on the part of the school.

The evaluation of the program management of the Learning Systems Project highlighted some important issues and problems. These included the following:

- availability, relevance and timeliness of management and performance information;
- evaluation, both of the project and of school centres/schemes;
- responsiveness to school needs in areas such as facilities and purchasing;
- availability and timeliness of support materials;
- realistic time-frames for planning and implementation." (Queensland Treasury Department and Department of Education, 1991, p. 99)

Subsequently, the evaluation report stressed that exploratory studies and investigations are necessary to assist in understanding the most effective ways of using the recently released and emerging technologies to enhance and extend children's learning.

Chapter Two

Review of the Literature
Findings relating to the impact of the project provided information about the usage of resources, learning contexts, curriculum, and teacher development and support. Based on these findings, recommendations were made. Among these were recommendations which focused on the need for strategies and incentives to be developed to encourage a broader base of teachers to improve their personal and professional competence in using information technology. The report noted that among teachers and administrators there is now widespread "acceptance of the use of information technology as a learning tool", that technology appears to have a number of positive impacts on students, "...particularly in personal attributes and behaviours such as motivation and confidence, thinking skills and social skills" (Queensland Treasury Department and Department of Education, 1991, p. (xvi)). However, it also noted that only "a very small proportion of Queensland teachers has gained a minimum level of proficiency with information technology, even at a personal level" (Queensland Treasury Department and Department of Education, 1991, p. (xvi)). Thus, while significant gains have been made in resourcing schools and implementing initiatives in integrating learning technology in schools there would appear to be little room for complacency.

The report (Queensland Treasury Department and Department of Education, 1991, p. (xix)) also recommended that $5 million should be allocated each year to secondary schools to enable them to maintain their learning technology base. If not, the report warned that "a crisis can be expected to develop within secondary schools in the near future" as the educational programs being implemented will find difficulty continuing due to equipment failure, unreliability, or poor performance. In addition, it was stated that this proposal would maintain the resource base at the existing level for only the current application areas. The report raised the issue of additional funding issue for schools and the system. That is, funding for learning technology initiatives in schools does not necessarily end once the initial acquisition of computer hardware and software has been completed. There is a need for funding provisions to be made for replacing and upgrading equipment as well as repairing equipment to enable the existing learning technology resource base in schools to be maintained.
Recommendations were made for the future direction of learning technology initiatives in Queensland schools (Queensland Treasury Department and Department of Education, 1991, p. (xx)). Among these were recommendations for the revision of the Department of Education's policy for learning technology, and for a strategic plan for learning technology to be developed. New initiatives were recommended for focusing on Years 6 and 7, and further projects to be initiated which focus on literacy, numeracy and language in Years 8-10. The recommendations suggest that the implementation of these new learning technology initiatives should be based on the 'critical mass' and 'lighthouse' principles. Furthermore, it was recommended that Studies Directorate be given responsibility for undertaking investigative studies in information technology in education. This recommendation is obviously a response to one of the program management problems discussed earlier which identified the lack of evaluation studies. That is, despite large funding being allocated for learning technology initiatives and programs being implemented in schools, there was insufficient evaluation information available to assist in further program improvement and policy revision. The program evaluation undertaken here using the QSC Project, a major innovative learning technology initiative, as the focus for this case study will provide insights and information which will assist program improvement and policy revision.

2.9.3 Other Recent Initiatives

Other initiatives have been implemented in Queensland in recent years. These include Telelearning, Distance Learning Systems, Information Access, Electronic Mail, Learning Systems Support, and the Queensland Sunrise Centre. Descriptions of these are available elsewhere (Department of Education, Queensland, 1990b, pp. 5-13). The focus of this program evaluation is the QSC. A summary of the background to the establishment of, and the broad purposes of the QSC were outlined in Chapter One (pp. 13-16). A situational analysis of the QSC Project is provided later in Chapter Five. The following sections present some of the important findings and implications contained in research reports of the QSC Project (Ryan, 1991; Rowe, 1992, 1993).
The QSC Project, which commenced in 1990, was in its third year of operation when the QSC evaluation for this thesis was undertaken. Prior to this evaluation, the QSC had been the focus of two research efforts conducted by ACER. The first of these was undertaken in 1990 and resulted in the report *The Queensland Sunrise Centre A REPORT OF THE FIRST YEAR* (Ryan, 1991). The second research initiative was undertaken in 1991 and a pre-publication copy titled *Learning with Microcomputers: Issues, Observations and Perspectives* (Rowe, 1992) had been made available for the perusal by key school and Departmental personnel. That work by Rowe became published and titled *Learning With Personal Computers: Issues, Observations and Perspectives* (Rowe, 1993). Those research reports are discussed in the following sections in order to highlight some of the key findings and implications.

### 2.10.1 The Queensland Sunrise Centre A REPORT OF THE FIRST YEAR (Ryan, 1991)

Ryan (1991) provides critical insights into the early stages of the implementation of the QSC Project. As he indicates:

> "The early stages of a project are critical. Decisions are made, and events unfold, that set the course for later development. It is also a time where heavy demands are placed on the teachers, students and the project planners. New practices have to be adopted and old ideas re-examined." (Ryan, 1991, p. 23)

Ryan noted that prior to the project’s commencement, most of the technological equipment that was perceived to be needed for the project was ordered and purchased by the project administration (Ryan, 1991, p. 39). In addition, Ryan (1991, pp. 39-41) identified technical difficulties early such as confusion over the type of disks that were suitable for the Toshiba 1000SE laptop computers, problems associated with the management of and charging of batteries, and students losing the contents of the RAM drive if the batteries were exchanged incorrectly. Ryan reported that some students lost work together with the software that had been established on the students’ machines. This resulted in the teachers’ distrust of the computers and their annoyance at the time demanded in maintaining them. Moreover,
he observed that the teachers had no training in either the organisation of computer files into directory structures or the use and management of hard drives. Indeed, he noted also that "extensive experience with the instructional aspects of computing was largely missing from their background" (Ryan, 1991, p. 41). Ryan suggested that while problems were presented due to the teachers' lack of previous experience, the problems became more significant due to the general lack of technical and curriculum support for the teachers early in the project. In fact, although the project was generated in late 1989 and implemented from the beginning of 1990, Ryan noted that a Project Officer who was to have a critical role in teacher support did not take up duty until May in 1990. This led Ryan to reflect that: "Although not apparent at the time, it may be inferred that there existed a pattern of action determined collectively by the project planners. The evidence suggests that a deep-end philosophy existed to guide the implementation of this innovative project. The philosophy was based on the belief that innovation should be initiated with an immersion in new ideas, tools and practices. Out of the ensuing struggle should emerge well-suited practices and novel ideas. Leaving aside for the moment the naivety of this approach and its unfortunate consequences, the whole approach must be seriously questioned in the absence of adequate support." (Ryan, 1991, p. 42)

Ryan noted that it was fortunate that the Project Officer had a primary teaching background and experience in preparing curriculum materials using computers. Through many activities, the Project Officer facilitated structures for meetings, timetables, inservice activities, curriculum planning, and assisted teachers in exemplifying the innovative uses of the computer in the curriculum. Both the Project Officer and the Research Officer assisted with technical support through regular meetings before school to provide Logo and operating system instruction. Ryan (1991, p. 47) noted that, in total, he provided twelve lessons for the teachers. Ryan reported that, through the activities of the Project Officer, toward the end of the first year "the collective notion of control and ownership of the project among the teachers" (Ryan, 1991, p. 46) had been developed. Importantly, the teachers had been given the opportunity to develop statements of philosophy that utilised their own ideas and they were given opportunities for input and control over the planning and provision of resources for the next year [1991].

In the conclusion of his report, Ryan (1991, p. 189) indicated that there was substantial evidence to suggest that students had become more willing risk-takers, demonstrated more
approaches to solving (classroom-related) problems, and established a network of cooperative practices. He noted that despite quite intensive and committed efforts by the teachers, the tasks of constructing and supporting a learning culture, attaining technical knowledge and implications of its use, and choosing models, metaphors and practices as starting points for students remained elusive. While he noted that some creative practices were evident in the teachers' responses to innovation, the teachers' responses "highlight how the key issue of access (to technical, curriculum and professional support) shapes the way they interpret the project goals" (Ryan, 1991, p. 190).

2.10.2 Learning with Microcomputers: Issues, Observations and Perspectives (Rowe, 1992) and Learning with Personal Computers: Issues, Observations and Perspectives (Rowe, 1993)

Rowe's study was of the QSC Project in its second year [i.e. 1991]. The major concern of that research was to focus on the "attitudes, knowledge, abilities, and achievements of Year 6 and Year 7 students who work with their own laptops" (Rowe, 1992). This review reports some of her key findings. Some of the conclusions contained in her reports are presented in the following discussion.

Rowe (1992) reported that students in both Year levels had improved in computer awareness and in the knowledge and skills relating to computing. She noted, however, that during the year some students became critical of the offerings of the 'Sunrise' classroom. In particular, by the end of the year [1991], a large number of the Year 7 students were unhappy about the prospect of another year (i.e. their first year at secondary school in Year 8) in the project. Rowe suggested that "Many of the students feel that they are missing out on certain learning and social activities which their friends in the non-Sunrise class children experience". Despite this, according to Rowe, the majority of students enjoyed computing and exploring with it.

In examining student efficiency in programming, Rowe noted that there was a lack of efficiency and that the perception of programming was that it was seen as no more than a
tool to achieve certain goals. The QSC students were compared with the Kurland et al (1987) study in which students were presented with seven geometric shapes and students were then instructed to write procedures for five of the seven figures. Students were informed that the procedures they formulated were to be their best; i.e. their most elegant or efficient that they could produce. The analysis of the programs examined the style of procedures particularly the use of the repeat command, the use of subprocedures, recursion and make command. Rowe (1992) found that although a few showed excellent programming, the results indicated that a large percentage of the QSC students were not focusing on efficiency and not using the higher level thinking skills that Logo can sustain. She argued the case for better modelling of the programming skills. She expressed the caution that:

"One of the disadvantages of the peer teaching approach as practised in the peer scheme of the Coombabah project is that the level of expertise and the programming experience of the class experts may not be just high enough. These experts might be able to produce workable procedures, but they themselves, lacking models and masters...are neither efficient nor elegant in their programming." (Rowe, 1992)

In relation to gender differences, Rowe indicated that gender differences with computer use tend to develop over time with computer familiarity and use. She noted that in situations such as the QSC in which there was guaranteed equal access to computers, gender differences were not evident before the students had considerable use of the computers. However, she reported that over time gender differences were evident in relation to attitudes to computing, to motivation and computing achievement. Among the differences identified, Rowe found that when stuck with a procedure, the boys tend to ask the teacher for help while very few girls do. Moreover, when girls are faced with a problem, they tend to turn to a friend for help. Rowe suggested that this might explain why some of the girls have adapted less well to computing. Rowe asserts that research concerned with gender differences in relation to learning with computers and student achievement indicates that this may be related to many factors. Some of these, Rowe indicates, include the impact of differential societal images, perceived expectations and the expectation of different life goals for boys and girls, the structure of learning tasks, the nature of the feedback in performance situations, the organisation of classroom settings, and the overt

Review of the Literature
and covert reactions of teachers to their female students.

2.11 Synthesising the Literature Review With the Evaluation Questions

The evaluation questions guiding this program evaluation of the QSC were stated in Chapter One. These were presented under four headings - Situational Analysis, Project Management, Impact of the Project, and Appraisal of the Model for Program Evaluation. The issues which emerged through the literature review have been synthesised with the evaluation questions relating to the first three headings. This process assists in identifying, justifying, and checking the validity of the evaluation questions. The evaluation questions relating to the heading - Appraisal of the Model for Program Evaluation will be justified in Chapter Three. The evaluation questions are presented in Table 2.2 together with the main sources justifying their inclusion.

2.12 Conclusion

This chapter has reviewed literature relating to technology and education. To assist in the conceptual organisation for presenting the review, an overview was presented in Table 2.1: Overview of the Review of the Literature. Following an introductory review of some of the broad, general issues emerging in the technology and education interface, the frameworks for analysing developments in technology and education developed by Cerych (1985) and Sendov (1986) were outlined. The contribution made by Papert (1987; 1990) through the distinctions he makes between technocentrism, scientism, educology, and constructionism were also presented. Furthermore, the 'technochoice' perspective suggested by Sachs, Russell, and Chataway (1990) was presented as an appropriate approach for examining questions relating to technology, society, and education. A summary of the use of Logo in classrooms followed due to Logo being a central feature of both Papert's work and the QSC. The need to investigate and illuminate the 'areas of silence' stressed by Bowers (1988) and Green and Bigum (1990) highlighted the importance of examining the cultural perspectives of computing in schools to help better 'illuminate' what happens in classrooms.
### Table 2.2: Synthesis of the Literature Review and the Evaluation Questions

<table>
<thead>
<tr>
<th>Evaluation Headings / Evaluation Questions</th>
<th>Issues</th>
<th>Sources/Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situational Analysis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why was it initiated?</td>
<td>Rationale</td>
<td>Major innovative initiative to investigate the uses of the new and emerging technologies for education. It is significant within the Queensland, Australian, and International Scene.</td>
</tr>
<tr>
<td>What is its setting and context?</td>
<td>Context</td>
<td></td>
</tr>
<tr>
<td>Who participates in the program?</td>
<td>Participants</td>
<td></td>
</tr>
<tr>
<td>What is the program's history? How long is it supposed to continue?</td>
<td>Planning</td>
<td></td>
</tr>
<tr>
<td><strong>Implementation and Implications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What was intended and what happened in terms of program management?</td>
<td>Intentionality/Reality Management</td>
<td>1. Need for Program Rationale. 1. Need for Evaluation Information.</td>
</tr>
<tr>
<td>What are the implications for the management of further initiatives to integrate learning technology in schools in terms of personnel, resources, budgets, and training and professional development?</td>
<td>Information Needs</td>
<td>1. Need for Evaluation Information. 1. 'Lighthouse' Project. 1. Technology Resources. 1. Support. 1. Policy Revision. 5. 'Areas of silence'.</td>
</tr>
</tbody>
</table>

| **Impact of the Project**                 |       |                        |
| What impact did the Queensland Sunrise Centre Project have upon the teaching and learning context in terms of classroom organisation and management? | Classroom Organisation and Management | Participants* 2. Pedagogic and Sociological Factors. 4. Eduology. 5. 'Areas of silence'. |
| What are the implications for the new and emerging technologies for curriculum design? | Curriculum | Participants* 2. Pedagogic Factor. 5. 'Areas of silence'. |
| Have there been changes in student learning through the use of laptop computers and immersion in a technology-rich environment? | Student Learning | 2. Pedagogic Factor. 3. QSC Research. 4. Eduology. |
| In what ways have the students been advantaged and/or disadvantaged by being involved in the program? | Student Learning | Participants* 2. Sociological Factor. |
| Were there any gender differences; e.g. do girls react differently to technology compared with boys? | Gender Differences | Participants* 3. QSC Research(Ryan,1991). |
| How did teachers come to grips with the new technologies? What are the implications for the training and professional development of teachers? | Technical and Professional Support for Teachers | Participants* 1. Need for Evaluation Information. 3. QSC Research(Ryan,1991). 5. 'Areas of silence'. |
| What were the concerns and perceptions of parents? | Stakeholders | 2. Sociological Factor. 5. 'Areas of silence'. |

*Note: This synthesis does not identify all sources from the literature review presented in the analyses of the International Scene, the Australian Scene, and initiatives in Queensland. It highlights some of the significant sources.

1. These were questions ranked highly by key participants involved in the Queensland Sunrise Centre.
2. These were key issues, implications and recommendations presented in the evaluation of the Learning Systems Project (1991).
3. These were factors identified in the framework presented by Cerych (1985).
4. Previous research of the Queensland Sunrise Centre.
5. This term was defined and stressed as an approach to thinking about technology and education by Papert (1987).
6. The 'Areas of silence' refer to the argument presented by Bowers (1988, 1990) for investigating and illuminating the cultural context of educational computing.
A review of trends and issues which have emerged on the international scene was presented. A summary of significant developments in the Australian setting was provided with particular reference to national initiatives, computer applications in Australian schools, and the development of policies throughout the Australian States. The examinations and analyses of the international and Australian contexts provided background in which to portray the initiatives which have been undertaken in Queensland. In particular, following the identification of issues which emerged in earlier initiatives to integrate learning technology in Queensland schools, some of the recent research findings of the QSC were presented.

Many issues emerged throughout the literature review of developments internationally, nationally, and in Queensland. In particular, there was strong evidence of the need for investigative studies which aim to provide evaluation information about integrating learning technology in classrooms. In determining and justifying the key evaluation questions to guide the program evaluation, a synthesis of the literature review and the evaluation questions was presented in Table 2.2: Synthesis of the Literature Review and the Evaluation Questions. That synthesis appropriately drew attention to three headings guiding this program evaluation - Situational Analysis, Program Management, and Impact of the Project. The fourth heading - Appraisal of the Model for the Program Evaluation is discussed in the next chapter in which the theoretical background to evaluation is examined.
CHAPTER THREE

THEORETICAL BACKGROUND IN EVALUATION

This chapter presents a review of the theoretical literature relating to evaluation. Educational evaluation and program evaluation are defined, a brief overview of developments in evaluation and an analysis of evaluation models is presented. That discussion and analysis leads to the identification, modification, and implementation of an evaluation model for undertaking the program evaluation of the QSC Project.

A naturalistic and participant-oriented approach was identified to facilitate the involvement by the participants in the evaluation process of the QSC. As Worthen and Sanders (1988, p. 130) suggest, people see things and interpret them in different ways. Thus, multiple, rather than single, realities need to be recorded. This represented a challenge in the process of developing the conceptual model for guiding the program evaluation to enable the evaluation to capture the multiple realities of the participants as well as identify important issues which are shared by and involve the participants as stakeholders in order to guide further developments. The formulation of an evaluation approach for this study is influenced by Worthen's statement that there is "no one way to evaluate" (cited in Teachers as Evaluators Project, 1982a, p. 9). A conceptual model, which is an adaptation of the Stake-Batchler Model and draws upon Owen's (1992) evaluation Forms and Guba and Lincoln's 4GE, was developed for using the QSC as the focus for a case study. The model developed allows a variety of forms of data collection and inquiry including document analysis, questionnaires, interviews, site descriptions, classroom observations, and samples of students' work.

Questions relating to an appraisal of the model for the program evaluation are formulated. As this evaluation process is a search for adequate interpretations and the report will be presented to a variety of audiences including the key participants, the evaluation itself will be subjected to evaluation. This is referred to by various writers as meta-evaluation (for
example, Brinkerhoff, 1983; Worthen and Sanders, 1988). As Kemmis and Stake (1988, p. 129) indicate: 

"Evaluative studies can be designed and their forms of reporting organised to help readers review their understandings of the quality of what is being evaluated both privately and publicly. When they do so, they also invite readers to become involved in interpreting and reinterpreting the thing to be judged and thus become involved in testing the adequacy of the interpretations. The reader of a book is invited to think about the things the book is about but can also ask about the quality of the book itself. In the same way, an evaluation invites attention to itself as well as to the thing evaluated. The public process of an evaluative study invites those participating in it (whether as evaluators or evaluated), those observing it, and those receiving its reports to see themselves in terms of the relevant public traditions of interpretation. It invites them to become aware that, one way or another, they are participants in public traditions of evaluation."

Therefore, the key participants were invited to make judgements about the evaluation. In particular, their views were sought in relation to the model used to guide the study and to provide reactions to the conduct and product of the evaluation.

3.1 Defining Evaluation and Program Evaluation

In order to review the theoretical background to evaluation it is necessary to examine various definitions of evaluation. Following this examination, a definition of evaluation as it is used in this study is identified. Moreover, the term program evaluation is clarified.

What is evaluation? A review of the literature relating to educational evaluation reveals many definitions of evaluation. These often reflect various purposes for evaluation as shown by the following definitions offered by various writers at different times.

"The process of evaluation is essentially the process of determining to what extent the educational objectives are actually being realised by the program of curriculum and instruction." Tyler (1949)

"The purpose of evaluation is not to prove but to improve." Stufflebeam (1971)

"Systematic educational evaluation consists of a formal appraisal of the quality of educational phenomena." Popham (1988)

Those definitions vary in their indications of the purpose for evaluation. Tyler's definition, for example, emphasises the process of comparing performance data with clearly specified objectives while Stufflebeam's definition highlights the role evaluation might play in
assisting decision-making. Popham's definition focuses on the appraisal of quality and that the evaluation is systematic as opposed to the everyday, informal evaluative acts. From his review of definitions of evaluation, Talmage (1982) noted that:

"Three purposes appear most frequently in definitions of evaluation: (1) to render judgments on the worth of a program; (2) to assist decision-makers responsible for deciding policy; and (3) to serve a political function" (Talmage, 1982, p. 594).

According to Worthen and Sanders (1988, p. 24), the first purpose Talmage lists for evaluation is evaluation - to render judgments of the value of a program. They argue that the other purposes do not describe what evaluation is but rather what it is used for. Worthen and Sanders (1988, p. 24) define evaluation "as the act of rendering judgments to determine value - worth and merit - without questioning or diminishing the important roles evaluation plays in decision-making and political activities". Stake (1967) also focuses on evaluation "as essentially an exercise in judging the worth of something". In addition, Stake (1967; 1975a; 1975b; 1978; 1980) asserted that the two basic tasks of evaluation are description and judgment. According to Stake, the evaluation of an educational activity needs to provide full description and judgment of that which is being evaluated.

Guba and Lincoln (1990), in describing 4GE, have defined evaluation as "a socio-political process that results in an outcome - one or more constructions - that are jointly and collaboratively arrived at with stakeholders" (Guba and Lincoln, 1990, p. 4). The definitions provided by Stake (1967), Worthen and Sanders (1988), and Guba and Lincoln (1990) provide the basis for the definition adopted in this study. That is, evaluation is referred to as the process concerned with clarifying the worth, or merit, of an educational activity and utilising the principles of 4GE

"characterised by continuing negotiation with all stakeholders in order to determine the focus, the procedures, the interpretations and the proposals for action that guide the evaluation activity and emerge from it" (Guba and Lincoln, 1990, p.3).

Program evaluation in this study refers to the evaluation of an educational program as the evaluation undertaken is school-based. Madaus et al (1983) in providing a historical overview of program evaluation portray program evaluation as a "dynamic, yet immature, profession" (Madaus et al, 1983, p. 18). They indicate that there is a need to "improve
research, training, and financial support for program evaluation" (Madaus et al, 1983, p. 18). That argument has become further evident as Winston (1992, p. 105.4) notes that during the 1980’s and into the 1990’s, program evaluation has become a key element of program budgeting (Department of Finance, 1987; Corbett, 1989; Robinson, 1992) adopted as an approach by governments throughout Australia. Following the publication by the Department of Finance and Public Service Board of *Evaluating Government Programs - A Handbook* (1987) and *Program Evaluation - A Guide for Program Managers* (1989a), there has been an ongoing series of program evaluation publications and papers (Department of Finance, 1989b; 1990; 1991; 1992a; 1992b; 1992c; 1992d; 1992e; 1992f) aimed at providing guidelines for government departments, including education, to undertake evaluations.

### 3.2 Overview of Developments in Evaluation and Evaluation Models

This section provides an account of key developments in educational evaluation together with an analysis of evaluation models. Models of evaluation have become increasingly evident in the evaluation literature since the 1960’s. For example, Guba and Lincoln (1981) identified more than forty which have emerged in the literature since 1967. This section provides a summary of some of these to provide a context for the process of developing an evaluation approach for undertaking a program evaluation of the QSC Project.

The evaluation literature reflects an area of increasingly stronger investigation and interest. For example, the current situation is now different from that described by Worthen and Sanders (1973, p. 1) over twenty years ago in which they stated that evaluation is one of the most widely discussed but little used processes in today’s educational systems. They suggested that:

"... only a tiny fraction of the educational programs operating at any level have been evaluated in any but the most cursory fashion, if indeed at all. Verbal statements about education and accountability? An abundance. Genuine evaluation of educational programs? Unfortunately rare." (Worthen and Sanders, 1973, p. 11)

Batchler (1992, p. 5), however, argues that the present situation is different from that to which Worthen and Sanders refer. According to Batchler, early evidence of increased interest in evaluation was provided by the *Teachers as Evaluators Project* (1978). The *Teachers
as Evaluators Project resulted in a series of publications, reports, and case studies (Teachers as Evaluators Project, 1979; 1980a; 1980b; 1980c; 1981; 1982a; 1982b; 1982c; 1982d). Furthermore, Bachler draws attention to the conferences, workshops, and tertiary education courses in evaluation as well as the increased commissioning of evaluations now evident.

In examining developments in evaluation in the United States, Popham (1975, p. 3) notes that the system of public education was considered for many decades to be "one of the nation's finest accomplishments". However, according to Popham, "in the 1950's, dissident voices began to be heard" as critics began to argue that schools were ineffectual. Popham observed that:

"The honeymoon was over. It was no longer a widely held belief that the schools were functioning flawlessly. People began to wonder just how well those schools were doing their jobs. And when you wonder how well something is working, that sets the stage for evaluating it." (Popham, 1975, p. 3)

Thus, the initial motivation in the United States, and consequently Britain and Australia came from accountability for improved outcomes for schools. The criticisms being levelled at schools together with the increasing expenditure on education in school systems throughout the 1960's resulted in demands for the evaluation and justification of that expenditure. Tyler's (1949) definition was typical of the approach to evaluation throughout the 1950's and the 1960's. That is, evaluation was employed to determine the extent to which the educational objectives were being realised through programs of curriculum and instruction. This response in America resulted in the growth of a formal evaluation movement which relied largely on the 'scientific' methodologies of behaviorism and empiricism.

Popham (1975) referred to those early 'models' as goal attainment models. As the evaluation movement developed, dissatisfaction with the narrowness of Tyler's conception provided the catalyst for more comprehensive approaches to be developed. In examining the emergence of evaluation models, Popham (1988, p. 23) used the term 'models' to mean a "set of plans". He noted that the building of educational evaluation models throughout the late 1960's and the early 1970's became a 'fashionable activity' and he observed that for a time it appeared that an educational evaluation model could be generated by anyone who:
Popham (1975) isolated the overriding orientations inherent in the various models and then grouped them into four descriptive categories, viz.

- Goal-attainment models
- Judgmental models emphasising intrinsic criteria
- Judgmental models emphasising extrinsic criteria
- Decision-facilitation models. (Popham, 1975, p. 22)

More recently, Popham (1988, pp. 23-49) produced a revision of his earlier (1975) categorisation. As a result, he employed a five-category descriptive framework. He retained the goal-attainment and decision-facilitation classifications, modified the second and third category descriptors, and identified an additional, fifth category. His five classes of educational models became:

- Goal-attainment models
- Judgmental Models Emphasising Inputs
- Judgmental Models Emphasising Outputs
- Decision-Facilitation Models
- Naturalistic Models (Popham, 1988, p. 24)

Due to their relevance to this study, naturalistic models will be examined in some depth. Other writers have published classifications of evaluation models (Worthen and Sanders, 1973; Ross and Cronbach, 1976; Curriculum Development Centre, 1977; Stufflebeam and Webster, 1980; Guba and Lincoln, 1981; House, 1983; Madaus, Scriven and Stufflebeam, 1983; Worthen, 1984; Worthen and Sanders, 1988; Owen, 1992). To facilitate the process of selecting and developing an approach for undertaking an evaluation of the QSC, several classification schemas are described (House, 1978; Talmage, 1982; Worthen and Sanders, 1988). Furthermore, Owen’s (1992) evaluation Forms are examined later in this chapter to assist in choosing the most appropriate approach to program evaluation of the QSC. Owen (1992, p. 78.1) indicates that his evaluation Forms provide a framework for “flexibly selecting and using the most appropriate approach, bearing in mind the state of current development of a given program”. He refers to Day’s (1991) observation that what appears to be missing are guidelines for choosing an appropriate approach best suited to a particular situation. Following this discussion, an analysis of 4GE is presented to facilitate the development and description of an approach to evaluating the QSC.
House (1983) presented a taxonomy of evaluation models making use of the classifications of several writers (Stake, 1967; Worthen and Sanders, 1973; Popham, 1975). He identified eight models - systems analysis, behavioural objectives, decision making, goal free, art criticism, accreditation, adversary, and transaction. Table 3.1 below provides an extension of House’s model by including the more recently developed 4GE form of evaluation proposed by Guba and Lincoln (1989). House’s model highlighted the critical dimensions of comparison - the audiences to whom the evaluation is addressed, what the model assumes consensus on, the methodology of data collection, the ultimate outcome expected, and the typical question that the approach tries to address.

**Table 3.1 A Taxonomy of Major Evaluation Models**
(Adapted from House, 1983, p. 48)

<table>
<thead>
<tr>
<th>Model</th>
<th>Proponents</th>
<th>Major Assumes</th>
<th>Methodology</th>
<th>Outcome</th>
<th>Typical Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems Analysis</td>
<td>Rivlin</td>
<td>Economists, managers</td>
<td>Goals; known cause &amp; effect; quantified variables.</td>
<td>Efficiency</td>
<td>Are the expected effects achieved? Can the effects be achieved more economically? What are the most efficient programs?</td>
</tr>
<tr>
<td>Behavioral</td>
<td>Tyler, Popham</td>
<td>Managers, psychologists</td>
<td>Prespecified objectives;</td>
<td>Productivity</td>
<td>Are the students achieving the objectives? Is the teacher producing?</td>
</tr>
<tr>
<td>Decision Making</td>
<td>Stufflebeam, Akin</td>
<td>Decision-makers, esp. administrators</td>
<td>General goals; criteria</td>
<td>Effectiveness</td>
<td>Is the program effective? What parts are effective?</td>
</tr>
<tr>
<td>Goal Free</td>
<td>Scriven</td>
<td>Consumers</td>
<td>Consequences; criteria</td>
<td>Consumer choice; social utility</td>
<td>What are all the effects?</td>
</tr>
<tr>
<td>Art Criticism</td>
<td>Eisner, Kelly</td>
<td>Connoisseurs, Consumers, Critics, standards</td>
<td>Critical review</td>
<td>Improved standards</td>
<td>Would a critic approve this program?</td>
</tr>
<tr>
<td>Accreditation</td>
<td>North Central Association</td>
<td>Teachers, public</td>
<td>Criteria, panel, procedures</td>
<td>Professional acceptance</td>
<td>How would professionals rate this program?</td>
</tr>
<tr>
<td>Eversary</td>
<td>Owens, Levine, Wolf</td>
<td>Jury</td>
<td>Procedures and Judges</td>
<td>Resolution</td>
<td>What are the arguments for and against the program?</td>
</tr>
<tr>
<td>Transaction</td>
<td>Stake, Smith Macdonald, Parlett and Hamilton</td>
<td>Client, Practitioners</td>
<td>Negotiations; activities</td>
<td>Understanding; diversity</td>
<td>What does the program look like to different people?</td>
</tr>
<tr>
<td>Fourth Generation</td>
<td>Guba and Lincoln</td>
<td>Stakeholders, Focus of the evaluation and Audiences agreed to by proposals for stakeholders action that guide the evaluation</td>
<td>Socio-political constructivist process</td>
<td>Constructions of the various stakeholders?</td>
<td>What action occurs during and from the evaluation?</td>
</tr>
</tbody>
</table>

Theoretical Background in Evaluation
House (1983, p. 47) argues that the "current models all derive from the philosophy of liberalism, with deviations from the mainstream being responsible for the differences in approaches". According to House, there are identifiable key liberal ideas such as choice, individualism, competitiveness, empiricism, and the models also assume a free market place of ideas in which the consumers will 'buy' the best ideas. A further adaptation of House's schema, as displayed in Figure 3.1, provides a proposal for locating 4GE evaluation models as they relate to liberalism. In that figure, House (1983, p. 49) describes the top four models as utilitarian which he indicates refers to maximising happiness in society. He labels the bottom four models as intuitionist/pluralist. House (1983, p. 50) indicates that the ethical principles in the intuitionist/pluralist domain are not single in number nor explicitly defined as in utilitarianism. For House, the ultimate criteria of what is good and right are seen as individual feelings or apprehensions.

Figure 3.1. A Schema Relating Major Evaluation Models to the Philosophy of Liberalism
(Adapted from House, 1983, p. 49)
Worthen and Sanders (1988, p. 60) also developed a classification schema. They classified the many different approaches to evaluation into the following six categories. They suggest that it should be noted that these frameworks refer to conceptual approaches to evaluation, and not techniques.

1. **Objectives-oriented approaches**, where the focus is on specifying goals and objectives and determining the extent to which they have been attained.
2. **Management-oriented approaches**, where the central concern is on identifying and meeting the informational needs of managerial decision-makers.
3. **Consumer-oriented approaches**, where the central issue is developing evaluative information on educational “products”, broadly defined, for use by educational consumers in choosing among competing curricula, instructional products, and the like.
4. **Expertise-oriented approaches**, which depend primarily on the direct application of professional expertise to judge the quality of educational endeavours.
5. **Adversary-oriented approaches**, where planned opposition in points of view of different evaluators (pro and con) is the central focus of the evaluation.
6. **Naturalistic and participant-oriented approaches**, where naturalistic inquiry and involvement of participants (stakeholders in that which is evaluated) are central in determining the values, criteria, needs, and data for the evaluation.

Worthen and Sander's classification schema enables the identification of the driving force behind the evaluation, the major questions to be addressed, and the major organiser/s; e.g. is the evaluation to provide information for objectives or management decisions? Furthermore, Worthen and Sanders (1988, pp. 60-61) suggest that these six categories seem to be able to be distributed along House's (1983) dimension of utilitarian to intuitionist-pluralist evaluation as shown below in Figure 3.2. Again, the model has been adapted and extended to propose the inclusion of 4GE as an additional seventh category.

![Figure 3.2. Distribution of Seven Evaluation Approaches on the Dimension of Utilitarian to Intuitionist-Pluralist Evaluation](image-url)
In selecting and developing an evaluation approach for this study, it is worth noting Worthen and Sanders' observation following their examination of how epistemological issues, methodological preferences, metaphoric views of evaluation, different needs, and practical issues contribute to the diversity of evaluation approaches that:

"Regardless of which view you subscribe to, it is clear that either the inability to generate an idealistic evaluation model (after all, none has been forthcoming since the call for synthesis nearly a decade ago) or resistance to trading the diversity of models for a unified view accounts, at least in part, for the continued variety of approaches that confronts the evaluation practitioner." (Worthen and Sanders, 1988, p. 59)

In addition, Worthen and Sanders view quantitative and qualitative methods as compatible, complementary approaches in the evaluation of educational programs. They view both forms of methodology as appropriate, depending on the purpose and the questions for which the study is conducted. Stone's (1984) comment about educational research in general seems to extend to evaluation as well:

"Today in educational research,... the trend is methodological pluralism and eclecticism. Many formerly devout quantitative researchers are now trying their hands at qualitative inquiry. The vigorous quantitative/qualitative debate, if not dead, is somehow buried." (Stone, 1984, p. 1)

Therefore, in selecting and developing an approach for undertaking an evaluation of the QSC, there was not available a single model or approach which could have been considered to be either the only approach or the best approach. However, it is possible and desirable to draw upon the features of various models to develop a framework which can accommodate the evaluation questions formulated and presented in Table 1.2, and can guide the data collection and its interpretation. The framework developed can also provide guidance for the writing of the evaluation report and for future school-based evaluations in this field.

To assist in this process, various models were examined and it became evident that the more qualitative methods using naturalistic and participant-oriented approaches as described by Worthen and Sanders (1988) and fourth generation evaluation (4GE) approaches proposed by Guba and Lincoln (1989) seemed to reflect possible ways of guiding this study. Naturalistic and participant-oriented approaches are similar to House's (1983) transaction and Popham's (1988) naturalistic models. These are examined together with 4GE following an analysis of Stake's Countenance Model and responsive evaluation. Illuminative evaluation, action
Research and action evaluation are also discussed as possible approaches in formulating a framework for evaluating the QSC Project.

### 3.3 Stake's Countenance Model and Responsive Evaluation

Stake's work is discussed in some detail in this section as it provides the basis for the model developed for use in this study. Stake's (1967) *The Countenance of Educational Evaluation,* had a profound impact upon thinking about educational evaluation. Stake (1967, 1975a, b, 1978, 1980) asserted that the two basic tasks of evaluation are *description* and *judgment.* That is, the evaluation of an educational activity needs to provide full description and judgment of that which is being evaluated. Stake's framework, shown in Figure 3.3, enables the evaluator to plan, think, and work through the process of a complete evaluation.

#### Figure 3.3: Stake's Layout of Statements and Data to be Collected by the Evaluator of an Educational Program  
(Source: Stake, 1967)

<table>
<thead>
<tr>
<th>Description Matrix</th>
<th>Judgment Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intents</td>
<td>Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rationale</th>
<th>Antecedents</th>
<th>Transactions</th>
<th>Outcomes</th>
</tr>
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His later writing (Stake, 1972, 1975b, 1978, 1980) expanded on this and addressed the need to consider the *stakeholder* audience through the notion of *responsive evaluation.* The ultimate test of the validity of an evaluation is the extent to which it increases the audience's...
understanding of the educational program being evaluated. Accordingly, an educational
evaluation is responsive evaluation:

“If it orients more directly to program activities than to program intents; responds to audience
requirements for information; and if the different value-perspectives present are referred to in
reporting the success and failure of the program.” (Stake, 1975a, p.14)

Stake describes the responsive evaluator’s role in the following way:

“To do a responsive evaluation, the evaluator of course does many things. He makes a plan of
observations and negotiations. He arranges for various persons to observe the program. With
their help he prepares for brief narratives, portrayals, product displays, graphs, etc. He finds
out what is of value to his audience. He gathers expressions of worth from various individuals
whose points of view differ. Of course, he checks the quality of his records. He gets program
personnel to react to the accuracy of his portrayals. He gets authority figures to react to the
importance of various findings. He gets audience members to react to the relevance of his
findings. He does much of this informally, iterating, and keeping a record of action and reaction.
He chooses media accessible to his audiences to increase the likelihood and fidelity of commu-
ication. He might prepare a final written report; he might not - depending on what he and
his clients have agreed on.” (Stake, 1975b, p.11)

A naturalistic and participant-oriented approach to evaluation, according to Stake (1978), has
appeal in four ways. Firstly, it helps audiences for the evaluation understand the program
if we pay attention to the natural way in which we understand and communicate about
things. Secondly, knowledge gained from experience facilitates human understanding and
extends human experience. Thirdly, naturalistic generalizations, which are arrived at by
recognizing similarities of objects and issues in and out of context, are developed through
experience. Fourthly, by studying single objects, people accumulate experiences that may
be used to recognize similarities in other objects. In that way, we add to existing experience
and human understanding.

In clarifying how to do the evaluation, Stake (1975) identified twelve recurring events and
developed these to be seen as the face of a clock (Figure 3.4). On Stake’s ‘clock’, any event
can follow any event and the evaluator may return to any event many times during the
course of an evaluation. In addition, according to Stake, many events can occur at the same
time. The ‘clock’ in this way alerts evaluators that “flexibility is an important part of using
this naturalistic and participant-oriented approach” (Worthen and Sanders, 1988, p. 136).
Furthermore, Stake distinguishes 'responsive' from 'preordinate' evaluation. For example, as a responsive evaluation proceeds, "new issues might emerge and already identified issues be refined" (Kemmis and Stake, 1988, p. 67) whereas 'preordinate' evaluation emphasises "(1) statement of goals, (2) use of objective tests, (3) standards held by program personnel, and (4) research-type reports" (Stake, 1975, p. 14). This distinction is further highlighted by the statement by Kemmis and Stake (1988, p. 67) that:

"Preordinate evaluation may answer the questions some people ask, especially those responsible for the program, but different program and evaluation audiences may have different concerns. Using issues to orient an evaluation study and make it 'responsive' is a way of giving a more holistic account of a curriculum and addressing the variety of concerns people have about it."

This review of responsive evaluation not only permits, but suggests that it is desirable to use a range of data sources which might include standardised tests, observations, questionnaires and interviews. The QSC program evaluation aims to be responsive to the concerns of the individuals for whom the evaluation is being conducted. Hence, the QSC evaluation was able to be undertaken following a scholarship being awarded with the main aim of producing an evaluation report which dealt with the main issues that were perceived as
being important by the main stakeholders; i.e. Central and Regional Office personnel, administrators, teachers, students, and parents involved in the project. In this way, it is argued that the evaluation would fulfill the dual role of providing feedback to the participants as well as identify and analyse issues to assist in the formulation, implementation and evaluation of further learning technology initiatives in schools.

Illuminative evaluation, action research, and action evaluation are discussed briefly to identify further implications for developing an evaluation approach for this study.

3.4 Illuminative Evaluation

For the purpose of illuminating problems, issues, and significant features of a program, Parlett and Hamilton (1976) have suggested an evaluation approach, which they called *illuminative evaluation*. According to Parlett and Hamilton, it is important to study the context of school programs due to the variety of factors which influence programs. Some of these might include constraints (administrative, financial...), educators' individual characteristics (teaching style, experience...), and students' perspectives. In addition, they suggest that the introduction of changes within the school context might produce unintended and additional effects. For the *illuminative* evaluator, the task is to discover, document, and discuss what the innovation comprises and what it means to be a participant involved in it. While not directly addressing educational computing, Parlett and Hamilton's illuminative evaluation relates to the argument by Green and Bigum (1990) presented earlier in Chapter Two in this report that, in relation to studies of educational computing:

"...these 'areas of silence' - the 'unsaid' - which must be investigated, those unsymptomatc absences in the discourse of educational computing that speak to its investments and secret impulses and that must be interrogated and illuminated." (Green and Bigum, 1990, p. 370)

3.5 Action Research and Action Evaluation

The intention of action research is "to give persons the power to act to bring about change (action) by generating knowledge through rational reflection on personal experience..."
(research)” (Grundy, 1982, p. 24). The term was developed by Lewin to attempt to link social science experimentation and action in response to social problems. Davis (1987) describes action research as:

“a systematic process whereby practitioners voluntarily engage in a spiral of reflection, documentation, and action in order to understand more fully the nature and/or consequences of aspects of their practice with a view to shaping further action or changing their current situation preferably in collaboration with colleagues.” (Davis, 1987, p. 3)

Thorne (1990, p. 82) notes that there are four fundamental aspects of action research which are dependent on each other and are called *moments* in the overall strategy. The four moments are:

*(1) to develop a plan of action to improve what is already happening; (2) to act to implement the plan; (3) to observe the effects of action in the context in which it occurs; and (4) to reflect on these effects as a basis for further planning, subsequent action and so on.*”

(Kemmis and McTaggart, 1982, p. 7)

The model which portrays the action research spiral is represented in Figure 3.5 below.

*Figure 3.5: The Action Research Spiral*
(Source: Kemmis and McTaggart, 1982, p. 8)
Kemmis and McTaggart (1988, pp. 22-23) describe action research developing through that 'self-reflective spiral' which involves "planning, acting, (implementing plans), observing (systematically), reflecting... and then re-planning, further implementation, observing and reflecting". Thus, action research is an approach in which people work towards the improvement of their own practices and consequently it is an approach to improving education by changing practices and learning from the consequences of those changes.

Davies (1987, p. 37) argues that accounts of classroom life by teachers have "an enormous impact on other teachers - particularly if the personal tone is retained, if the process is described 'warts 'n all', and if there are few pedantic assertions about what other people could do in the classroom". Thorne (1990, p. 84) also notes that while action research is more a strategy of evaluation than a model, it is being regarded widely as a model due to its widespread use and credibility. In addition, he suggests that the collection and processing of data inherent in Stake's evaluation model could be the basis for the observation and reflection stages in the action research process. Thorne concludes that:

"... it seems reasonable to accept that the action research method now has a distinct place in evaluation practice and therefore the process can be examined as an entity along with models of evaluation." (Thorne, 1990, p. 84)

A more recent term and approach is that referred to as action evaluation which is:

"a process in which the 'practitioners' are included as evaluators, which features collaborative planning and data-gathering, self-reflection and responsiveness, and which embodies a substantial element of professional development. 'Ownership' of the evaluation is vested in the 'practitioners'." (Batchler, 1984, p. 15)

According to Batchler and Maxwell (1987, p. 70), action evaluation "aims primarily to bring about improvement in educational programs in an ongoing fashion". Moreover, due to its emphasis on professional development, action evaluation also aims to produce change in participants. They indicate that there are similarities between action research and action evaluation since they share seminal writings on action research. However, Batchler and Maxwell (1987, p. 73) suggest that action evaluation draws upon evaluation literature. The similarities are that both have improvement in context as their purpose, both intend professional development as an outcome, both use facilitators to ease along the processes
of discussion, reflection, and action, and both are demanding of teacher time and energy. They also indicate that participation is a feature of both and the participants own the process.

However, while there are similarities, Batchler and Maxwell (1987, p. 74) point out that there are differences. They suggest that action research tends to have the classroom as the focus, while action evaluation has the school as the focus with less emphasis upon a particular classroom. They state that:

"The characteristics of action evaluation make it an appropriate change-producing activity in schools. Through its evaluative emphasis it leads to informed action aimed at improving schools' programs, but also, through its professional development thrust, it leaves behind expertise and changed attitudes enabling teachers to conduct their own evaluations. Given the context within which it must function, it is much more suitable as an improvement procedure than any external 'white coat' approach to evaluation." (Batchler and Maxwell, 1987, p. 76)

Through action evaluation operating at the whole school level, they indicate that the dialogue amongst teachers may produce something new to them. Negotiation becomes paramount, for Batchler and Maxwell, in action evaluation, as the purpose is for improvement of the whole school, not only the improvement through more effective individual classroom practices but also through school structures. Similarly, the 4GE principle of negotiations with stakeholders is important in this study "as a means to empowerment, both because of its process aspects and because it shares information (which is itself power)" (Guba and Lincoln, 1989).

3.6 Naturalistic and Participant-Oriented Approaches

Worthen and Sanders (1988, pp. 127-128) indicate that beginning as far back as 1967, some evaluation theorists began reacting to the dominance of what they considered to be mechanistic, insensitive approaches to educational evaluation. These theorists expressed concerns that many large-scale evaluations were conducted without the evaluators ever once setting foot in the participating classrooms. Moreover, they began to publicly question whether many evaluators really understood the phenomena that existed behind
writings (e.g. Worthen and Sanders, 1988) that value pluralism needed to be accommodated and protected. In particular, multiple, rather than single, realities needed to be recorded. As Worthen and Sanders (1988, p. 130) suggest, people see things and interpret them in different ways, and no one perspective is accepted as the truth. Thus, because only an individual knows what he or she has experienced, then all perspectives are accepted as correct. The evaluator’s task then is to capture these multiple realities of the participants. Therefore, in evaluating the QSC, it is important for that evaluation to include the teachers and the students in the process. In addition, school-level administrators (i.e. Principals, Deputy Principals, Registrars and Heads of Departments) and the parents also need to be included in that process.

In providing a summary and comparative analysis of alternative evaluation approaches, Worthen and Sanders (1988, pp. 144-159) outline features of each of the approaches presented in their classification schema. Naturalistic and participant-oriented approaches are summarised on the following page in Table 3.2 which is an adaptation of Worthen and Sanders (1988) classification. The purpose, distinguishing characteristics, and contributions to the conceptualisation of an evaluation relate closely to the principles of 4GE models outlined earlier in this chapter. Moreover, the aims of this study are congruent with the purpose of the evaluation outlined in their summary - that is, to understand and portray the complexities of the QSC and respond to an audience’s requirements for information.

3.7 Fourth Generation Evaluation (4GE)

3.7.1 The Generation Metaphor and Approach

Guba and Lincoln (1989) have described successive generations of evaluation leading to a constructivist form of evaluation which they refer to as fourth generation evaluation. Caulley (1989), in providing an account of the four generations of evaluation, suggests that this process is similar to the development of the hand calculator in that the basic concept remains the same but as each of the generations appear there is a refinement of features and
Table 3.2: Stakeholder Focus and Evaluation Conceptualization

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Patton Guba and Lincoln Rippey</th>
<th>MacDonald Parlett and Hamilton</th>
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<tr>
<td>Purpose of Evaluation</td>
<td>Understanding and portraying the complexities of an educational activity, responding to an audience's requirements for information.</td>
<td>Reflecting multiple realities, use of inductive reasoning and discovery, firsthand experience on site.</td>
</tr>
<tr>
<td>Guiding Characteristics</td>
<td>Examination of innovations and change about which little is known, ethnographies of operating programs.</td>
<td>Emergent evaluation designs; use of inductive reasoning; recognition of multiple realities; importance of studying context; criteria for judging the rigour of naturalistic inquiry.</td>
</tr>
<tr>
<td>Benefits</td>
<td>Credibility, fit, auditability, confirmability.</td>
<td>Focus on description and judgment, concern with context, openness to evolve evaluation plan, pluralistic, use of inductive reasoning, use of a wide variety of information, emphasis on understanding, empowers stakeholders.</td>
</tr>
<tr>
<td>Limitations</td>
<td>Nondirective, tendency to be attracted by the bizarre or atypical, potentially high labor intensity and cost, hypothesis generating, potential for failure to reach closure.</td>
<td>Continuing negotiations with all stakeholders to determine the focus, the procedures, the interpretations and the proposals for action that guide the evaluation activity.</td>
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According to Guba and Lincoln (1989), the initial generation was reflected by the proliferation of tests which were used to determine the status of individuals or groups as compared to pre-defined scores. Thus, the evaluator performed a functional role of developing, administering, scoring, and interpreting test results. In the second generation, Guba and Lincoln noted that the evaluator began to describe differences in terms of the strengths and weaknesses of an individual or group in comparison to defined objectives. It’s indicated earlier in this chapter, critics in the 1960’s drew attention to deficiencies of...
second generation evaluation, in particular, the lack of judgment. Judgment became an integral feature of third generation evaluation. In fourth generation evaluation, as outlined by Guba and Lincoln (1989), all evaluation activities occur through continuing negotiations with the relevant stakeholders and the method is consistent with the paradigm of constructivist inquiry. McEvoy and Rissel (1992) indicate that:

"The role of the evaluator is radically changed. No longer is the evaluator the independent evaluator, technician or leader; rather the evaluator acts as a mediator and facilitates negotiation amongst stakeholders, surrendering the obtrusive investigator role and becoming a simultaneous teacher and learner. As the evaluator is a mutual participant in the evaluation process, he/she has no avenue for claiming neutrality or objectivity or cosy relations with the program managers. The evaluator honours value pluralism and the respondents as a group fully and continually collaborate in the identification of claims, concerns and issues, in the collection and analysis of data and in decisions to take action. Thus, fourth generation evaluation theoretically comes to be both the process and the product." (McEvoy and Rissel, 1992, p. 25)

Importantly, McEvoy and Rissel (1992, p. 26) argue that the principles inherent in the constructivist paradigm foster the empowerment of the participants and should ultimately mean that the evaluation findings may be more broadly useful. Furthermore, through the model's collaborative approach, accountability for the evaluation results is shared and subsequent action becomes shared rather than assigned. Similarly, Russell and Willinsky (1995, p. 3) argue that 4GE, through having particular relevance for developing alternative formulations of evaluation practices, "can add a richness to accounts of student learning, and increase the likelihood of the evaluation actually being used to improve teaching in the school".

McEvoy and Rissel (1992, p. 25) also indicate that the objectives, methods and instruments are chosen by group consensus and thus the dominance of managerialism theoretically becomes obsolete. They provide a diagram, presented in Figure 3.6, which illustrates the process whereby decisions regarding methodology are made. A variety of different methods are available in 4GE including group discussion, collaborative inquiry, as well as quantitative methods. McEvoy and Rissel (1992) indicate that Svenson (1991) claims that observational interviews is the backbone of this approach as its object is to "step inside the mind of the respondent stakeholder and discover their particular feeling, thoughts and constructions" (McEvoy and Rissel, 1992, pp. 25-26).
In terms of this study, Stake's 'clock' as depicted earlier in Figure 3.4 provided a guide for formulating the steps in the program evaluation process. From a review of the literature relating to evaluation models, a need to establish a new model was realised. Together with the steps used in 4GE models identified by McEvoy and Rissel (1992) and displayed in Figure 3.6, the steps used in this study are presented in Figure 3.7 on the following page in a diagrammatic manner similar to Stake's 'clock'.

### 7.2 Fourth Generation Evaluation - A Critique

In recent years, 4GE has become the focus for critical analysis and debate (Sechrest, 1992; Fishman, 1992) and further clarification by Lincoln and Guba (1992) following Guba and Lincoln's proposed concept of 4GE (1989, 1990). For example, Fishman (1992) argues that the main focus of Guba and Lincoln's (1989) book on 4GE is an "argument to replace traditional evaluation with 'fourth generation evaluation'; which is based on the post-modernistic epistemology of constructivism" (Fishman, 1992, p. 263). According to
In polar contrast to positivism's assumption that the 'true' nature of external reality is discoverable through the scientific method, constructivism assumes that there are only alternative, subjective constructions of reality produced by different individuals. Therefore, instead of the positivist role of measuring a program's goal attainment in scientific, quantitative ways, the role of the program evaluator becomes one of facilitating interpretive dialogue among a wide variety of a program's stakeholders." (Fishman, 1992, p. 263)

Similarly, Sechrest (1992, p. 1) in a scathing attack titled Roots: Back to Our First Generations is highly critical of the generational metaphor as it is "bothersome". He argues that:

"The first thing that bothers me about the generational metaphor is the image, the implication, of earlier generations being replaced by later ones in a sort of inevitable progression. The first, second, and third generations? Away with them! They are tiresome, garrulous, and soak up too many scarce resources!... The Fourth Generation does mean to replace what it sees as the preceding three." (Sechrest, 1992, pp. 1-2)

Furthermore, Sechrest(1992, p.2), in that same article, interprets what he takes to be the role of 4GE (i.e. Guba and Lincoln, 1989) as offering "no compromise, no integration" but
rather "It expounds a philosophy - ontology, epistemology, and ethics - to substitute for the philosophy that has been our foundation in the past". In response to Sechrest's (1992) attack, Lincoln and Guba (1992) directly addressed the criticisms in their paper titled In response to Lee Sechrest's (1991) AEA Presidential Address: "Roots: Back to our First Generations". They indicated that they were "astonished and dismayed" by Sechrest's (1992) paper:

"We were astonished because of the misunderstandings and misinterpretations of our book, Fourth Generation Evaluation...that Professor Sechrest's paper evidences, and dismayed, because of the animosity he displays. His is less an attempt to provide criticism than to demolish." (Lincoln and Guba, 1992, p. 165)

Through this critical debate and interplay of ideas, 4GE becomes clarified by Lincoln and Guba (1992, pp. 165-169). Specifically in relation to methods, they refute Sechrest's suggestion that they "aim to replace all quantitative methods with qualitative ones" and they state that:

"We have never so argued, and certainly not in 4GE. It has always been our position that both quantitative and qualitative methods are appropriate to any paradigm, including the constructivist paradigm that undergirds 4GE: it is only their relative emphasis that is likely to differ." (Lincoln and Guba, 1992, p. 166)

Lincoln and Guba (1992, p. 167) proceed to highlight that their position is that, through a process of negotiations with the various stakeholders, whatever emerges as the problems, concerns, and issues should be the basis for the evaluation, and "not the criteria, and certainly not the methods, that the evaluator...brings to the evaluation" (Lincoln and Guba, 1992, p. 167). Thus, according to the spirit of 4GE, the criteria and methods must be negotiated.

Fishman (1992), in his critique of 4GE, discusses the practical paradigm which he develops by incorporating many of the ideas of third generation evaluation into a constructivist epistemology (Fishman and Neigher, 1987; Fishman, 1991a). Program evaluation undertaken within the pragmatic paradigm employs quantitative and conceptual elements from positivistic evaluation within a constructivist context "so that quantification is employed in the service of meeting the decision-makers' information needs" (Fishman, 1992, p. 269). Fishman argues that in developing that paradigm, he linked it to a variety of case studies (Fishman and Peterson, 1987; Fishman, 1991a, 1991b) to illustrate how the model describes and explains more or less successful evaluation projects. Fishman's purpose in discussing
The pragmatic paradigm is that the ultimate justification of any evaluation model within an activist methodology is in its pragmatic value in helping decision-makers and other stakeholders in particular case situations. Fishman (1992, p. 269) subsequently notes that, unfortunately, Fourth Generation Evaluation is lacking in such case study examples. Russell and Willinsky (1995, p. 18) also urge that “what is now needed are case studies of attempts by teachers and their school communities to use 4GE approaches...to see how the potential for improving teaching and learning ...is realised”. Similarly, Sechrest observed that:

“Interestingly, The Fourth Generation Evaluation (Guba and Lincoln, 1989) contains no examples whatsoever of fourth generation, or third-and-a-half level evaluations unless one counts a qualitative evaluation of a quantitative evaluation as such”. (Sechrest, 1992, p. 4)

This evaluation represents a serious attempt to meet the challenge posed by Fishman (1992) to his critique of 4GE in which he noted that Guba and Lincoln could not provide “even one sample study...in enough detail to demonstrate in actuality the practical value of their model” (Fishman, 1992, p. 268). Furthermore, Fishman argued that, while he remained open to the possibility that 4GE could be successful, “the model must be demonstrated with detailed case examples” (Fishman, 1992, p. 269). In taking up that challenge in this thesis, the following analyses provide models from which features can be drawn to develop an evaluation framework for guiding this evaluation using 4GE principles.

**Summary**

Following the review of evaluation models and in particular, naturalistic and participatory and 4GE approaches, several models and approaches were described. Stake's maintenance Model and responsive evaluation were examined in terms of their implications for undertaking evaluation studies. Illuminative evaluation was subsequently described briefly to highlight Parlett and Hamilton's argument for evaluation studies to illuminate problems, issues, and significant program features. Action research and action evaluation were then discussed and similarities and differences between the two approaches were outlined. Collectively, these approaches together with the earlier analysis of evaluation models provide an essential context within which an evaluation model for
undertaking a program evaluation of the QSC can be developed. The development of that model is undertaken in the following section of this chapter.

3.9 Selecting and Formulating an Evaluation Model for Undertaking the Program Evaluation of the Queensland Sunrise Centre

In undertaking the process of selecting and formulating a model to evaluate the QSC project, two key options were identified. The first option required a search to locate a model which had been used elsewhere in evaluating learning technology initiatives and could subsequently be used again without the need for modifications. Alternatively, a model would be developed to suit the purpose of this evaluation. The first option was considered by the QSC stakeholders and a discussion of the reasons for not adopting it follows. The second option was selected and the formulation of the model to be used for this study is described.

3.9.1 The First Option - Locating an Evaluation Model

Investigations into locating a model used elsewhere for evaluating learning technology initiatives revealed a plethora of papers, journal articles, and books dealing with computers in schools. However, a search for evaluation studies of those initiatives revealed a lack of comprehensive evaluations of technology initiatives in schools which were based upon many evaluation models. For example, in Queensland, three prominent evaluation studies undertaken - Microcomputers in Queensland Preschools A Study (Blemings, 1988), Business Education Centres in Queensland State High Schools: Context and Change (Department of Education, Queensland, 1990c) and the report of the Learning Systems Project (Queensland Treasury Department and Department of Education, 1991) did not apply models found in the evaluation literature.

In describing the research design to Microcomputers in Queensland Preschools A Study, Blemings (1988), indicated the use of naturalistic research and used a variety of data
gathering techniques - interviews, teacher diaries, structured logs, software usage checklists, software observation schedules, questions for parents, questions for teachers, and teacher ratings of software, to gain an "understanding of complex realities" (Blemings, 1988, p. 5). Similarly, the report *Business Education Centres in Queensland State High Schools: School Context and Change* (Department of Education, Queensland, 1990c) utilised a qualitative research method to gather information for that report and viewed "inquiry as an interactive process between the researcher and the participants". That report indicated that "such research is largely descriptive and relies on people's impressions for the primary data" (Department of Education, Queensland, 1990c). However, no indications of 4GE principles being employed to guide the studies were evident. Indeed, neither presented a model drawn from the evaluation literature that could be used as a basis for this study.

The report of the *Learning Systems Project* (Queensland Treasury Department and Department of Education, 1991) used an evaluation process which consisted of a review of relevant documents, interviews, and observations within Central Office, Regional Offices, and selected schools. In addition, surveys were conducted. That report indicated that it did not attempt to establish empirical relationships between learning technology and learning outcomes. It noted that support for adopting observation and interview methods was provided by Kinnick et al. (1990) in their paper arguing for the need for a new framework for evaluating computer technology innovation in schools. Again, no comprehensive framework was identified in that evaluation which could directly assist in undertaking the QSC school-based evaluation.

A wider search of the literature dealing with the evaluation of learning technology initiatives in schools provided evidence of some evaluative studies - for example, *Exploratory Studies in Educational Computing in New Zealand* (McMahon, 1986), *Computers, Children and Classrooms: A Multisite Evaluation of the Creative Use of Microcomputers by Elementary School Children* (Carmichael et al., 1985), and *An Evaluation of a Project for Preparing Science Teachers to Use Microcomputers* (Ellis, 1989). Each of those studies indicates the research methodology employed but, like the Queensland studies cited earlier, no model was presented that could be used as a basis for this study. Indeed, Mojkowski (1985, p. 20)
deserved that "despite all of the activity to date, comprehensive evaluations of computer programs are in short supply".

For example, at the Australian Computers in Education Conference (1992), of more than eighty papers presented, those which referred to studies in educational computing in schools provided examples of various research procedures - for instance, an empirical study of problem solving and adventure games (Curtis, 1992), case studies of learning in computing contexts (McDougall, 1992; Lau, 1992), an examination of where Logo research heading (Au, 1992), action research (Hallet and Macfarlane, 1992), research related to projects (Nadebaum, 1992; Pacey, 1992), and longitudinal studies (McKinnon et al, 1992). However, none of the papers presented effectively outlined a model, drawn from the evaluation literature and involving stakeholders as active participants, for use in evaluating technology initiatives in schools. Following the unfruitful search for evaluation models used elsewhere in educational computing studies in Queensland, nationally, and internationally, it was decided that the first option of using a model used before was not viable.

3.9.2 The Second Option - Developing an Evaluation Model

The major purpose of this study was to provide a program evaluation of the QSC Project because of the priorities of the Department of Education in Queensland relating to the integration of learning technology in schools. As such, it aimed to provide information and analysis about that project by focusing on situational analysis, project management, and the impact of the project. Essential to the study was the identification of, negotiation with, and involvement of the key people in the program in the evaluation process. Ownership, involvement and credibility with the participants in the project were central concerns. Stake's Countenance Model offers ideas for an initial framework for questions to be asked about rationale, intents, actual events, and standards. That model reminds us that full descriptions of the actual object of the evaluation and the context in which it operates would be included in our evaluation (Worthen and Sanders, 1988, p. 214). Moreover, his notion of responsive evaluation emphasises that the ultimate test of the validity of an evaluation is the extent to which it increases the audience's understanding of the educa-
The examination of developments in evaluation together with the presentation of the various evaluation models which have emerged provided a summary of the different approaches to evaluation. More recently, Owen (1992) has argued that what is needed is a framework based on the concept of evaluation Form for providing guidelines for choosing the evaluation approach. Owen provides a framework which he suggests is not a 'higher' model than those developed by the key evaluation theorists, but that his framework helps in "flexibly selecting and using the most appropriate approach" (Owen, 1992, p. 78.1). Owen's framework is built on the concept of Form which he suggests consists of five dimensions which give conceptual and practical guidance in determining the most appropriate approach to program evaluation for a given situation. Decisions based on Form are a prerequisite for action in any field work, that is, Form should be used in the planning stage of an evaluation (An evaluation can be thought of as having three stages; (i) planning, (ii) obtaining, and (iii) disseminating). Experience has shown that, if planning takes into account the concept of Form, the evaluation will be more clearly focused and has a high likelihood of impacting on decision making concerning the program under review." (Owen, 1992, p. 78.1)

Five major Forms are identified by Owen. These are impact evaluation, monitoring evaluation, process evaluation, design evaluation, and evaluation for development. Owen discusses each of these Forms according to the dimensions of orientation (i.e. the fundamental reason for undertaking the evaluation), state of the program (i.e. the degree to which the program under review has been implemented at the time of the proposed evaluation), focus (i.e. the component/s upon which the evaluation is likely to be concentrated), timing (i.e. the temporal link between the evaluation and the program delivery), and evaluation approach. Owen (1992, p. 78.2) indicates that it is possible that an approach might be chosen which uses either a single Form or uses a design which is based on more than one of the Forms. Owen's evaluation Forms are presented in Figure 3.8.

The evaluation Forms which most closely relate to this study are process evaluation and impact evaluation. The evaluation relates to process evaluation because it aims to:

* gain information about the QSC activities,
* assist those involved in the project to examine effective learning and teaching practices
e.g. teachers using action research,
• assist those associated with the QSC Project and with the various audiences of the study to more fully understand how and why the project operates; e.g. Stake's responsive evaluation and Parlett and Hamilton's illuminative evaluation.

The focus on process evaluation also allows for the evaluation to be conducted from within a constructivist paradigm and avoid the dangers of a reductionist model. The study also relates to *impact evaluation* as the evaluation seeks to provide information related to questions and concerns about project impact. Those questions and concerns were formulated by the key participants in the project; e.g. in what ways have the students been advantaged and/or disadvantaged by being involved in the project? Therefore, the approach most appropriate for undertaking this evaluation represents a balanced combination of two of the evaluation Forms - *process evaluation* and *impact evaluation*.

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<tr>
<th>DIMENSION</th>
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<th>Form Four</th>
<th>Form Three</th>
<th>Form Two</th>
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<tr>
<td>EVALUATION TERM</td>
<td>EVALUATION FOR DEVELOPMENT</td>
<td>DESIGN EVALUATION</td>
<td>PROCESS EVALUATION</td>
<td>MONITORING EVALUATION</td>
<td>IMPACT EVALUATION</td>
</tr>
<tr>
<td>ORIENTATION</td>
<td>SYNTHESIS</td>
<td>CLARIFICATION</td>
<td>IMPROVEMENT</td>
<td>ACCOUNTABILITY</td>
<td>JUSTIFICATION</td>
</tr>
<tr>
<td>STATE OF PROGRAM?</td>
<td>NONE</td>
<td>DEVELOPMENT</td>
<td>DEVELOPMENT</td>
<td>SETTLED</td>
<td>SETTLED</td>
</tr>
<tr>
<td>FOCUS</td>
<td>CONTEXT</td>
<td>DESIGN</td>
<td>DELIVERY</td>
<td>OUTCOMES/ DELIVERY</td>
<td>OUTCOMES/ DELIVERY</td>
</tr>
<tr>
<td>TIMING</td>
<td>BEFORE</td>
<td>DURING</td>
<td>DURING</td>
<td>DURING</td>
<td>AFTER</td>
</tr>
<tr>
<td>TYPICAL APPROACHES</td>
<td>NEEDS ASSESSMENT</td>
<td>EVALUABILITY ASSESSMENT</td>
<td>ACTION RESEARCH</td>
<td>RAPID RESPONSE</td>
<td>OBJECTIVE BASED SYSTEMS</td>
</tr>
<tr>
<td></td>
<td>REVIEW OF PRACTICE</td>
<td>ASSESSMENT</td>
<td>RESEARCH</td>
<td></td>
<td>ANALYSIS</td>
</tr>
<tr>
<td></td>
<td>RESEARCH</td>
<td>ACCREDITATION</td>
<td>ILLUMINATIVE</td>
<td></td>
<td>GOAL FREE</td>
</tr>
<tr>
<td></td>
<td>SYNTHESIS</td>
<td></td>
<td>RESPONSIVE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 3.8: Evaluation Forms* (Source: Owen, 1992, p. 78.6)
Having used these guidelines for choosing an appropriate methodology, a model for guiding the QSC program evaluation can be more effectively developed. Batchler (1982a, b) indicated that "in order to accommodate the wide variety of projects, we need a model general enough to allow for both a broad range of input data and for adaptations to particular requirements". Batchler suggested a modification of Stake's model which he claims is general enough to embody elements of both goal and systems models. That model is shown below in Figure 3.9.

**WHAT WAS INTENDED**

<table>
<thead>
<tr>
<th>What we needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>. people</td>
</tr>
<tr>
<td>. money</td>
</tr>
<tr>
<td>. equipment, etc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What we intended to do</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What we intended to happen</th>
</tr>
</thead>
</table>

**WHAT HAPPENED**

<table>
<thead>
<tr>
<th>What we had</th>
</tr>
</thead>
<tbody>
<tr>
<td>. people</td>
</tr>
<tr>
<td>. money</td>
</tr>
<tr>
<td>. equipment, etc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What we did</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What actually happened</th>
</tr>
</thead>
</table>

![Figure 3.9: A Framework to Guide Evaluation and Reporting](Source: Batchler, 1982a, p.8)

Each of these cells are briefly described under two major organising headings - What Was Intended and What Happened. In the What Was Intended cells, intended resources refer to the kinds of people, equipment and other resources needed to be used in the project. In addition, this cell requires a description of the children involved. Intended processes refer to the procedures to be implemented and describes what the project intended to do. Intended results refer to what was intended to happen as a result of the project. Batchler (1982a, p. 9) suggests that results are often tied closely to the intended processes.
The concern is with what actually happened as the project was implemented. As well as finding ways of describing what occurs as guided by the intentions part of the model, attempts should be made to note unanticipated effects as well. Batchler (1982a, p. 9) indicates that in some projects, results will be easy to measure, while in other projects, this will be much more difficult. According to Batchler, this is a function of the degree of precision with which what was intended to happen was specified.

There are four main steps in processing the information obtained through employing the framework devised by Batchler (1982a, p. 10). Firstly, the relationships among resources, processes, and results from the What Was Intended column are examined. Secondly, the relationships among resources, processes, and results in the What Happened column are discussed. Thirdly, the degree to which the resources, processes, and results cells in the What Happened column match the resources, processes, and results cells in the What Was Intended column are analysed. Fourthly, judgments are made about the merit of the project based on the information and discussion undertaken in the first three steps. The first two steps equate to Stake’s contingencies contained in his Countenance Model (see Figure 3.4), while the third step reflects his notion of congruence. The fourth step involves judgments which in Stake’s Countenance Model is evident in the judgments and standards columns.

Corbett (1990, p. 94) reported that the model devised by Batchler had been used successfully with many programs in Australia through a National Project which evaluated programs for severely handicapped children (Batchler, 1982b); e.g.

- Basic Sensory Stimulations for the Severely Handicapped (at Windsor),
- Develop, Implement, Evaluate, Disseminate Curricula for Severely Handicapped Children (at Sunbury), and
- Mobility, relaxation and exercise through hydro-therapy (at Echuca).
Thorne, in undertaking an evaluation of the parent segment in early special education programs in a selection of schools in Tasmania, augmented the Batchler adaptation by including a facility to compare the program being evaluated with agreed and/or desired standards. While not evaluating learning technology initiatives, the model provides a basis for the development of a model for this study. That model which Thorne called the Augmented Stake-Batchler Model is presented below in Figure 3.10.

Identify, negotiate with and involve key people in the program in the evaluation process.

**PROGRAM RATIONALE:**

- **WHAT WAS INTENDED**
  - What we needed.
  - people
  - equipment
  - money
  - training

- **WHAT HAPPENED**
  - What we had.
    - people
    - equipment
    - money
    - training
  - What we did.
  - What actually happened.

- **STANDARDS**
  - Acceptable levels of
    - people
    - equipment
    - money
    - training
  - Recommended activities.
  - Reasonable short and long term results.

**REVIEW** the utilization effectiveness of the evaluation process.

**Figure 3.10: Augmented Stake-Batchler Model**
(Source: Thorne, 1990, p. 95)

The Augmented Stake-Batchler Model includes the need to identify, negotiate with, and involve key people in the program in the evaluation process as he argues that evaluation
seen as a major step in a series of negotiations with significant people that should lead
quality programs. A persistent theme advocated by Thorne was "the need to plan
effectively for the eventual utilization of the evaluation" (Thorne, 1990, p. 97). Thorne notes
that:

"The idea of utilization, whereby a specific audience is identified and involved from the outset
in negotiation, design, analysis, focus, interpretation and dissemination, is a key feature of
action research. If this audience includes significant members of the program staff... then it
will be a sound foundation for effective communication, a sense of ownership of the evaluation
activity and the credibility of the evaluation. The base model then could take on the strongest
features from Stake, and action research." (Thorne, 1990, pp. 89-90)

Using the features derived from Stake and action research, this study also draws upon some
features of action evaluation through its involvement of the 'practitioners' as evaluators
through collaborative planning, data-gathering, self-reflection and responsiveness. Fur­
thermore, it can be described as an illuminative evaluation in order to illuminate problems,
issues, and significant features of the program. In developing the model, as displayed in
figure 3.11 on the following page, for the evaluation being undertaken of the QSC, features
these are used to develop a further modification of the Augmented Stake-Batchler Model
formulated by Thorne. As Owen (1992) has suggested, it is important for an evaluation to
identify the design of the evaluation which is appropriate for the program being evaluated.
For example, it might be that another evaluation activity is undertaken of an initiative
such as a required monitoring evaluation for accountability purposes. It would be essential
that context that an approach to that evaluation was based around an evaluation Form
evaluation Forms which reflected the orientation, state, focus, and timing aspects of that
program. In addition, the evaluation Forms (Owen, 1992) of process evaluation and impact
evaluation determined to be the appropriate approach for this evaluation are included in
the model. Both of these are highlighted in the section of the model which focuses on
choosing an appropriate evaluation Form. All of the five Forms are included in the model
the model developed might be used as the basis for the evaluation of other learning
technology initiatives. Thus, Owen's framework has been included in the model to assist
guiding the selection of an appropriate Form.
Figure 3.11: The Model for Guiding the Program Evaluation of the Queensland Sunrise Centre Project

Theoretical Background in Evaluation
The model formulated to guide the program evaluation of the QSC Project, presented in Figure 3.11, indicates the importance of identifying, negotiating with and involving key people in the evaluation. Moreover, the key participants (i.e. the QSC teachers) are involved early in the evaluation process and they play an important role in identifying the evaluation questions. The evaluation headings - Situational Analysis, Project Management, and Impact of the Project to which the evaluation questions relate provide key headings in the model. Both description and judgment, which Stake (1967, p. 525) insists are the two basic acts of evaluation are included. The cells in the columns What Was Intended and What Happened are retained from Stake (1967), Batchler (1982), and Thorne (1990) to provide a framework for describing and judging the QSC Project. Resources, processes, and results are included in that section of the model.

As the QSC Project was established as an investigative activity to explore ways to enhance and extend learning for students immersed in a technologically-rich classroom environment, it is difficult if not impossible to negotiate standards from previous research or other programs due to the innovative nature of the project. Thus, the augmented dimension relating to 'standards' has been modified to highlight the identification of issues emerging from the evaluation. That also reflects the process evaluation Form of this study in that the stage of the project relates predominantly to development, the timing is during the project, and the study can provide information and assist in project improvement. As a consequence of that process, findings and their implications can be discussed which will be credible with the participants and serve audience requirements for information.

At the same time, the QSC was in its third year of operation which constituted the final year for the first group of students in the project. Moreover, it was the final year of involvement for the teachers involved in the project at Coombabah State School. Therefore, there was the need expressed by stakeholders that information relating to impact evaluation should be gained. That is, the orientation is project justification, and the focus of the study relates to outcomes as well as delivery.
As indicated in the Model for Guiding the Program Evaluation of the Queensland Sunrise Centre Project (Figure 3.11), an appraisal of the model for program evaluation is included in that model. In appraising the model, the key participants were invited to evaluate the evaluation model. Questions related to the evaluation heading *Appraisal of the Model for Program Evaluation* were presented in Chapter One (see Table 1.2, p.5); i.e.

**Appraisal of the Model for Program Evaluation**

- Was the model used suitable for evaluation of the Queensland Sunrise Project?
- How effective was the model for identifying the key components of the Queensland Sunrise Project?
- What contribution does the program evaluation make for program improvement?

As Worthen and Sanders (1988, p. 370) indicate, they are convinced of the importance of evaluation in educational improvement. In addition, they suggest that "Despite great strides, it is increasingly apparent how little we really know about evaluation, compared to what we need to know" (Worthen and Sanders, 1988, p. 400). Similarly, this evaluation is undertaken as an investigative activity as well as an evaluative endeavour. As such, it provides the opportunity for the evaluation of the evaluation itself in order to contribute to our knowledge about evaluative frameworks for use in investigating learning technology initiatives in schools.

The justification for the inclusion of these questions in an appraisal of the model for program evaluation of the QSC is substantiated by two main arguments. Firstly, the role of the participants throughout the evaluation is regarded as critical. Through the involvement of, and negotiations with participants, the evaluation gains credibility through its responsiveness. Furthermore, it can serve an educative, professional development function. In practice, this means that the evaluation process extends beyond the production of a final report. That is, the report itself will be the subject of evaluation. Participants will be invited to undertake a post-evaluation check strategy in which an appraisal of the model
be an important part of that strategy. Secondly, the model requires appraisal as one of the aims of this study is to assist in the development of evaluative frameworks for investigating learning technology initiatives in schools. Put succinctly, the model developed can provide the basis for future investigations aimed at evaluating learning technology initiatives in schools.

Included in that post evaluation check (see Appendix J) were additional questions about the utility, feasibility, propriety, and accuracy of the evaluation report. Those questions were formulated through adapting the *Standards for Evaluations of Educational Programs, Projects, and Materials* (Joint Committee on Standards for Educational Evaluation, 1981).

**Conclusion**

This chapter has presented a review of theoretical issues evident in the evaluation literature. Initially, evaluation and program evaluation were defined. Subsequently, an overview of developments in evaluation and an analysis of evaluation models were presented. Specifically, Stake's Countenance Model and his notion of responsive evaluation were then discussed. Illuminative evaluation, action research, and action evaluation were examined to provide essential background for facilitating the process of selecting and formulating a model to guide the QSC program evaluation. Following that analysis and discussion, naturalistic and participant-oriented and 4GE approaches were reviewed.

Two options were examined for formulating the model. The first option involved a search for a model which had been used elsewhere in evaluating learning technology initiatives and which had been derived from the evaluation literature. That search failed to locate any suitable models on which this study could be based. The second option was undertaken in which a model was developed after selecting a model from the evaluation literature, drawing upon various approaches, and modifying the model. The model developed emphasises 4GE methodology, particularly with stakeholder involvement, uses features from Stake's Countenance Model (1967) and his later work on responsive evaluation. It also
incorporates the importance of *illuminative evaluation* described by Parlett and Hamilton (1976), and features of *action research* and *action evaluation*. Batchler's (1982) adaptation of the Stake Model (1967) provided the basis for the model. Thorne's Augmented Stake-Batchler Model (1990) built from that model was further modified to highlight the need for illumination and identification of issues and their implications arising from the process describing and judging the QSC Project. Finally, questions relating to the appraisal of that model were described.

The model provides a framework for guiding this evaluation. It provides the basis for selecting and justifying the data to be collected. The research design is described in the next chapter.
CHAPTER FOUR

RESEARCH DESIGN

This chapter provides a description of the research design, its justification and implementation as used in this study. The focus of the research design was the implementation of an evaluative case study employing 4GE principles through the involvement of all relevant stakeholders. Once the 4GE approach had been identified as the basis of the evaluation of the QSC, all evaluation activities were then directed through continuing negotiations with the relevant stakeholders.

In this chapter, the study sample, the research methodology, the program evaluation data collection procedures employed, and the data collection instruments are outlined. The steps employed in undertaking this program evaluation are then presented. The overall reliability and validity of the study are examined in terms of the separate strategies employed for ensuring internal validity, reliability, and external validity of the different and varied aspects of the data collection. In addition, the issue of ethics involved in carrying out the study is addressed. Finally, the treatment of the data is discussed.

4.1 The Study Sample

The study sample is described in terms of the schools, the teachers and the students involved in the QSC. Two schools were chosen for the site of the QSC by the Department of Education, Queensland in late 1989. Those schools were Coombabah State School and Coombabah State High School. This study focuses on the students and teachers who were directly involved with the project within those schools. Site descriptions were undertaken at both of those two schools using situational analysis principles (Marsh and Stafford, 1992, pp. 107-110) in May, 1992 to enable the following contextual features of them to be identified.
4.1.1 The Schools

Coombabah State School and Coombabah State High School are located in the South Coast Region of the Department of Education, Queensland (Appendix C). The schools are in close proximity to each other in the northern suburbs of the Gold Coast. Coombabah State School and Coombabah State High School draw their student populations from a range of socioeconomic conditions. Housing and accommodation ranges from caravans to valuable homes and units. Residential areas near both schools include several caravan parks, townhouse and unit developments, single dwelling residences, canal front homes, valuable island homes, and high rise units. Some of the island homes and high-rise penthouses are worth in excess of a million dollars.

4.1.1a Coombabah State School

Coombabah State School, located on Oxley Drive, Paradise Point, opened in 1981. The school's population has increased to a current enrolment which is in excess of 820 primary students and approximately 80 children in a double unit preschool. The primary enrolment which stabilised throughout the period 1990-93 after quite rapid growth in the earlier years has shown substantial growth throughout 1993-94 and, as displayed in Table 4.1 on the following page, demographic projections by Facilities Development Branch (Sept. 1994, p.2) has predicted further growth in enrolment to almost 1100 students by the year 2000.

The school staff consisted of a Principal, 2 Deputy Principals, Registrar, Teacher in Charge of Prep School, 27 Classroom Teachers, Teacher Librarian, Physical Education Specialist, Music Specialist, Learning Support Teacher, Administration Officer, Teacher Aides, Administrative Assistance Enhancement Program Casual Employee, Janitor/Groundsperson, and Cleaners. The school architecture is mostly characterised by multiple area classrooms with withdrawal rooms. The school's computer resources were greatly enhanced by the resources allocated through the QSC Project. Actual computer holdings increased from 10 computers at the end of 1989 to more than 130 during 1991-92.
Table 4.1 Enrolment History and Forecast - Coombabah State School 1990 - 2000

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Total</th>
</tr>
</thead>
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<td>112</td>
<td>92</td>
<td>78</td>
<td>109</td>
<td>116</td>
<td>98</td>
<td>711</td>
</tr>
<tr>
<td>1991a</td>
<td>95</td>
<td>114</td>
<td>105</td>
<td>98</td>
<td>67</td>
<td>111</td>
<td>117</td>
<td>707</td>
</tr>
<tr>
<td>1992a</td>
<td>95</td>
<td>89</td>
<td>114</td>
<td>122</td>
<td>101</td>
<td>77</td>
<td>112</td>
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<td>1993a</td>
<td>104</td>
<td>84</td>
<td>99</td>
<td>121</td>
<td>119</td>
<td>100</td>
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<td>796</td>
</tr>
<tr>
<td>1995f **</td>
<td>119</td>
<td>117</td>
<td>119</td>
<td>104</td>
<td>118</td>
<td>146</td>
<td>152</td>
<td>875</td>
</tr>
<tr>
<td>1996f</td>
<td>126</td>
<td>127</td>
<td>125</td>
<td>123</td>
<td>112</td>
<td>131</td>
<td>158</td>
<td>902</td>
</tr>
<tr>
<td>1997f</td>
<td>134</td>
<td>133</td>
<td>135</td>
<td>129</td>
<td>130</td>
<td>124</td>
<td>142</td>
<td>927</td>
</tr>
<tr>
<td>1998f</td>
<td>141</td>
<td>142</td>
<td>141</td>
<td>139</td>
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<td>134</td>
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<td>147</td>
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<td>2000f</td>
<td>156</td>
<td>156</td>
<td>157</td>
<td>154</td>
<td>153</td>
<td>158</td>
<td>158</td>
<td>1092</td>
</tr>
</tbody>
</table>

(Source: Facilities Development Branch, Department of Education, Queensland, Sept. 1994)

### 4.1.1b Coombabah State High School

Coombabah State High School is located on Pine Ridge Road, Coombabah. It opened in 1986 with an initial intake of Year 8 students. The student population grew rapidly with the school's enrolment peaking at 1566 students in both 1989 and 1990. The enrolment in May, 1992 was 1352 students. Coombabah State High School is a Band 11 school which is the highest banding of schools in Queensland. Band 11 schools are commonly regarded as super schools' due to their large enrolments. The staff of the school is correspondingly large with 123 staff (including teaching and non-teaching staff) employed at the school. The buildings are sited on 11.5 hectares of grounds and the buildings are relatively modern as the school is less than 7 years old. According to the school's administration, the computer resources in the school were considered by them to be better than in many schools.

### 4.1.2 The Teachers and the Students

The study focuses on the QSC classes within those schools. An overview of the participants in the project during 1992 is presented in Table 4.2 on the following page. The study sample involved 2 teachers and approximately 60 Year 7 students at Coombabah State School and approximately 60 Year 8 students and their teachers at Coombabah State High School.
4.2 Research Methodology

The key research methodology chosen for this study is by case study. While the literature is replete with references to case studies, Lancy (1993, p. 140) agrees with Lincoln and Guba's assertion that "there seems to be little agreement about what a case study is" (Lincoln and Guba, 1985, p. 360). Similarly, Merriam (1988) warns that "material on case study as a research strategy can be found everywhere and nowhere". Ironically, in spite of that caution, Merriam has been a prolific writer about case studies and provides clarification through defining case studies. Consequently, case study research in the context of this study is defined from a naturalistic research paradigm as outlined by Merriam because: "research focused on discovery, insight, and understanding from the perspectives of those being studied offers the greatest promise of making significant contributions to the knowledge base and practice of education. Furthermore, most case studies in education are qualitative and hypothesis-generating, rather than quantitative and hypothesis-testing, studies." (Merriam, 1988, p. 3)
Merriam (1988) examined several definitions proposed by several writers. For example, Wilson (1979, p. 448) defined the case study as a process "which tries to describe and analyze some entity in qualitative, complex and comprehensive terms not infrequently as it unfolds over a period of time". Moreover, Merriam noted that Macdonald and Walker's (1977, p. 371) definition of a case study as "the examination of an instance in action" is similar to Guba and Lincoln's (1981, p. 371) statement that the purpose of the case study is to "reveal the properties of the class to which the instance belongs". Merriam drew upon these definitions and then proceeded to further define the case study by its special features. Four characteristics which are considered by Merriam (1988, p. 11) as essential properties of a case study are that they are particularistic, descriptive, heuristic, and inductive.

According to Merriam (1988, pp. 11-13), particularistic means that case studies have a particular program, event, or phenomenon as their focus. Descriptive relates to the end product of a case study in which a rich, 'thick' description of the focus for the study is provided. Heuristic means that case studies aim to illuminate the audience's understanding of the phenomenon being studied. Finally, inductive means that, generally, case studies rely on inductive reasoning in which generalisations, concepts, or hypotheses emerge from the process of data examination. Consequently, Merriam defines case study as:

"...an intensive, holistic description and analysis of a single entity, phenomenon, or social unit. Case studies are particularistic, descriptive, and heuristic and rely on inductive reasoning in handling multiple data sources." (Merriam, 1988, p. 16)

Merriam's definition is adopted for the purposes of this study. The QSC program evaluation focuses on a particular project, aims to provide a full description of that project, attempts to illuminate the audience's understanding of it, and relies on inductive reasoning in dealing with emerging issues from the data collection.

4.2.1 Evaluative Case Studies

The end product of a case study "can be primarily descriptive, interpretive, or evaluative" (Merriam, 1988, p. 27). Merriam (1988, p. 28) indicates that evaluative case studies involve
description, explanation, and judgment. Similarly, Stenhouse (1988, p. 49) suggests that there are four broad styles of case study - ethnographic case study, evaluative case study, educational case study, and case study in action research. According to Stenhouse, the evaluative case studies, as either a single case or a collection of cases, are studies with the purpose of providing the educational actors or decision makers with information that will help them judge the merit and worth of policies and programs. As shown in the conceptualisation presented in Figure 4.1, an *evaluative case study* has been chosen as the strategy for focusing on the QSC.

### Case Studies

<table>
<thead>
<tr>
<th>Properties of Case Studies (Merriam, 1988)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Particularistic</em></td>
</tr>
</tbody>
</table>

#### Styles of Case Study (Stenhouse, 1988)

- **Ethnographic**
  - Program Evaluation of the QSC, involving description, explanation, and judgment
- **Educational**
- **Action Research**

**Figure 4.1 Conceptualisation of the Selection of Case Study Methodology**

The case study methodology in this evaluation required a process for undertaking the collection and analysis of data which was organised by The Model for Guiding the Program Evaluation of the Queensland Sunrise Centre Project (Figure 3.11, p.110) formulated earlier in this thesis and employed 4GE principles. Together with the Synthesis of the Literature Review and the Research Questions (see Table 2.2, p.74) which identified and justified the research questions, that model provided the basis for establishing the research design. Strategies were then implemented to enable the data collection procedures and the subsequent processing and reporting of the information to address the evaluation questions while being guided by the model developed. Thus, the case study was *evaluative* in its orientation.
Program Evaluation Data Collection

This section discusses the choice of data collection procedures, provides an overview of the evaluation questions and the program evaluation data collection and validation, summarizes the procedures for the program evaluation, and finally presents an overview of the program evaluation timeline for this evaluative case study. The program evaluation data collection procedures were determined following consideration of what information was being sought and how that information would most appropriately be gained. For the purposes of this thesis, both quantitative and qualitative data were collected. Multiple methods of data collection were used and this was seen as a strength of case study methodology (Fetterman, 1988, p. 54). Case studies provide the opportunity to use multiple methods of data collection exceeding that in other research strategies, such as experiments, surveys, or histories.

"Experiments, for instance, are largely limited to the measurement and recording of actual behavior and generally do not include the systematic use of survey or verbal information. Surveys tend to be the opposite, emphasizing verbal information but not the measurement or recording of actual behavior. Finally, histories tend to be limited to events in the 'dead' past and therefore seldom have any contemporary sources of evidence, such as direct observations of a phenomenon or interviews with key actors". (Yin, 1984, p.90)

The methods of data collection used included situational analysis, questionnaires, interviews, classroom observations, samples of students’ work, document perusal and analysis, and notes compiled from attendance at QSC meetings. These methods were used throughout the evaluation process designed to engage participants in negotiating and gathering data to ensure that the evaluation was responsive. In summary, a naturalistic and participant-oriented approach, based on the 4GE paradigm (Guba and Lincoln, 1989), was used in implementing the data collection procedures in order to provide a responsive approach to the concerns of the individuals for whom the evaluation was being conducted. The evaluation represented a serious attempt to meet the challenge posed by Fishman in his critique of 4GE that Guba and Lincoln could not provide "even one sample study...in enough detail to demonstrate in actuality the practical value of their model" (Fishman, 1992, p.268). Fishman argued that, while he remained open to the possibility that 4GE could be successful, "the model must be demonstrated with detailed case examples" (Fishman,
2. Establish the feasibility of the evaluation proposal (Feb. 1992).
5. Identify and notify the stakeholders; i.e. Queensland Sunrise Centre Staff, Regional Officers, School Administration and University Personnel (Apr. 1992).
6. Develop and enlarge group constructions - consider stakeholders' claims, concerns, and issues (May 1992).
7. Identify and negotiate consensus on the evaluation questions (May, 1992).


Figure 4.2: Steps outlining the Program Evaluation Process
### Choice of Data Collection Methods and the Instruments

Due to being awarded a research scholarship from May until December in 1992, the opportunity to visit both school sites and employ a variety of data collection methods was available as that scholarship provided the researcher in his role as evaluator with five months within which he was released from his normal duties as Deputy Principal. Of particular importance, the research scholarship contract placed a time constraint on the conduct of the evaluation in that an evaluation report required by the Department of Education had to be completed by 4 December 1992. The steps employed in undertaking the evaluation and in meeting that report deadline are shown in Figure 4.2 (p. 122). A brief description of the data collection procedures chosen and developed is provided in the following discussion.

#### 4.5.1 Situational Analysis

Situational analyses, as outlined by Marsh and Stafford (1992), were considered to be important for assisting in the process of describing the contextual setting within which the QSC operated by obtaining fundamental information about the two school sites. Also, this was seen to be an essential early step in identifying the participants (i.e. the QSC teachers). Consequently, situational analyses of both schools were undertaken to gather information related to the school community, the school, the teachers, the students, the classrooms, the technological resources, and the support staff. A checklist of information headings was devised by the evaluator to facilitate obtaining the information (see Appendix D).

#### 4.5.2 Using Both Questionnaires and Interviews

Questionnaires limit the information to a written response of respondents to prearranged questions. Worthington (1982, p. 6) indicates that a questionnaire is:

"a list of questions or statements printed on a form to be filled out by respondents, usually in the absence of the evaluator".

The most common form of interview is the person-to-person interview in which an
Interviewer seeks information from a single respondent. However, groups of people or panels can also be used in interview situations. A major difference between using questionnaires and interviews "is that interviews allow clarification and probing" (Worthen and Sanders, 1988, p. 308). That is, because the interviewer and respondent are both present as the interview is conducted, questions can be communicated and answers elicited with potentially greater opportunity for exploring issues that were not predetermined by the evaluator. As Lancy (1993, p. 17) indicates, "Often one is rewarded by the interviewee presenting a view...which is completely unexpected".

According to Kidder (1981, pp. 148-153), in comparing interviews and questionnaires, advantages and disadvantages of both procedures can be identified. For example, questionnaires are usually less expensive to administer, avoid potential interviewer bias, respondents have greater anonymity, and they can place less pressure on the respondent for an immediate response. However, there are disadvantages in that the response rate of questionnaire is often not as high as the response rate of interviews, and some respondents might experience difficulty and/or are unable to fill out even simple questionnaires. Kidder (1981, p. 153) also suggests that interviews are more appropriate than questionnaires for obtaining information that is both complex and emotionally laden. Thorne (1990, p. 109) indicates that as both interviews and questionnaires have strengths and weaknesses, it is worthwhile attempting to complement the weaknesses of one with the strengths of the other. For example,

"...a questionnaire in having closed questions and therefore restricting answers is matched by an interview in which a wide range of response is possible".

For the reasons outlined above, both questionnaires and interviews were used in this study.

### 4.5.3 Questionnaires

Students were involved in two questionnaires - *Initial Computer Questionnaire for Students* May, 1992 (see Appendix E) and the *Follow-up Computer Questionnaire for Students September, 1992* (see Appendix F). A questionnaire called *Questionnaire for Teachers and School-level*
Administrators May, 1992 was administered to teachers and school-level administrators (i.e. Principals, Deputy Principals, Registrars, Heads of Department) (see Appendix G). A questionnaire was also administered to the parents of the students involved in the project Questionnaire for Parents of Sunrise Students (see Appendix H).

Those questionnaires were designed to seek information from the key stakeholders in the project: i.e. the teachers, the students and their parents. Furthermore, they sought information related to the evaluation headings and the evaluation questions which had been formulated through a series of negotiations with key stakeholders. Following the determination of the objectives of the questionnaire, a series of steps were followed similar to that suggested by Brady (1992, p. 245). The steps followed in developing each of the questionnaires are shown in Figure 4.3.

1. **Determine** the information to be sought. Consider this in relation to the evaluation questions.
2. **Prepare** several drafts and refine the format to ensure that the questionnaire is clearly and attractively presented.
3. **Consult** with several of the stakeholders for whom the questionnaire is intended to check the validity of the items.
4. **Pilot** the questionnaire using a small but representative sample.
5. **Refine** the items further according to feedback from the pilot.
6. **Administer** the final questionnaire to the whole sample.
7. **Maximise** the response rate by personally delivering and retrieving the questionnaires to the students, the teachers, and the school-level administrators. Personally thank them for their efforts and indicate that their responses remain confidential and are valued. Parent questionnaires were distributed to the students who then took them home and, subsequently, were required to bring them back to school for collection by the evaluator.

**Figure 4.3. Steps for Developing and Administering the Questionnaires**

The student questionnaires, following their refinement, were administered by the evaluator with the students in their class groups. The evaluator remained present throughout the process to assist in clarifying student concerns about confidentiality and indicating the
Importance of gaining their opinions, perspectives, attitudes, and information. Parents were given the telephone number of the evaluator if they wished to make any enquiries needed to complete the parent questionnaire.

4.5.4 Questionnaire Distribution and Retrieval

The process of questionnaire distribution and retrieval generally reflected a very cooperative spirit between the evaluator, school-level administrators, teachers, students, and parents as suggested by Guba and Lincoln (1989) as part of the 4GE approach. No antagonism was expressed by any of the respondents. Indeed, most respondents displayed a willingness to assist the evaluation. That positive response could be attributed to several factors. Respondents were aware that the evaluation had the support of the Director-General of Education in Queensland, the support of Senior Officers from both Central Office and the South Coast Regional Office of the Department of Education in Queensland. There was also good support from the administration of both Coombabah State School and Coombabah State High School. The teachers, students and parents conveyed the general feeling that they realised that they were actively involved in a major technology initiative and were keen to provide assistance in enabling the research to learn as much as possible before the project ended. Table 4.3, on the following page displays the names and abbreviations of the questionnaires, the respondents, the number of questionnaires distributed, the number of questionnaires retrieved, and the response rate.

4.5.5 Interviews

As indicated earlier, interviews enable the researcher to be more responsive to the subject than questionnaires allow (Lancy, 1993). Moreover, the use of interviews as well as questionnaires enhances the validation of the evaluation. Semi-structured interviews were held with the QSC teachers. A semi-structured interview approach was chosen to take advantage of both structure and the opportunity for interviewees to elaborate, clarify, and illuminate issues which they perceived to be important. The structure of the interview, like
Table 4.3. Distribution and Retrieval of Questionnaires

<table>
<thead>
<tr>
<th>Name of Questionnaire*</th>
<th>Respondents</th>
<th>No. Distributed</th>
<th>No. Retrieved</th>
<th>Response Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICQS</td>
<td>Year 7 Students CSS</td>
<td>28</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Boys</td>
<td>28</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>28</td>
<td>28</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>56</td>
<td>56</td>
<td>100</td>
</tr>
<tr>
<td>ICQS</td>
<td>Year 8 Students CSHS</td>
<td>26</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Boys</td>
<td>26</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>24</td>
<td>24</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>QTS LA</td>
<td>Teachers and School-level Administrators</td>
<td>15</td>
<td>14</td>
<td>93</td>
</tr>
<tr>
<td>QPSS</td>
<td>Parents of QSC Students</td>
<td>106</td>
<td>73</td>
<td>69</td>
</tr>
<tr>
<td>FCQS</td>
<td>Year 7 Students CSS</td>
<td>29</td>
<td>29</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Boys</td>
<td>29</td>
<td>29</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>26</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>55</td>
<td>55</td>
<td>100</td>
</tr>
<tr>
<td>FCQS</td>
<td>Year 8 Students CSHS</td>
<td>26</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Boys</td>
<td>26</td>
<td>26</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>22</td>
<td>22</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>48</td>
<td>48</td>
<td>100</td>
</tr>
</tbody>
</table>

*See key below

ICQS = Initial Computer Questionnaire for Students  FCQS = Follow-up Computer Questionnaire for Students
QTS LA = Questionnaire for Teachers and School-level  QPSS = Questionnaire for Parents of Sunrise Students

The format and objectives of the questionnaires, was derived from the evaluation questions. The semi-structured interview schedule (Appendix I) was administered as a face-to-face interview with all of the six teachers involved directly with the QSC Project during 1992. A face-to-face interview is referred to in this study as:

"...a situation where one interviewer administers a relatively structured questionnaire to a single respondent within a limited time period and in the physical presence of the respondent." (Katos, 1992, p. 60.1)

Appointments were made with each of the teachers. Again, due to the research scholarship having been awarded to the evaluator, potential time and cost problems were minimal. A relaxed setting was established prior to the conduct of the interviews and interviewees were assured that their responses would be extremely important in investigating the evaluation questions. Moreover, responses were tape recorded following the gaining of each teacher's approval. Tape recording the responses was considered to be more suitable
than written notes for two reasons. Firstly, the interviews became more conversational and fluently than they would have been if interviewees had to stop while notes were recorded. Secondly, the recorded responses enabled more effective analysis of the responses after the interviews had been completed. For example, they allowed for replay to facilitate the careful transfer of full responses to providing a printed copy for subsequent analysis and reflection.

4.6 Classroom Observations

Unstructured classroom observations were undertaken through regular site visits over four months (June-September) in 1992. Each Thursday during those four months, the researcher visited the Year 7 QSC classroom at Coombabah State School and the Year 8 QSC classes at Coombabah State High School during the afternoon. An observation schedule was not used. Notes were taken of special tasks students were doing, summaries from conversations with students and teachers, and general classroom management and organization observations were made.

During those visits, the students continued working unimpeded to ensure that a naturalistic setting was retained. Teachers were approached professionally to assure them that in no way should they feel either threatened or that the researcher would get in their way. The informal discussions held with students and teachers were always interesting and enlightening to the researcher and they assisted in helping to obtain a holistic portrayal of the complexities of the classroom situations.

4.7 Samples of Students’ Work

Samples of students’ work were examined to provide useful information about the processes and the products of the teaching and learning experiences. Some of the work was examined through viewing work displayed in the classrooms, teachers and students sharing and discussing samples of work with the evaluator, and representative samples of
students' work selected by teachers were examined.

5.8 Document Perusal and Analysis

QSC documents were located and obtained from Central Office, South Coast Regional Office, and school sources. Many of these were provided by Coombabah State School as all documentation had been shared with the school administration and teachers at the school by various departmental officers (e.g. Project Leader and Project Officer) and personnel from ACER. These provided essential information for reporting and analysing aspects related to the philosophy and rationale for the project, project description, and project management. In addition, the two research reports of the QSC Project (Ryan, 1991; Rowe, 1992) were obtained and examined to identify the nature, purpose, findings, and the implications of the previous research undertaken.

5.9 Attendance at Sunrise Meetings

The researcher made himself available to attend meetings held by QSC staff at both schools. These meetings sometimes involved South Coast Regional Officers, school administration, as well as the teachers. Important issues were dealt with at those meetings. On some occasions, minutes of the meetings were recorded in a field diary and these provided a source of information. On other occasions, either tape recordings or notes were taken.

5.10 Post-Evaluation Check

A post-evaluation check strategy was employed. It was established in describing the significance of this thesis, and following a fruitless search for a model derived from the evaluation literature to guide this evaluation, that evaluation models appropriate for evaluating learning technology initiatives in schools is not well developed. Consequently, this study aimed to provide a significant theoretical contribution by developing an evaluation model which might be used as a basis for the evaluation of further learning technology initiatives.
As outlined in the following section, the model developed involved key participants in the project in the evaluation process. An evaluation of the evaluation itself, or what Worthen and Sanders (1988, pp. 370-371) refer to as a meta-evaluation, was seen as an important stage in the overall evaluation. To facilitate that meta-evaluation, each of the key participants was presented with a set of questions (Appendix J) to accompany the draft report. The draft report was given to each of the teachers, and copies presented to the Deputy Executive Director and the Assistant Executive Director (Studies) in South Coast Region, the school administrations of both schools, and the former Project Officer. Three general questions were addressed; viz.

Was the model used suitable for evaluation of the Queensland Sunrise Project?

How effective was the model for identifying the key components of the Queensland Sunrise Project?

What contribution does the program evaluation make for program improvement?

In addition, questions were derived from the guiding principles provided by the Standards for Evaluations of Educational Programs, Projects, and Materials (Joint Committee on Standards for Educational Evaluation, 1981) which presented standards related to four aspects of evaluation; i.e. utility, feasibility, propriety, and accuracy. That meta-evaluation provided an expression of valuing stakeholders’ values, assisting with redeveloping group constructions and planning for future directions of the project (refer to Figure 4.2, p.122). McEvoy and Rissel (1992, p. 30) argue that the principles of 4GE in this way address the limitations of previous models as it

"...presents methods and strategies that accommodate and value stakeholder values; and it challenges traditional, empirical and quantitative techniques by espousing continual negotiation with stakeholders regarding all aspects of evaluation design, procedure and action on outcome. Such principles facilitate an evaluation process and consequent outcome that is purposive and meaningful and an experience that is empowering for participants."

4.5.11 Involvement of Key Participants

The research design emphasised the need to involve the participants in the evaluation process. Kemmis and Stake (1988, p. 11) argue that "All educators evaluate" and they suggest that:
"Proposals for action derived from evaluation are most practicable and appropriate when they draw directly upon the experience, understandings and critically examined interpretations of those responsible for the work of realising a curriculum in their own teaching and learning". (Kemmis and Stake, 1988, p. 11)

To ensure that critical and self-reflection is not sacrificed due to their involvement in the evaluation, Kemmis and Stake indicate special conditions for the evaluation to give those involved special freedoms; viz.

- the freedom to consider, reflect on and express their understandings and values
- the freedom to articulate, share and collaboratively scrutinise their interpretations and judgments
- the freedom to make and implement decisions in the light of their collective judgment, and to monitor and review the consequences of their decisions in action." (Kemmis and Stake, 1988, p. 12)

Participants were invited to contribute throughout the evaluation through negotiations and discussions with the evaluator to further illuminate the impact, issues, and implications of the project being studied using the 4GE philosophy (Guba and Lincoln, 1990). Under the overall guidance of the evaluator, each step in the evaluation process was discussed, shared and negotiated with the teachers and with senior Education Department personnel.

4.6 The Evaluation Questions, Program Evaluation Data Collection and Validation

A variety of data collection procedures were employed to gain quantitative and qualitative data. The multiple methods of data collection were chosen to address and investigate the evaluation questions guiding the study. Triangulation was used in this study through obtaining multiple sources of data and employing multiple methods. As suggested by Fetterman (1988, p. 54), "Qualitative data can validate or be validated by qualitative observations". Similarly, Lancy (1993, p. 20) argues that triangulation provides the qualitative researcher's "most effective defence against the charge of being subjective". This approach assisted in ensuring validity. Table 4.4, on the following page, illustrates the evaluation questions addressed and the data collection methods agreed to by the stakeholders. Table 4.5 displays the program evaluation timeline which was formulated
### Table 4.4: Evaluation Questions and the Program Evaluation Data Collection and Validation

<table>
<thead>
<tr>
<th>Evaluation Headings / Evaluation Questions</th>
<th>Issues</th>
<th>Data Collection and Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Analysis</td>
<td>Innovative Investigation</td>
<td>Document Analysis QTLSA</td>
</tr>
<tr>
<td>Why was it initiated?</td>
<td>Rationale</td>
<td>SD: CSS SD: CSHS</td>
</tr>
<tr>
<td>What is its setting and context?</td>
<td>Context</td>
<td>SD: CSS SD: CSHS</td>
</tr>
<tr>
<td>Who participates in the program?</td>
<td>Participants</td>
<td>Document Analysis QTLSA</td>
</tr>
<tr>
<td>What is the program’s history? How long is it supposed to continue?</td>
<td>Planning</td>
<td>Document Analysis QTLSA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Management</th>
<th>Implementation and Implications</th>
<th>Document Analysis QTLSA ITIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was intended and what happened in terms of program management?</td>
<td>Intentionality/Reality Management</td>
<td>SD: CSS SD: CSHS</td>
</tr>
<tr>
<td>What are the implications for the management of further initiatives to integrate learning technology in schools in terms of personnel, resources, budgets, and training and professional development?</td>
<td>Information Needs</td>
<td>ITIS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact of the Project</th>
<th>Impact and Implications</th>
<th>Classroom Observations QTLSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>What impact did the Queensland Sunrise Centre Project have on the teaching and learning context in terms of classroom organisation and management?</td>
<td>Classroom Organisation and Management</td>
<td>SD: CSS SD: CSHS ITIS ICQS FCQ5</td>
</tr>
<tr>
<td>What are the implications of the new and emerging technologies on curriculum design?</td>
<td>Curriculum</td>
<td>ITIS</td>
</tr>
<tr>
<td>Have there been changes in student learning through the use of group computers and immersion in a technology-rich environment?</td>
<td>Student Learning</td>
<td>ITIS QTLSA ICQS FCQ5</td>
</tr>
<tr>
<td>What ways have the students been advantaged and/or disadvantaged by being involved in the program?</td>
<td>Student Learning</td>
<td>QTLSA ICQS FCQ5 ITIS</td>
</tr>
<tr>
<td>Are there any gender differences; e.g., do girls react differently to technology compared with boys?</td>
<td>Gender Differences</td>
<td>ITIS QTLSA ICQS FCQ5 Classroom Observations</td>
</tr>
<tr>
<td>How did teachers come to grips with the new technologies?</td>
<td>Technical and Professional Support for Teachers</td>
<td>QTLSA</td>
</tr>
<tr>
<td>What are the implications for the training and professional development of teachers?</td>
<td>Stakeholders</td>
<td>ITIS</td>
</tr>
<tr>
<td>What were the concerns and perceptions of parents?</td>
<td>Written Contributions</td>
<td>QTLSA</td>
</tr>
</tbody>
</table>

### Appraisal of the Model for Program Evaluation

*Was the model used suitable for evaluation of the Queensland Sunrise Project?*

*How effective was the model for identifying the key components of the Queensland Sunrise Project?*

*What contribution does the program evaluation make for program improvement?*

<table>
<thead>
<tr>
<th>QLGNT = Nominal Group Technique</th>
<th>SD: CSHS = Site Description: Coombabah State School</th>
<th>SD: CSS = Site Description: Coombabah State High School</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICQS = Initial Computer Questionnaire for Students</td>
<td>FCQ5 = Follow-up Computer Questionnaire for Students</td>
<td>FCQ5 = Follow-up Computer Questionnaire for Students</td>
</tr>
<tr>
<td>QTLSA = Questionnaire for Teachers and School-level Administrators</td>
<td>QPSS = Questionnaire for Parents of Sunrise Students</td>
<td>QPSS = Questionnaire for Parents of Sunrise Students</td>
</tr>
<tr>
<td>PEC = Post Evaluation Check</td>
<td>ITIS = Individual Teacher Interview Schedule</td>
<td>ITIS = Individual Teacher Interview Schedule</td>
</tr>
</tbody>
</table>

**Research Design**
<table>
<thead>
<tr>
<th>Identify key participants and outline the research task:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet with and notify regional officers, school admin., teachers, students.</td>
</tr>
<tr>
<td>Identify research questions:</td>
</tr>
<tr>
<td>NGT Workshop</td>
</tr>
<tr>
<td>SD: CSS / SD: CSHS</td>
</tr>
<tr>
<td>ICQS</td>
</tr>
<tr>
<td>QTSLA</td>
</tr>
<tr>
<td>QTSLA</td>
</tr>
<tr>
<td>FCQS</td>
</tr>
<tr>
<td>QPSS</td>
</tr>
<tr>
<td>ITIS</td>
</tr>
<tr>
<td>Interviews:</td>
</tr>
<tr>
<td>Teachers</td>
</tr>
<tr>
<td>Written Contributions: Teachers Students</td>
</tr>
<tr>
<td>Former Project Officer/Research Officer</td>
</tr>
<tr>
<td>Teacher reflections, classroom action research projects ...</td>
</tr>
<tr>
<td>Student perspectives</td>
</tr>
<tr>
<td>Implications for program management</td>
</tr>
<tr>
<td>Additional Sources:</td>
</tr>
<tr>
<td>Attendance at QSC Meetings</td>
</tr>
<tr>
<td>Classroom Observations</td>
</tr>
<tr>
<td>Samples of Students Work</td>
</tr>
<tr>
<td>Document Perusal and Analysis</td>
</tr>
<tr>
<td>Various dates</td>
</tr>
<tr>
<td>Report Preparation:</td>
</tr>
<tr>
<td>Supervision and guidance by Assoc. Professor Neil Russell (GUGC)</td>
</tr>
<tr>
<td>Report Presentation:</td>
</tr>
<tr>
<td>Progress reports at various meeting dates</td>
</tr>
<tr>
<td>Post Evaluation Check:</td>
</tr>
<tr>
<td>Final Report Publication:</td>
</tr>
</tbody>
</table>

**Key:**
- NGT = Nominal Group Technique
- SD: CSS = Site Description: Coombabah State School
- SD: CSHS = Site Description: Coombabah State High School
- ICQS = Initial Computer Questionnaire for Students
- FCQS = Follow-up Computer Questionnaire for Students
- QTSLA = Questionnaire for Teachers and School-level Administrators
- QPSS = Questionnaire for Parents of Sunrise Students
- ITIS = Individual Teacher Interview Schedule
- PEC = Post Evaluation Check
provide direction to the evaluation process. As indicated earlier in this Chapter, the research scholarship contract placed a time constraint on the conduct of the evaluation (refer to Figure 4.2, p. 122) as an evaluation report for the Department of Education in Queensland had to be completed by 4 December 1992.

4.6.1 Validity and Reliability

As Merriam (1988, p. 163) indicates, all research "is concerned with producing valid and reliable knowledge in an ethical manner". Merriam suggests that validity and reliability are concerns that need to be addressed according to appropriate standards formulated through "careful attention to a study’s conceptualization and the way in which the data were collected, analyzed, and interpreted" (Merriam, 1988, p. 165). This study of the QSC is the focus for an evaluative case study, requires a different set of criteria for 'trusting the study' than if the rationale of the study was to test a set of hypotheses. However, the basic question remains - to what extent can the evaluator 'trust' the findings of the study? The following discussion describes the strategies employed to address the issues of internal validity, reliability, and external validity. In addition, the issue of ethics is examined.

4.6.1a Internal Validity

One of the assumptions underlying this study is that reality is holistic and dynamic. For example, the learning experiences of the students are not seen as fixed, objective events able to be observed and measured. Reality, according to Lincoln and Guba (1985, p. 295) is: "a multiple set of mental constructions... made by humans; their constructions are on their minds, and they are, in the main, accessible to the humans who make them".

Therefore, according to Lincoln and Guba (1985, p. 296) judging the truth or validity of a study relies upon the evaluator establishing that:

"...he or she has represented those multiple constructions adequately, that is, that the reconstructions (for the findings and interpretations are also constructions, it should never be forgotten) that have been arrived at via the inquiry are credible to the constructors of the original multiple realities".

Thus, the evaluator is concerned with investigating perspectives of the participants.
Several strategies were employed in this study to address the issue of internal validity. Triangulation, participant checks, site observations, participants’ examination of findings, and participation by the participants in the evaluation process were important features of the study’s research design. Triangulation is referred to by various writers (Merriam, 1988; Fetterman, 1988; Lancy, 1993) as a strategy involving the use of more than one method of data collection used to study an issue, problem, or question. The use of multiple methods for data collection and validation in this study is shown in Table 4.4 (p.132). For example, in examining the evaluation question - In what ways have the students been advantaged and/or disadvantaged by being involved in the program?, multiple methods and multiple sources of data were used. Items on both of the two student questionnaires addressed these questions. Furthermore, these were questions asked of the teachers during the semi-structured individual teacher interviews. Parents were also asked those questions on the parent questionnaire.

Participant checks were regularly undertaken throughout the study. That is, information, progress reports and findings were shared with the teachers and teachers were asked if the writing progress and data collection and analyses was credible. Progress reports were also presented at the regional level through the evaluator tabling reports for discussion at the South Coast Technology Education Reference Group meetings.

Site observations at both of the schools undertaken regularly to enable the collection of data over a sustained period of time increased the validity of the data collection. Fieldwork or field observations involved visiting the QSC sites at both Coombabah State School and Coombabah State High School to observe the teachers and the students in action. Permission to visit both sites was obtained as an essential part of the approval to undertake the study. Guba and Lincoln (1981, p. 213) point to the importance of observing the phenomenon being evaluated.

"In situations where motives, attitudes, beliefs, and values direct much, if not most human activity, the most sophisticated instrumentation we possess is still the careful observer - the human being who can watch, see, listen... question, probe, and finally analyze and organize his direct experience."
Participants' examination of the findings were undertaken to allow the participants opportunities to comment on the findings as they emerged. Through the use of the data collection procedures employed, a great deal of data was collected. This information was shared with the participants and they were invited to comment. This included the information gained from students and parents as well as from the teachers and school-level administrators. In particular, drafts of the chapters reporting the findings were made available for their perusal.

Central to the research design was the participation by the QSC participants in the evaluation process. This involvement was encouraged from the early stages of the evaluation when participants were identified and the evaluation questions were formulated. That encouragement and involvement continued throughout the evaluation. Through the facilitation of a participatory mode of research, the internal validity of the evaluation was enhanced. Russell and Willinsky (1995, p. 18) suggest that, as teachers can expect to interact with other stakeholders in improving learning and teaching in their classrooms, it requires teachers "to acknowledge both their unique political context and also the range of value positions operating with different stakeholders". Consequently, they argue that stakeholders should be involved, as occurred in this study, from the beginning of the process.

46.1b Reliability

The purpose of the evaluation in this thesis was to describe and make judgments about the QSC Project as those involved in the project interpret it. As the project was a dynamic, innovative, 'lighthouse' investigation into students and teachers working in technology-rich classroom environments, there were no standards or benchmarks by which this study could establish reliability in terms of the traditional concept. That is, reliability could not be determined through examining the extent to which the findings of this study can be replicated. It is argued that because what is being studied is assumed to be:

"...in flux, multifaceted, and highly contextual, because information gathered is a function of who gives it and how skilled the researcher is at getting it, and because the emergent design of
Therefore, as the notion of reliability in the traditional sense is deficient for case study, Lincoln and Guba (1985, p. 288) suggest that rather than demanding that outsiders get the same results, the aim is for outsiders to concur that, given the data collected, the results make sense, are consistent, and are dependable. Thus, reliability in this approach is obtained through an understanding that reliability and validity are inextricably linked. As Guba and Lincoln (1981, p. 120) argue, "Since it is impossible to have internal validity without reliability, a demonstration of internal validity amounts to a simultaneous demonstration of reliability". The strategies employed to ensure internal validity (e.g. triangulation) also ensure that the findings of this study are reliable.

4.1c External Validity

External validity, according to Merriam (1988, p. 1173), is concerned with the extent to which the study findings can be applied to other situations. Again, Guba and Lincoln (1981, p. 115) indicate that to discuss this issue, internal validity is important as "there is no point in asking whether meaningless information has any general applicability". The purpose of this evaluation study is to investigate the QSC Project in depth and not to find out about what might be 'true' of many other situations. However, it is argued that we can learn from case study in terms of external validity through thinking in terms of the audiences of the study. As Walker (1980, p.34) indicates, it "is up to the reader who has to ask, what is there in this study that I can apply to my own situation, and what clearly does not apply?". More recently, Groundwater-Smith and White (1995), in arguing for project evaluation to be treated as a case study suggest that:

"This enables us to recognise the particularities and idiosyncrasies present in a specific school, and also allows us to pool cases together in order to understand larger phenomena or general principles. This has long been the situation in professional practices such as law and medicine, where case studies have acted both to enable theory building, and as valuable resources for professional education". (Groundwater-Smith and White, 1995, p.166)

For the generalizability of the case study's results to be enhanced, the evaluation must provide a detailed description of the context of the study so that the description specifies
everything that a reader may need to know in order to understand the findings" (Lincoln and Guba, 1985, p.125). To ensure that the external validity of this study was enhanced this report provides description and evaluation information "so that anyone else interested in transferability has a base of information appropriate to the judgment" (Lincoln and Guba, 1985, pp. 124-125).

**Ethics**

The issues related to the ethics of carrying out an evaluation needed to be addressed and considered throughout the entire evaluation process. Indeed, Hill (1992) in outlining ethical considerations in evaluation warned that "Many people become involved in evaluation exercises without necessarily realising they have entered a moral minefield" (Hill, 1992, p.3). He drew attention to the trend for evaluation to involve the participants in the evaluation and this unavoidably introduces a moral dimension to the evaluator's role. Thus, Hill argues that evaluation studies need to be concerned with the ethical dimension as well as the analysis and measurement undertaken.

In addition, Hill (1992, p.15) notes that, while the development of a more professional approach to evaluation resulted initially in a strong emphasis on the evaluator being a trained external arbitrator, it was soon realised that this approach was still as much a top-down model as the traditional model in which management undertook internal top-down audits whenever it chose to. Moreover, Hill suggests that this approach did not necessarily safeguard "the rights of those being appraised or capitalise on their inside views of the situation" (Hill, 1992, p. 15). He argues that both the ethical and empirical considerations have been influential in determining the current view that evaluation should be a process in which all the stakeholders participate. Through the participation of stakeholders, this approach has the potential for all participants to protect their own moral interests.

The researcher undertaking the evaluation was the Deputy Principal at Coombabah State School, one of the school sites at which the QSC is located. The selection of the evaluator resulted mainly from that person's interest in, commitment to, and ownership of the project.
since its inception at Coombabah State School. Access to both of the school sites was negotiated. The participants at both school sites were very cooperative and contact with all of the teachers involved in the project was established. The nature of the planned data collection was discussed with and determined by the respective personnel involved and they displayed a willingness to negotiate times, places, and cooperative approaches with the researcher in his role as evaluator undertaking the various data collection procedures. This study was conducted by the evaluator along consensual lines using all of the attributes of *AG*E (Guba and Lincoln, 1990). For example, the key participants were involved in establishing the evaluation questions, and the data collection procedures were developed and implemented through a series of negotiations with participants.

A draft report was presented to each of the key participants as they were perceived as owners of the evaluation report. They were provided with the opportunity to ensure that their rights had been protected. In particular, they were urged to ensure that the report did not enable them to be incriminated against in any way and/or that their confidentiality had been threatened. Furthermore, participants were asked to comment about changes that might need to be made before final publication and to reach consensus about the distribution and dissemination of the report. The decision about dissemination had to be made within the context that the Department of Education, Queensland which had been the sponsoring body of the evaluation required a copy of the report as a requirement of the scholarship contract. They were also asked to ensure that ethical concerns had been considered. That is, had the evaluator collected, used and reported data from the human subjects in a manner which did not infringe upon the basic rights of any of the participants?

In summary, the evaluation was conducted against a background of ethical considerations. These related to ethical concerns about gaining access to the sites, the way in which the evaluation was conducted, the moral rights of the participants being respected, and the ownership and decisions about the dissemination of the published report.
Treatment of the Data

The Model for Guiding the Program Evaluation of the Queensland Sunrise Centre Project (Figure 3.11, p.110) provided the framework for the data collection and the treatment of data. In particular, the evaluation Forms presented by Owen (1992) assisted in clarifying the choice of an appropriate approach best suited to this particular study. It was determined that two evaluation Forms would be employed - process evaluation and impact evaluation. Within the model which was subsequently developed, three major headings were used - Situational Analysis, Project Management, and Impact of the Project. Within each of those three areas, the various evaluation questions are addressed through findings gained by the data collection procedures employed. Information relating to the evaluation questions which sought to appraise the model for the program evaluation was gained through a post-evaluation check strategy. That information is presented in the final chapter of this thesis (see Chapter Seven, pp. 264 - 274).

This thesis is characterised by methods designed to explore, find patterns, learn from a site or a series of group discussions or an event (Daly and Richards, 1990). Richards and Richards (1992, p. 83.1) indicate that in such research the goals are perceptions, insights, and coherence rather than testing hypotheses and theories (Richards, 1990). A great deal of data was collected which resulted from interviews, observations, meeting notes, and responses to open ended questions on the questionnaires administered which required analysis. Software programs have now achieved a "plateau of competence in their one way of handling text - coding it so that all material to which any particular code or codes can be retrieved" (Richards and Richards, 1992, p.p. 83.1-83.2). The NUDIST (Non-numerical Unstructured Data Indexing, Searching and Theory-building) was ordered from La Trobe University but did not arrive in time to allow for its use. However, other integrated software programs (i.e. Clarisworks) were used to assist in the process of managing the data through entering and storing the text on a Macintosh computer and then proceeding to create an index system, and implement searches for analysis of the data. This enabled responses to be "decontextualised" so that they could be "recontextualised" according to topics through coding and retrieval (Tesch, 1990).
Other data, which required more of a quantitative mode of collation and treatment were presented in a form which enhanced audience understanding and readability through the presentation of absolute frequency, relative frequency (%) and, where possible, graphical representation. Some of the participants in the project indicated that they were 'visual' learners and suggested that graphs could assist in their understanding of the findings and results. Several options were discussed with the teachers and they felt that the following presentation presented results effectively. For example, Figures 4.4 and 4.5 display the results obtained from the QSC students on two of the items on the Initial Computer Questionnaire for Students May, 1992.

![Figure 4.4: The Extent of Computer Use by Students at Home BEFORE Their Involvement in the Queensland Sunrise Centre](image1)

![Figure 4.5: The Extent of Computer Use by Students at School BEFORE Their Involvement in the Queensland Sunrise Centre](image2)
The Chi Square Test ($\chi^2$) was applied to some data as a test of independence; i.e. that one variable is not affected by, or related to, another variable. As Best (1981, p. 287) indicates:

"The $\chi^2$ is not a measure of the degree of relationship. It is merely used to estimate the likelihood that some factor other than chance (sampling error) accounts for the apparent relationship. Since the null hypothesis states that there is no relationship (the variables are independent), the test merely evaluates the probability that that the observed relationship results from chance."

Following the calculation of $\chi^2$ values, the $\chi^2$ value was checked to see if it equalled or exceeded the appropriate $\chi^2$ table critical values (see Best, 1981, Abridged Table of Critical Values for Chi Square, p. 413) to enable the justification of the null hypothesis or the assumption of independence at the .05 or .01 level of significance.

Thus, due to the collection of both quantitative and qualitative data, the treatment of the data required various approaches to enable effective, reliable reporting of findings. The findings are reported in a variety of formats in Chapters Five and Six - tables, graphs, extracts from documents, quotes from meeting notes, individual responses from interviews, and observations. Collectively, they portray and present the QSC Project evaluation findings in order to increase audience understandings about the project.

19 Conclusion

This chapter has outlined the research design for this study in which the QSC is the focus of a case study. The research design was described in terms of the study sample, the research methodology and the program evaluation data collection procedures employed. Case studies were defined and the summary of the data collection procedures chosen indicated that a range of procedures were employed; viz. site descriptions, questionnaires, interviews, classroom observations, samples of students' work, document perusal and analysis, and notes compiled from attendance at QSC meetings.

The data collection instruments used in the study were described. Furthermore, the steps employed in undertaking the program evaluation were outlined. The strategies for ensuring reliability and validity in undertaking case studies were examined in terms of...
internal validity, reliability, and external validity. Ethical considerations were then discussed. Finally, the treatment of the range of quantitative and qualitative data obtained was outlined. The following chapters report the findings of this research.
CHAPTER FIVE

FINDINGS

(a) SITUATIONAL ANALYSIS AND PROJECT MANAGEMENT

This is the first of two chapters which present the findings of the program evaluation of the QSC Project. Through addressing the following questions, Chapter Five provides a situational analysis of the QSC Project and investigation of the QSC project management;

Situational Analysis of the QSC Project:

Why was it initiated?
What was its setting and context?
Who participated in the program?
What was the program's history? How long was it supposed to continue?

Project Management:

What was intended and what happened in terms of program management?
What are the implications for the management of further initiatives to integrate learning technology in schools across Queensland in terms of personnel, resources, budget, and training and professional development?

Examing and reporting findings derived from the situational analysis and related to program management, the following discussion and analysis is couched within the framework presented in Chapter Three using the model developed to guide the research (Figure 3.11, p.110). That model drew attention to examining what was intended and what happened in terms of program description and management. Resources were examined according to what was needed (i.e. people, equipment, money, and training and professional development) and what was available. Processes were investigated in terms of what we intended to do and what we did. Results referred to what the QSC Project Team intended to happen with program management and what actually happened. There was considerable overlap between the processes involved in examining resources, processes, and results. For example, while findings about resources were being examined, issues relating to processes
findings also emerged. Official QSC (i.e. Department of Education, Queensland endorsed) planning documents provided an essential source of information relating to intentions of the project at the policy and planning level. Questionnaires and interviews with key participants, classroom observations and meeting notes provided critical insights into what happened at the school and implementation level. Subsequently, implications for the management of further technology initiatives in schools across Queensland were drawn from an identification of the perceived strengths and weaknesses of the QSC program management employed.

§ 1 Situational Analysis of the Project:

§ 1.1 Why Was It Initiated?

The QSC Project was initiated to enable the investigation of "the educational potential of computers through the establishment of a special classroom learning environment within an existing primary and secondary school" (Grimmett, 1991, p.2). Officially, it was established for two broad reasons; viz.

"* to investigate ways in which new information and communication technologies could be used to enhance and extend the learning of young Australians; and
* to enable active participation within an educational technology research community in Australia which is evaluating critically the practices developing around new technologies, investigating innovative learning environments and charting a path for future use." (Vogler, 1989, p. 2)

According to Grimmett (1991, pp. 3-5), the establishment of this project was derived largely from the notion that children using computer systems as personal intellectual tools needed to be explored. Grimmett (1991, p.3) suggested that it had been widely accepted that considerable experience and knowledge had been built within schools in which technology had been integrated into classrooms as "delivery systems for teaching and learning in various curriculum areas" which he referred to as using computers as amplifiers. Grimmett noted that it was considered important that a long-term research project should be established which could:

"inform a variety of Departmental agencies about the success of this approach in schooling;
identify any implications for future information technology programs regarding the resourcing of schools, the professional development of teachers; and indicate the nature and extent of classroom support services." (Grimmett, 1991, p. 4)

The following sections of this thesis report the official goals of the QSC Project and analyses the participants' beliefs about why they believed it was established and why it was unique when compared with other computer initiatives in Queensland schools.

5.1.2 Goals of the Project - Official View

The goals of the project were:

"to develop a personal, comprehensive, integrated technology-based literacy as a partial substitute for the literacy based on the extensive use of paper, pencil and printed media to which students essentially have been confined in the past;

to develop a technology-rich environment for students by providing them with a new computational environment and to evaluate this environment as a tool to foster an independent approach to learning;

to investigate the implications for curriculum implementation, classroom organisation and management, and teaching and learning strategies of adopting the new environment inschools;

to develop innovative learning activities, work units and assessment procedures which would otherwise not be available to students not using the QSC approach to learning, but which nevertheless fulfil the requirements of the existing Years 6-8 syllabuses in the areas addressed by the project;

to examine and document the role of the teacher in classrooms where extensive use is made of self-directed, child-centred activities; and

to investigate the transferability from upper primary to lower secondary of this approach to learning and curriculum implementation." (Grimmett, 1991, pp. 4-5)

Essential principles therefore were inferred for the classroom culture of the QSC in that it was to be built upon the constructivist belief that knowledge is created by the learner (Grimmett, 1991, p.4). That is, students would become involved in processes which encouraged them to evaluate their own knowledge, reconstruct their knowledge, and extend their knowledge. In addition, the classroom culture was expected to value collaboration and cooperation, and knowledge would be seen to be a shared public utility in which its subsequent evaluation becomes dependent upon its utility according to a variety of contexts (Department of Education, 1990a). Logo was to be extensively used to ensure that students could share their developing skills and knowledge.
Why Was the QSC Established? - Participants’ Views

The school-level administrators (i.e. Principals, Deputy Principals, Registrars), the former Project Officer, and the teachers directly involved in the QSC at Coombabah State School and Coombabah State High School expressed views largely congruent with the ‘official’ view for the establishment of the QSC. The former QSC Project Officer, for example, indicated that the QSC was established:

"A - To explore the possibility of using computers as intellectual tools
B - To provide insights into professional development required by teachers if they are to use it in this way (see A)
C - To develop knowledge regarding curriculum and management required to facilitate A."

(Former Project Officer, May, 1992)

Other responses emphasised the importance of the QSC as a site for investigating students operating in technology-rich environments:

"I believe it was established as a "What if" situation that would attempt to see into the future of education investigating the changes that would take place to curriculum, children's learning, teachers' behaviour and role and the classroom if every child was given [Logo and technology] as a tool to learn with." (QSC Teacher, May, 1992)

"To research, investigate and develop ways of enhancing learning through the use of information technology (CD ROM, scanner, continuous access to printers, desktop monitors, laptop computers) in the classroom and at home (i.e. 24 hours a day, 7 days a week)." (QSC Teacher, May, 1992)

"To investigate ways in which technology can be used to enhance learning in classrooms." (Deputy Principal, May, 1992)

"To investigate the impact of information technology on the learning environment in relation to learning styles, classroom relationships, problem solving and building personal 'building blocks' using Logo." (QSC Teacher, May, 1992)

"As an experiment to ascertain:-
- what student learning was possible using current electronic technology (total immersion on an unlimited budget)
- how this learning differed from that gained in conventional classrooms
- to what degree students could/would become responsible for their own learning outcomes and to be able to make informed recommendations on future educational strategies and
- to develop ideas/programs that could be used by other students in more conventional classrooms to reinforce their learning experiences." (Head of Department, May, 1992)
"As an experiment into total immersion of students in computer technology." (QSC Teacher, 1992)

The Principal of the primary school involved highlighted the importance of the QSC for system information:

"Provide systemic information on teaching and learning implications provided there was a technology rich environment provided." (Principal, May, 1992)

However, a teacher in the project provided a rather cynical view which did not refer to the investigative nature of the project, but instead indicated that while it was a technology initiative there were perhaps other motives for the project's establishment:

"An initiative in technology. Good P.R. Possibly a 'passing shot' by a departing government aimed to cause an incoming government a little trouble." (QSC Teacher, May, 1992)

The primary school registrar suggested that as well as examining computer literacy, the focus of the project was to examine the financial implications of introducing technology in schools.

"Develop computer literacy in primary age students. To monitor feasibility of such a project and the costs and benefits of introducing such programmes into primary schools." (Registrar)

The project experienced significant laptop computer repairs which presented problems in terms of both developing efficient processes for expediting the repairs and funding the extensive repairs frequently needed. Often, those problems were dealt with by the Registrars in the schools in liaison with the teachers.

5.1.4 Was There Anything Unique About the QSC When Compared With Other Computer Initiatives in Schools? - Participants' Perceptions

All QSC teachers, school administration team members, Regional Officers, educational advisers and the Project Officer involved with the QSC Project indicated that they believed that there was something unique about the QSC Project. Participants' perceptions indicating why they believed that it was unique revealed considerable congruence with the official goals of the program. For example, the following comment reflected the high level of...
technological resources:
"a) the children have their own personal computer
b) the computer is taken home at night and over the weekend
c) the children are able to use CD ROM, scanner, monitor whenever necessary." (QSC Teacher, May, 1992)

That high level of resourcing also raised doubts in the minds of some that it was likely that the level of resourcing in the QSC Project could ever be extended system-wide:
"I don't believe the kind of financial assistance given to this project can possibly be justified in terms of education for all children at the systems level." (Deputy Principal, May, 1992)

Many of the comments suggested that the project was unique because it went beyond merely providing high levels of access to technological resources. Comments suggested that new approaches to learning were being explored, students were encouraged to be more responsible for their own learning, and there was an emphasis on programming and risk-taking.

"Sunrise is a dimension beyond what has been done in other primary schools where the focus is really interaction with established software. Through Logo especially an opportunity is given to students to make their computer a 'tool' for their own decision making in learning." (Principal, May, 1992)

"It is concerned more with "How children learn" than providing simulation games as motivational material. It looks at far more than hardware and software. The depth of commitment is enormous." (QSC Teacher, May, 1992)

"(1) Number of computers
(2) High degree of student involvement in content/approach - ownership, control, empowerment of students
(3) emphasis on programming at an early age
(4) open ended nature/risk taking
(5) lots more." (QSC Teacher, 1992)

"Extreme use of Logowriter.
Coupling technology with the self-motivation/investigative learning style. Desire to concentrate on the learning steps/mechanism." (QSC Teacher, May, 1992)

"The degree to which students are responsible for their own learning outcomes. Students encouraged to construct their own knowledge from raw data." (Head of Department, May, 1992)

The length of the project was cited as being an important feature. The project aimed to involve two groups of children throughout the planned four years to enable a longitudinal
The project also required a commitment from the teachers to remain with the project.

"The commitment to maintain the concept of a learning environment by the teachers - especially the long term ones is special (not unique)." (QSC Teacher, May, 1992)

"Structure of the program; i.e. length, grouping, staffing, availability of resources." (Deputy Principal, May, 1992)

A claim was made by the former Project Officer that the QSC Project was unique in that it was the "only longitudinal study... in Australia or the world at this time" (Grimmett, 1991), which was exploring the possibility of using computers as intellectual tools, providing insights into professional development requirements of teachers to use computers in that way, and developing knowledge regarding curriculum and management to facilitate the use of computers as intellectual tools.

### 1.5 What Was its Setting and Context?

The QSC was established at Coombabah State School and Coombabah State High School. Both schools are located in the South Coast Region of the Department of Education, Queensland. The selection of these schools was consistent with the program planning decision that the QSC would operate in two neighbouring schools - one of which was to be a primary school and the other school was to be a secondary school. Moreover, the schools were located close to Brisbane to enable contact between the coordinating and support groups from the principal project partners. At the conception of the project in 1989, the project partners consisted of the Department of Education, Queensland, ACER, and the University of Queensland. The monitoring, evaluation and research activities were to be determined through consultation between the project partners (Vogler, 1989, p.2).

### 1.6 Who Participated in the Program?

The selection of the schools, teachers and students was planned to accommodate the criterion that most of the students (>80%) would move from Year 7 to Year 8 in the sec-
Secondary school chosen to enable the group to remain together during their planned involvement in the project. Parents were informed of their children being selected to be participants in the program and their consent was sought. It was recognised that it would be necessary to "keep the confidence of students' parents that their children will not be disadvantaged through participating in the project" (Vogler, 1989, p.12). During the selection process, administrators and teachers were asked to indicate their commitment to remain involved throughout the life of the project. Furthermore, the teachers were to be selected according to their:

"...disposition, background, training, familiarity with the use of information technology, creativity, ability to cope with change, ability to implement innovative learning systems." (Vogler, 1989, p. 7)

Since the inception of the QSC Project in 1990, most of the students (> 80%) and most of the teachers have remained in the project. For example, all three of the primary school teachers initially selected remained with the project throughout 1990 and 1991. One of the teachers left the project in 1992 when the project no longer needed three primary school teachers to be involved. The two remaining teachers were still involved in the project in its third year of operation. The research expanded in 1991 to include almost one hundred and twenty Year 6 and Year 7 students, and five teachers. An overview of participants in the project is displayed below in Table 5.1.

<table>
<thead>
<tr>
<th>Table 5.1: Overview of the Participants in the QSC Project 1990 - 1992</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First wave of students</strong></td>
</tr>
<tr>
<td>1990</td>
</tr>
<tr>
<td>Year 6</td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td><strong>Second wave of students</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Boys</td>
</tr>
<tr>
<td>Girls</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
This data collection for this research, undertaken in 1992, was conducted with 56 Year 7 students (N(Boys) = 28, N(Girls) = 28) and 50 Year 8 students (N(Boys) = 26, N(Girls) = 24). Those enrolments differed only slightly from the numbers involved in the two earlier studies (Ryan, 1991; Rowe, 1992). Ryan’s study involved 54 Year 6 students (N(Boys) = 26, N(Girls) = 28) and Rowe’s study involved 56 Year 6 students and 59 Year 7 students. The number of students did not change to any great extent during the data collection phase conducted from April until December 1992 (see Chapter 4, Table 4.5, p. 133) for this thesis. The number of Year 7 students increased slightly to 60 students due to an administrative decision that new enrolments needed to be placed in the QSC classroom as the other Year 7 drafts at the primary school had also reached approximately 60 students.

The number of students in the Year 8 draft had decreased slightly due mainly to some parents electing to enrol their children in other secondary schools either through personal preference or through employment transfers. Table 5.2 further illustrates that most of the children had been involved in the QSC Project for a sustained period as planned.

Table 5.2: Length of Student Involvement in QSC Project

<table>
<thead>
<tr>
<th>Length of Involvement</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>2 - 5 months</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>1 month</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>less than 1 month</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of Involvement</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>2 years</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>24</td>
</tr>
</tbody>
</table>

Students had been selected to include similar numbers of boys and girls and to have classes which were composed of students of mixed abilities and behaviours. Rowe (1992) indicated that, in her total sample, the average IQ for girls was 107 (SD = 11) and for boys the average IQ was 102 (SD = 12). As displayed in Tables 5.1 and 5.2 above, the composition of the study sample remained very similar for this study. Information was also gained to examine the extents to which students perceived that they had an interest in computers, had access to computers at home, and that they had used computers at school and at home before their
involvement in the QSC. Only 9 students (8%) indicated that they were interested in computers to a very great extent and a further 23 students (22%) of those studied indicated that they were interested in computers to a great extent before their involvement in the QSC Project. Almost 50% of students expressed that they had very little or no interest at all. As shown below in Table 5.3, 54% of the students had access to computers at home, which was similar to that reported by Rowe (1992) that 54% of the students had access to family computers at home.

**Table 5.3: Does your family have a computer in your home?**

<table>
<thead>
<tr>
<th>Response</th>
<th>Boys Frequency (%)</th>
<th>Girls Frequency (%)</th>
<th>Total Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>28 52</td>
<td>29 56</td>
<td>57 54</td>
</tr>
<tr>
<td>No</td>
<td>26 48</td>
<td>23 44</td>
<td>49 46</td>
</tr>
<tr>
<td>Total</td>
<td>54 100</td>
<td>52 100</td>
<td>106 100</td>
</tr>
</tbody>
</table>

Further investigation revealed that many of those computers had been purchased by students' families within the last three years. That is, although their children had been supplied with a laptop for their own use at school and at home, some parents had still purchased additional hardware for home use. Anecdotal evidence gained from some students suggested that some families had become more interested in computers through their laptop use at home. Several students, for example, stated that their parents had used their laptop computers for doing business letters and some of their older brothers and sisters had used their laptop computers for assignments.

Figures 5.1 and 5.2 respectively display the low extent to which students perceived that they had used computers at home and at school before their QSC involvement. There was little difference between Year 7 girls and boys with 60% of boys and 57% of girls indicating they had used computers at home before their QSC involvement to a very little extent or not at all. However, while 31% of Year 8 boys had used computers at home to a great or very great extent, only 4% of Year 7 girls had used computers at home to that extent. Moreover, none of the Year 8 girls stated that they had used computers at school to a great
to a very great extent before their QSC involvement, while 15% of the Year 8 boys indicated that they had used computers to a great or very great extent. In addition to that information about the low extent of use of computers at school and at home by students before their QSC involvement, students also perceived that their understanding of computers was also low (Figure 5.3). Only 8% of students indicated they had gained an understanding and skill in using computers to a great or very great extent.

![Figure 5.1: The Extent of Computer Use by Students at Home BEFORE Their Involvement in the Queensland Sunrise Centre](image)

![Figure 5.2: The Extent of Computer Use by Students at School BEFORE Their Involvement in the Queensland Sunrise Centre](image)

**Findings - (c) Situational Analysis and Project Management**
Therefore, before their involvement in the QSC Project, most students generally perceived that they had used computers at home and at school to a little or no extent. While slightly more than half of the students had access to a family computer at home, only a very small proportion of students believed that they had a great or very great understanding and skill in using computers before their QSC involvement. Findings were similar for boys and girls, although Year 8 girls were found to have used computers at school and at home to a lesser extent than Year 8 boys.

From the survey administered in 1992 (Appendix G), it was also found that the QSC teachers had little or no skill and understanding in using computers before their involvement in the QSC Project. Several teachers had shown personal interest in using computers in their classrooms and one teacher, in particular, had been considered to be a key computer resource person within her school. Much of the teachers' previous experiences, however, had been with Apple computers. Thus, working with laptops and Logowriter had been totally new to all of the primary school teachers. The secondary teachers, in a similar spirit to the primary teachers, indicated a willingness to learn about using computers with students. There was also a general indication from them that they felt they should have had more extensive inservice in using laptop computers and preparation for using Logowriter.
The planned life of the QSC Project was four years; viz. 1990 - 93. Official planning implementation (Vogler, 1989, p. 6) indicated that this would be the minimum time required for the project to "properly explore the proposed computer environment and classroom methodologies". As outlined earlier, two groups of students were to be involved with each of those two groups proceeding through Years 6, 7 and 8. Thus, the project, at the time of the data collection for this thesis, had a further year to continue through to its officially planned completion in 1993. By the end of 1992, the first group of students would end their planned involvement after having been QSC participants for three years (i.e. 1990-92).

Major restructuring of the Department of Education in Queensland was commenced throughout 1991, which impinged greatly upon the management and coordination of the QSC. However, despite some changes which threatened to end the life of the project throughout that restructuring, enough support was provided from Central Office and truth Coast Regional Office to assist in maintaining the project. However, the locus of control for the project moved substantially from Central Office to the South Coast Region in line with the principles underlying the restructuring process. In response to that shift in responsibility, the South Coast Region (in particular, the Deputy Executive Director, the Assistant Executive Director (Studies), the South Coast Regional Technology Reference Group, and the Gold Coast North School Support Centre) provided support for the QSC to continue throughout second semester of 1991 and throughout 1992. There was also an intention made by the South Coast Region to assist in ensuring that the QSC Project continued to its planned completion in 1993.

Project Management

5.2.1 What Was Intended in Terms of Program Management?

5.2.1a People

Planning proposal (Vogler, 1989, p. 10), it was recognised that the QSC would
require special management arrangements in order to achieve its objectives having regard to the diversity of educational, research and support interests represented by participating agencies. A Policy Group and a Steering Committee which consisted of the following membership was formed:

- **Policy Group:**
  - John Tainton, Assistant Director (Development and Portfolio Services), Department of Education, Queensland;
  - Barry McGaw, Director, Australian Council for Educational Research; and
  - Glen Evans, Professor of Education, University of Queensland.

- **Steering Group:**
  - Regional Director;
  - Director, Division of Communication and Information Systems;
  - Principals of the primary and secondary schools concerned;
  - Member of the Faculty of Education, University of Queensland;
  - Assistant Director, Curriculum Services;
  - Project Director, Sunrise Central Group; and
  - Primary and secondary project teachers" (Vogler, 1989, p.10)

The role of the Policy Group was to consider global issues such as project formulation and direction, resourcing and staff requirements, the project's progress, and cooperative contributions between project partners. The Steering Group was to be responsible for the coordination of the QSC implementation, while the day-to-day management was to be dealt with by the 'Project Leader' who would be required to report progress to the QSC Policy Group. The responsibilities of the Project Leader were to coordinate all aspects of project through consulting with the schools' administration, various Regional and central Office agencies, ACER, and the Faculty of Education at the University of Queensland.

In addition to the Policy Group, the Steering Group, and the Project Leader, other roles and actions were delineated for students' parents representatives, Learning Technology service, Division of Schools, and the Sunrise Central Group (SCG) (Vogler, 1989, p. 12). The role and function of ACER and the University of Queensland were, at that time in late 1989, incomplete. Further project support, outlined in the early official planning document (Vogler, 1989, pp. 12-13), would be provided through the encouragement of parents, other students and teachers in the project schools, and local educational support personnel to
participate in discussions for assisting the Sunrise classrooms. Regional support teams are expected to attend meetings with the QSC teachers to offer support which teachers might require.

Accompanying research was to be formulated by the project partners. It was indicated at that time, that researchers and staff from ACER and the Faculty of Education at the University of Queensland would provide significant support for the research function. The research formulation was subsequently modified as ACER and the University of Queensland were no longer funded by the Department of Education after 1991. Their research roles were reduced and the Griffith University Gold Coast provided significant research support and coordination with the South Coast Region to enable the evaluation of the collection for this thesis to take place during 1992.

5.2.1B Equipment

Technological resources were a key element of the QSC Project plan as the "most important aspects of the Sunrise philosophy are concerned with developing a culture of learning in which activities help to develop the role of information technology as a special resource." (Vogler, 1989, p. 3)

'It was acknowledged that the only completely integrated technology-based environment developed for micro-computers was Logo. Logowriter was planned to be the main software used, with Boxer to be introduced later, subsequent to its development. Boxer, according to Vogler (1989, p. 5) would extend the capabilities of Logo and would provide more suitable user interface.

The resource requirements described the provision of personal laptop computer access for the student. Students were to use their personal laptop computers at school and at home. Criteria for the selection of those computers was outlined (Vogler, 1989, p.9). Additional technological resources were planned to be provided; i.e. printers, CD ROM, modem, synthesiser, and LEGO interfaces and kits.
§ 2.1c Budget

An initial budget was proposed for $185,250 (Vogler, 1989, p. 13) which was to cover the salary for the Project Officer, contribution to the SCG, travel and accommodation costs for SCG staff and visiting support personnel, QSC Project Officer’s travel and operating expenses, students’ computer resources, additional classroom facilities, professional development workshops and teacher release, materials acquisition and development, and consultancy. Major responsibility for the provision of funding resided with Central Office, with some additional budgetary support (e.g. provision of TRS funding for teacher release and the provision of an extra teacher number) from South Coast Region. Schools were not required to provide either any funding or be involved in budgetary decision-making.

§ 2.1d Training and Professional Development

Extensive inservice was planned for teachers on project principles, the intended computing environment, and familiarity with the technological resources at an initial training workshop to be held in November, 1989. During November and December of 1989, prior to QSC implementation in 1990, teachers were to develop, as a part of the inservice activities, a program for the beginning of 1990. An extra teacher was assigned to the QSC class for 1990, to enable flexibility for the organisation of professional development activities to be undertaken by the QSC teachers.

§ 2.2 What Happened in Terms of Program Management?

§ 2.2a People

The Policy Group and the Steering Group met throughout 1990 as planned. Representatives from the project partners, South Coast Regional representatives, and school representatives attended meetings held in Brisbane. Three teachers and the Year 6 students were selected as planned. ACER commenced the research program through the appointment of
Michael Ryan. However, the appointment of the Project Officer did not occur until May 1990. Ryan (1991, p. 45) observed that the Project Officer had a critical role to play in teacher support and that "the delay in appointment was to have a number of adverse effects". According to Ryan, they included:

"difficulties experienced by the teachers in the planning of innovative classroom experiences; problems in the design and coordination of a new approach to the official curriculum; coping with device malfunctions and inexperienced users; arranging the supply and maintenance of various goods and services; and the fundamental difficulty in interpreting practical plans from a poorly articulated project philosophy." (Ryan, 1991, p. 45)

Following the appointment of Greg Grimmett as the Project Officer, Ryan (1991, p. 45) stated that those issues were dealt with by the Project Officer in two ways - "through the specification of a more structured approach to planning; and in the provision of much needed technical support."

The number of teachers involved in the QSC Project increased in 1991 to include five teachers at Coombabah State School. The same Project Officer continued working with the project into 1991. However, during 1991, major personnel changes occurred at Regional and Central Office through the restructuring of the Department of Education in Queensland. This had major implications for the Policy Group and Steering Group as all of the representatives from Central Office and South Coast Regional Office were impacted upon by the restructuring. Some of those representatives had to seek newly created positions, while some chose to leave the Department of Education. By mid-1991, the Policy Group and the Steering Group no longer existed and the management of the project was transferred to the South Coast Region.

The Project Officer left the project during mid-1991 for a short period throughout that transition. He returned to the project for the remainder of 1991. Throughout the transition period, personnel changes provided significant uncertainties about the future viability of the QSC. Personnel changes impacted upon the morale of the teachers, resulted in uncertainties about funding, and required a renewal of the program management and co-
A South Coast Policy Committee for the QSC Project was established and the meeting of that group was held on 11 September 1991. The membership of that group were significantly different from the previous Policy Group. The membership of the newly formed QSC Policy Group reflected the regional ownership. Representatives were the Executive Director, South Coast Region, Senior Research Fellow, ACER (ACER continued the research through the work being coordinated by Dr Helga Rowe throughout 1991), Assistant Executive Director (Studies), South Coast Region, Principal Coombabah State School, Principal Coombabah State High School, and a QSC teacher representative.

Neither the SCG nor the University of Queensland had any further direct QSC policy involvement.

The transition process proceeded throughout 1991 and into 1992, school support centres were established, and revised regional roles, management structures and functions were regulated (South Coast Region, 1992). Those revisions were guided by the organisational principles from the *Focus on Schools* report (Department of Education, 1990). Of particular relevance to the QSC Project, a South Coast Regional Technology Reference Group was established to oversee major technology initiatives in the South Coast Region. Consequently, the QSC Policy Group became superseded by the newly formed group in late 1991.

That group, which continued to operate throughout 1992, was chaired by the Deputy Executive Director, South Coast Region, and membership consisted of the Assistant Executive Director (Studies), South Coast Region, the Educational Advisers (Technology), School Support Centre Coordinators, Coombabah State School Principal, and a QSC teacher representative from Coombabah State High School. The researcher undertaking the evaluation study was also invited to attend meetings throughout 1992 to enable the presentation of progress research reports. ACER was no longer directly involved in 1992.

The conduct of the research undertaken in 1992 which is presented in this thesis was facilitated by the provision of a research scholarship by the Study and Research Assistance Scheme of the Department of Education, Queensland to Glenn Finger, the Deputy Principal of Coombabah State School was appointed as the researcher to undertake the QSC evaluation which is presented in this thesis.
since the project's conception, significant personnel changes had occurred. Whilst the project continued throughout 1992 and there had been little change in the composition of the QSC students, the management structure and coordination underwent major changes. Those changes which included the non-reappointment of a Project Officer, ACER and the University of Queensland no longer being active project partners, and the SCG no longer directly liaising with the QSC, reflected significant differences between the initial intention and what happened. Support for the QSC came from within the schools and within the South Coast Region. This was found to have resulted in feelings among the teachers and schools' administration that due to the QSC losing its original parents, the schools had been required to adopt its ownership without appropriate leadership, coordination and support.

12a Equipment

The Toshiba 1000SE laptop computers were chosen for the project. At the commencement of the QSC Project in 1990, 30 students had their own laptop computers, and a further 30 students shared fifteen computers. Additional classroom facilities were also acquired including CD Rom unit, large desktop computers, printers, scanner, modem, telephone connection, and LEGO kits. A site licence for Logowriter and some additional software was purchased. In addition, security was installed in the QSC classroom in 1990.

A decision was made in November 1990, at a meeting involving the Project Officer in consultation with QSC teachers that the provision of computers would be increased to allow all students in 1991 to have their own personal laptop computer. That decision resulted in there being almost 120 laptop computers being used by almost 120 Year 6 and Year 7 students in 1991. That level of resourcing had been maintained in 1992, although there had been some computers 'written off' due to the high cost of repairs quoted for those computers. Figure 5.4 displays information which indicates that nearly all QSC students had a computer for their own use. Furthermore, Figure 5.5 shows that most QSC students used their computers at both school and at home. Surprisingly, five girls and one boy in Year 8 indicated that they used their laptop computer only at home. Informal classroom
Observations and discussions with some of the Year 8 teachers revealed that those students shared their computers at school. Indeed, it was mandatory for the completion of many set tasks. Students were also asked to estimate the proportion of the school day in which they used information technology. While only 2% of Year 7 students either did not use technological resources at school or used them to a very little extent, 19% of Year 8 boys and 23% of Year 8 girls indicated that they did not use technological resources at all or used them to a very little extent as shown in Figure 5.6.

![Figure 5.4: Student Access to Laptop Computers](image1)

![Figure 5.5: Location of Student Use of Laptop Computers](image2)
The provision of the technological resources represented a significant capital outlay. Together with the funding for other contingencies such as professional development, ACER research costs, Project Officer salary, and consultancy, the total funds invested in the QSC Project through 1990 and 1991 was over $290,000. What happened in terms of resource acquisition more than matched the intended resourcing levels outlined in the planning document (Vogler, 1989). The consequent funding was considerable due mainly to the expansion of the QSC Project in 1991. The budget requirements for the QSC Project for Semester 1, 1991 was $212,642.50. In addition to the initial establishment costs in 1990, funding was sought and obtained for the purchase of an additional 75 Toshiba C500SE laptop computers at a total cost of $98,625. Submissions for those funds and the execution and management of that QSC budget was largely the responsibility of Learning Technology Services located within the Central Office of the Department of Education, Queensland. The Project Officer performed a major role in submission writing and the day-to-day implementation of ordering equipment and materials, arranging repairs, and coordinating payments for professional development activities.

Neither the schools nor the region during 1990 and Semester 1, 1991 had any direct control over the budget. As the Project proceeded, funding issues and decisions about the project...
...direction devolved to the South Coast Region and to the schools involved. However, funding constraints and uncertainties emerged throughout 1991 as ownership of the project became devolved from Central Office. The QSC Project operated throughout the 1991-92 financial year on contingency funding of $50,000. By the 13 May, 1992 that contingency funding had been exceeded by more than $8,000. There was concern within the schools that even basic repairs could not be funded and that the QSC might not continue. Senior South Coast Regional Officers provided significant support at that stage and further funding was allocated to ensure that the project could be maintained. An important meeting was coordinated by the Gold Coast North School Support Centre Coordinator on 28 May, 1992. QSC teachers attended that meeting. A major purpose of that meeting was for the teachers to establish a budget required for the QSC Project to continue throughout 1992 and 1993. Subsequent to the submissions made by teachers from that meeting, the South Coast Regional Technology Reference Group instigated the formulation of a submission for further funds to enable the QSC Project to continue in 1993.

§2.2d Training and Professional Development

During the commencement of the project in 1990, Ryan (1991, p. 50) drew attention to the importance of access to broad professional support for teachers who were involved in innovation. Analysis is presented here of the access teachers had to that support. While this section focuses on training and professional development, the investigation of support for teachers discovered that teachers also required moral support as well as technical and professional support. Sources of that leadership and support are discussed.

Ryan was highly critical of the lack of professional support early in the QSC implementation. He reported that:

"To begin a major innovation without such support, as occurred in this project, is to repeat the mistakes that have plagued many innovative projects in instructional technology. The teachers became quickly overwhelmed with difficult planning and management issues and coped by using unproductive mechanisms". (Ryan, 1991, p. 50)

Ryan referred to that approach as the deep-end philosophy which guided early implementa-
and suggested that "one manifestation of the deep-end philosophy is the well
documented gap between expressed goals and implementable practice" (Ryan, 1991, p.
192). The lack of support for teachers was such that Ryan even assisted in the conduct of
sessions with teachers to help them resolve technical and educational difficulties posed by
the technological resources. However, following the arrival of the Project Officer, a
program of professional development for the QSC teachers at Coombabah State School was
developed. Specific sessions and courses were devised to provide assistance for teachers
with:

- general classroom management strategies;
- basic knowledge of the disk operating system for the laptops;
- organisational techniques for computer files and disks;
- constructs and programming in Logo; and
- classroom use of Lego control devices." (Grimmett, 1990, p. 2)

An inservice program was organised which enabled the QSC teachers to participate in a
rich program of professional development activities throughout 1990. The Project Officer
noted that by July 1990, the teachers were becoming more reflective about their classroom
practice and had become better able to incorporate advice from the specialists which he had
made available to them (Grimmett, 1990, p. 3). Moreover, he noted that the classroom
culture had become more inquiry-oriented, and that the QSC teachers were displaying
greater confidence in their ability to use the learning technology to enhance the employ­
ment of more effective learning and teaching strategies. The role played by the Project
Officer was critical in providing technical, professional, and moral support for the teachers.

A similar program of professional development proceeded throughout 1991 with the
Project Officer being the key facilitator of that program of professional development. As
a result of the QSC experiences in using laptop computers, a report titled Using Laptop
Computers in Schools (Department of Education, Queensland, 1991c) was compiled by the
Project Officer. That report made the distinction between the training and professional
development of teachers in using computers. According to that report, training referred to
the skills required to make teachers competent users of the technology, while professional
development referred to the approaches necessary for teachers to successfully incorporate
... that technology into the classroom experiences of their students. Two reasons were cited for making that distinction. Firstly, training and professional development were different, and, secondly, that the QSC experience had strongly shown that they should not be undertaken together (Department of Education, Queensland, 1991c, pp. 5-6). The report argued that:

"Teachers need time to meet all of the problems involved in the use of technological tools (copying files, adding graphics, crashing disks, losing files, controlling printers, etc.) prior to facing the avalanche of problems which can result from introducing a number of computers into the classroom of students." (Department of Education, Queensland, 1991c, p. 6)

The necessary training which Ryan (1991) identified had been largely missing in the early stages of the project was present throughout most of 1991. However, due to the Project Officer not being appointed for 1992, the teachers at the secondary school received only several days of inservice in December, 1991. The secondary teachers throughout 1992 had experienced similar problems to those observed by Ryan of the teachers in early 1990. The QSC teachers at Coombabah State High School expressed criticisms about the lack of access to appropriate leadership, support, and inservice. One of the secondary teachers, when asked what had been the strengths of the project management indicated that he didn't perceive that there had been any project management at all. Moreover, one of the key secondary administrators who had shown interest in the QSC Project also was critical of the lack of management in making the transition to Year 8 in 1992. He stated that:

"The non-replacement of the Project Officer appears to have left the project without an overview of direction, with problems of negotiation between departments (especially budget) leading to serious doubts among staff as to the future viability of the project, their personal value to the project and their future tenure details.

A common comment from staff also seems to be their displeasure at the number of times they have been asked to provide the same information for various reasons. They feel they have covered the same ground repeatedly. This would seem to indicate a lack of coordination/loss of information/communication/reticence to take responsibility or ............. (unknown) within the project." (Head of Department, May, 1992)

Therefore, not only was the lack of training and professional development a concern for the secondary school QSC teachers in 1992, but there also existed a lack of cohesive, effective project management and coordination. Informal discussions with the secondary teachers and comments made by them at meetings suggested that, while they had been interested
participate in the QSC Project, they felt that they had been left to fight for the project's survival. They believed that was not an appropriate role for them to play in their first year of involvement as they were still asking questions about the project's philosophy, rationale, and goals. The strategic planning, management and support necessary to maximise the secondary teachers' training and professional development was missing.

The lack of support for the secondary teachers in 1992 was further exemplified by the contrasting indications from the primary teachers and the secondary teachers when asked about the personnel who had provided them with leadership and support. The teachers and administrators at Coombabah State School listed twenty-one people whom they perceived had provided them with leadership and support. The secondary teachers only listed eleven people. Of those eleven people, six of them were teaching colleagues, and a further three listed were the former Project Officer and two lecturers from Monash University (Dr Anne McDougall and Jeff Richardson) with whom they had worked briefly for several days in late 1991. Professor Richard Smith from Griffith University Gold Coast was listed by one of the teachers who was undertaking postgraduate work with Richard.

The following were responses from teachers:

**Greg Grimmett**  Project Officer 1990 - 91

"Introduction to project philosophy, research material." (Year 8 QSC Teacher, May, 1992)

"Inservice (Dec '91)." (Year 8 QSC Teacher, May, 1992)

"Organised Logo inservice with Monash Uni. staff." (Year 8 QSC Teacher, May, 1992)

**Dr Anne McDougall**  Lecturer, Monash University

"Inservice training in Logowriter. (This was invaluable)" (Year 8 QSC Teacher, May, 1992)

**Jeff Richardson**  Lecturer, Monash University

"Inservice training in Logowriter. (This was invaluable)" (Year 8 QSC Teacher, May, 1992)

**Professor Richard Smith**  Griffith University Gold Coast

"Advice and information." (Year 8 QSC Teacher, May, 1992)

There was little indication from the secondary teachers of any planned, strategic project support either from their school administration or from Departmental support from outside the school. One teacher indicated that the Head of Department (Mathematics) had assisted in coordinating the secondary school staff. However, they named other QSC
Teachers as their main sources of support; viz.

Dave Mitchell, Zoe Schalch, Dave McGuren, Mike Hawney, and Julie Hammett  QSC Teachers at Coombabah State High School
"They’ve taught me everything I know." (Year 8 QSC Teacher, May, 1992)

Dave Mitchell  QSC Teacher 1990-92
"Background, philosophy, in class help, technical help." (Year 8 QSC Teacher, May, 1992)
"General advice on the operational issues associated with Sunrise. Assistance with ordering and purchasing. Technical advice that has assisted in gaining best value for money for repairs." (Year 8 QSC Teacher, May, 1992)

Zoe Schalch  QSC Teacher 1991-92
"Team type teaching." (Year 8 QSC Teacher, May, 1992)

Karen Hallett  QSC Teacher 1990-92
"Observation, discussion, sharing ideas/projects." (Year 8 QSC Teacher, May, 1992)

Mike Hawney  QSC Teacher 1992
"Ideas/project sharing brainstorming." (Year 8 QSC Teacher, May, 1992)

In stark contrast, the primary QSC teachers and administration indicated a broader range of support emanating from Central Office and South Coast Region, school administration, ACER, and Monash University. Central Office and ACER leadership was perceived to have been evident at the commencement of the project with Laurie Vogler and Liddy Nevile seen as key personnel in the conception of Sunrise; e.g.

Laurie Vogler  Project Leader - Central Office 1989-1991
"Initial setting up of the project. Guidance with curriculum and planning." (Year 7 QSC Teacher, May, 1992)
"Original concept formation." (Year 7 QSC Teacher, May, 1992)
"Administrative assistance." (Year 7 QSC Teacher, May, 1992)

Liddy Nevile  ACER consultancy to Department of Education, Queensland 1990
"Some Logo ideas, personal support, some planning advice, introduced us to others." (Year 7 QSC Teacher, May, 1992)
"Original concept formation." (Year 7 QSC Teacher, May, 1992)
"A Sunrise Centre in which to operate." (Year 7 QSC Teacher, May, 1992)

South Coast Regional support was also identified which reflected the transition which occurred in ownership of the project and through changes in senior personnel at the regional level. The primary teachers listed the following personnel; viz.
The QSC teachers indicated that they perceived on-site visits by those officers to see what was happening in the QSC classrooms as important. The QSC teachers, for example, were encouraged by the compliments expressed in a letter (dated 20 March 1991) which was sent to the Project Officer from Tom Birtwistle following a visit to the school. The following is an extract of that letter:

"Keith Bryant, Assistant Regional Director, South Coast Region and I visited the Sunrise Centre at Coombabah State School on Friday 15 March 1991.

...the teachers and pupils showed us a sample of some of the work that has been accomplished at the Sunrise Centre.

Both Keith and I would like to say, Greg, that we were most impressed with the progress and changes that have occurred not only in the teachers' classroom management and attitudes but also in the learning outcomes of the pupils. ...I thank you for your involvement."

Similarly, the school administration at Coombabah State School was also perceived by the teachers to have provided leadership and support. Teachers, when interviewed, strongly argued that they felt that it was important that their work was valued by their administration and by senior Departmental Officers. A teacher expressed that the interview itself had provided her with a personally beneficial emotional experience through which she had been given the opportunity to state freely her feelings about her project involvement. The QSC teachers had worked in a high-risk environment and consequently sought regular affirmation of the viability of the project, assurances that they were "heading in the right direction", and required moral support as well as technical and professional support. As the school administration and the Project Officer had been close to the QSC teachers in their day-to-day work, teachers saw those personnel as key support figures for confirming their efforts. A teacher even referred to the Project Officer as a 'minder' and 'father figure'. The following statements from teachers provided evidence of the importance of that administrative support:

Robin Ramsbotham Principal, Coombabah S.S. 1989-92
"Helped with parent meetings and most workshops. Maintained strong ultimate school responsibility for the project. Represented the project at Regional Office and Central Office meetings..."
Helped some teachers to obtain support to go to ACEC in 1992." (Year 7 QSC Teacher)

Glenn Finger  Deputy Principal, Coombabah S.S. 1989-92
"Interest and enthusiasm in all aspects of the project. Participated in workshops and ran inservice where possible. Fought for all initiatives and supported teachers at all stages. Met with Project Officer on weekly basis in 1991 to plan strategically. Also worked to familiarise parents with the project at all times. Helped organise the selection of students into project." (Year 7 QSC Teacher, May, 1992)
"Enthusiasm for the project. Support and encouragement at all times. Excellent advice in administration areas." (Year 7 QSC Teacher, May, 1992)
"Being prepared to work with the project, sustain initiatives, etc." (Year 7 QSC Teacher, May, 1992)
"Professional and moral support." (Year 7 QSC Teacher, May, 1992)
"Confident/effective school manager." (Year 8 QSC Teacher, May, 1992)

Greg Grimmett  Project Officer 1990-91
"Supported us in all areas- curriculum development, care of resources, purchase of equipment, represented us at Regional and Central Office level meetings, organised inservice. General 'minder' and 'father' figure." (Year 7 QSC Teacher, May, 1992)
"Inservice of software that was to be used (Logo, WordPerfect, Works). Moral support and encouragement at all times. Guidance in all areas - personal and professional." (Year 7 QSC Teacher, May, 1992)
"Transference of concept to practice. Logistical support." (Principal, May, 1992)
"Stocktake." (Registrar, May, 1992)
"Crucial co-ordination, provision of professional development, FUNDING arrangements." (Year 8 QSC Teacher, May, 1992)

The primary school QSC teachers also named their teaching colleagues as sources of support in assisting with their training and professional development. Teaching colleagues as a source for teaching ideas, strategies, and professional discussions cannot be underestimated as shown by the following teacher responses. Many effective training and professional development activities were classroom-based and involved planning discussions with teaching colleagues.

Karen Hallett  QSC Teacher 1990-92
"Advice, encouragement and support in all areas." (Year 7 QSC Teacher, May, 1992)

Jenny Betts  QSC Teacher 1990-91
"Personal backup and expertise with Logo. Modelled good teaching practices in the classroom. Inservice the team at particular times." (Year 7 QSC Teacher, May, 1992)
"Invaluable assistance with Logo and classroom strategies. A great role model for any teacher." (Year 7 QSC Teacher, May, 1992)
Dave Mitchell  QSC Teacher 1990-92
"Personal backup and expertise with Logo. Worked hard to learn how to manage the different pieces of hardware and the different software packages. He was always helpful whatever the problem. Inserviced the 'team' in various areas of software." (Year 7 QSC Teacher, May, 1992)
"Excellent advice in Maths area of Logo. Great assistance with maintenance." (Year 7 QSC Teacher, May, 1992)

Barbara Macfarlane  QSC Teacher 1991-92
"Personal backup and expertise with software packages. Willingness to be flexible in a co-operative teaching situation has been of incredible help to me personally." (Year 7 QSC Teacher, May, 1992)

Karen Hallett, Jenny Betts, Dave Mitchell, Zoe Schalch, and Barbara Macfarlane  QSC Teachers at Coombabah State School
"A supportive school environment."(Year 7 QSC Teacher, May, 1992)
"A professional group of teachers." (Principal, May, 1992)
"Being prepared to put in the extra effort, suffer the stress, etc." (Year 7 QSC Teacher, May, 1992)

Inservice activities and sources of support for the QSC teachers at Coombabah State School were derived from Educational Advisers and tertiary education lecturers; viz.

Bev Pacey  Educational Adviser
"Inservice at various times. Participation in the project when possible." (Year 7 QSC Teacher, May, 1992)

Bob Rogers  Educational Adviser
"Setting up of hardware in the initial stages of the project. Willingness to fix hardware at a moment’s notice. Inservice in WordPerfect." (Year 7 QSC Teacher, May, 1992)
"Technical support in early days of the project." (Year 7 QSC Teacher, May, 1992)

Dr Anne McDougall  Lecturer, Monash University
"Inservice for a week in Logo. Enthusiasm for the project at all times." (Year 7 QSC Teacher, May, 1992)

Jeff Richardson  Lecturer, Monash University
"Inservice for a week in Logo. Lecturer for Graduate Diploma in Computers in Education. Enthusiasm for the project and offered to be available at any time if we needed help." (Year 7 QSC Teacher, May, 1992)

Some of the QSC teachers had participated in State, national, and international conferences about computers in education. That participation included the presentation of papers based upon their QSC experiences at many of those conferences. In addition, six of the QSC teachers had commenced tertiary study programs directly related to educational computing. Despite some of the limitations and shortcomings of the training and development
sources of professional support, the involvement of the teachers in the QSC Project
t PROVIDED a commitment on the part of the teachers to pursue personal programs of
professional development which was largely classroom-based and for many of them was
implemented by formal tertiary studies in educational computing. Moreover, some of the
teachers made significant contributions to the professional development of others through
publication, presenting papers at conferences, active participation in computer users
networks, and providing school-based inservice workshops.

To further illuminate project management issues, the QSC teachers, school-level adminis­
tors, and the former Project Officer were surveyed and interviewed to gain their
perceptions about the strengths and weaknesses of the project management employed.
The subsequent discussion provides a summary of the analysis of their responses. Follow­
the presentation of their perceived strengths and weaknesses of the project management,
applications for managing further technology initiatives in schools are drawn from the
participants' insights gained through their involvement in the QSC Project.

3.3 Strengths of the Project Management

The perceived strengths of the QSC project management related strongly to the appoint­
ment of and the role played by the Project Officer. All of the personnel who had been
involved throughout the first two years of the project suggested that the role played by the
Project Officer was critical. The secondary teachers who had not had the support of a
Project Officer throughout 1992 saw that as being a major weakness of the project
management in 1992. The following statements by teachers about the strength of the project
management prior to 1992 indicated the perceived importance of the Project Officer:

"Project Officer - undoubtedly the greatest single factor in the functioning of the project."
(QSC Teacher, May, 1992)

"Having had a Project Officer who was able to manage and educate a group of people who
had limited skills into a team who have developed some expertise in the area of information
technology." (QSC Teacher, May, 1992)

"Major commitment to personal skills of those involved, especially inservice to teachers and
provision of highly skilled project officer." (Principal, May, 1992)
The personal and professional commitment of the QSC teachers was also seen as being a strength of the project (Finger, 1992, p.133). Ultimately, the success or failure of the QSC was dependent upon the commitment of the teachers. Teachers indicated that they spent many hours during evenings, weekends, and school holidays when they planned lessons, solved software problems, examined students' work, and overcame technical difficulties. Those teachers with families stated that their spouses occasionally asked them if all teachers had to do what they did. There were clearly additional demands made on those teachers involved to which they responded with high levels of commitment. That commitment was evident in teachers' expressions of it being viewed as a strength of the project:

"Personnel involved - Some very dedicated and professional staff at the school and at regional office level." (QSC Teacher, May, 1992)

"Commitment of staff involved to the project" (Greg Grimmett's role). (QSC Teacher, May, 1992)

"Excellent school and classroom staff have ensured that students have enjoyed maximum benefit." (Former Project Officer, May, 1992)

In addition to the role of the Project Officer and the commitment of teachers, other perceived strengths of the project were the initially generous budget, having an extra teacher assigned to the project, administration with faith and confidence in the project, and the use of Logowriter as the main tool of enquiry for the children.

5.2.4 Weaknesses of the Project Management

The non-replacement of the Project Officer, lack of continuity in Departmental support, inadequate teacher inservice, uncertainty about funding and the future of the project were perceived by the teachers and school administration to be the most serious weaknesses of the project management (Finger, 1992, p.133). Moreover, these were found to interrelate.
without the existence of a Project Officer, for example, there had been little tangible
evidence of any strategic coordination and formulation of project direction, funding, and
teacher inservice during most of 1992. This had particular impact on the secondary teachers
who sought clarification of the project rationale and required high initial inservice. In
contrast, the primary teachers were familiar with the project rationale and had been
involved in extensive training and professional development activities while the QSC
Project Officer was involved. For the primary school QSC teachers, the context within
which they operated during 1992 was largely consolidation and further exploration rather
than the significant transformational changes in classroom operation which they had
experienced throughout 1990 and 1991. Teachers highlighted their concerns about not
having a Project Officer:

"Losing Project Officer - this meant many duties were passed onto the teachers and increased an
already heavy workload." (QSC Teacher, May, 1992)

"No provision for Project Officer role in first term 1990.
Not reappointing Project Officer for 1992. It had already been shown there was no one capable
of filling this position as well but we should have someone 'to go into bat for us'." (QSC Teacher,
May, 1992)

Uncertainties about funding were linked with the dislocation in ownership of the project.
During late 1991 and 1992, funding concerns and the restructuring process resulted in the
administration and teachers at the two schools being unsure that the project would proceed
its planned conclusion. It was through increasingly stronger South Coast regional
ownership and support that the project was maintained throughout 1992. More strategic
program management emerged which aimed to enable the project to continue in 1993.
However, teachers referred to that discontinuity between ownership and funding issues as
project management weaknesses:

"Lack of consistency with the same people involved at the regional level,
The budget was never defined or sure. It needed to be a more concrete thing." (QSC Teacher,
May, 1992)

"Lack of continuity in Departmental support - consequently morale/decision making problems
Inadequate communication between staff in the project and Departmental Officers responsible
for the project. Uncertainty - Is there a budget? - Who is in charge? - Is the project on-going?"
(QSC Teacher, May, 1992)

"No one has ownership - all agree to support the project but the bottom line is funding - we have

Findings - (a) Situational Analysis and Project Management
not been able to get guarantees.” (QSC Teacher, May, 1992)

“The unsureness of enough financial support to sustain the project as initially expected. It has been “unsure” for at least a year now and that is too long.” (QSC Teacher, May, 1992)

“External changes (Regional transition, restructuring, etc) have been allowed to impinge upon the project’s operation.” (Project Officer, May, 1992)

Having examined project management in terms of what was intended and what happened, and gained insights from the key participants of their perceptions of the strengths and weaknesses of the QSC project management, implications can be drawn from that evaluation. Those implications are discussed in the next section.

12.5 What Are the Implications for the Management of Further Initiatives to Integrate Learning Technology in Schools?

Based upon their QSC experiences, the schools’ administration, QSC teachers, and the former Project Officer were asked to indicate what they believed were essential strategic elements necessary for maximising the successful establishment, maintenance, and institutionalisation of learning technology initiatives in schools. The important implications which emerged from their responses and from the preceding analysis of the strengths and weaknesses of the project management were able to be categorised according to four areas, displayed in Table 5.4 - personnel, resources, budget, training and professional development.

Personnel, resources, budget, and training and professional development issues were found to interrelate. Uncertainties and problems associated with one of those planning components was found to produce changes in another component. In particular, this section of the analysis of the management of the QSC Project highlighted the importance of the human resources dimension of project management. While the project had a focus on technological resources through the establishment of special learning environments in which the students and teachers accessed computers of their own, evidence emerged which suggested that the roles played by people had been substantially more influential in determining the success or otherwise of the project. Changes in Central Office personnel,
example, influenced funding mechanisms. Funding decisions, in turn, were essentially critical for resourcing levels in the QSC classrooms. Uncertainties about funding for computer repairs and maintenance of the resource base was found to affect the morale of the QSC teachers during 1992. The nature and extent of the training and professional development activities was also impinged upon by changes in personnel, budget, and the resources. Due mainly to the non-reappointment of the Project Officer in 1992, the training and professional development program of the secondary teachers had been severely limited.

### Table 5.4: Strategic Elements for Project Management

<table>
<thead>
<tr>
<th>Personnel:</th>
<th>&quot;A coordinator who keeps the project together.&quot; (Teacher)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;In the future schools will need a resident computer technician!!&quot; (Teacher)</td>
</tr>
<tr>
<td></td>
<td>&quot;Guaranteed involvement of all personnel for the entire program.&quot; (Deputy Principal)</td>
</tr>
<tr>
<td></td>
<td>&quot;Personnel to remain constant.&quot; (Deputy Principal)</td>
</tr>
<tr>
<td>Resources:</td>
<td>&quot;Maintenance/Management of resource base.&quot; (Project Officer)</td>
</tr>
<tr>
<td></td>
<td>&quot;Convenient access to computers, etc. in significant blocks of time (it is perhaps not necessary that students be able to take computers home with them and desktops may be seen as more desirable by some).&quot; (Head of Department)</td>
</tr>
<tr>
<td></td>
<td>&quot;Equality of resources - equal access for all students and teachers - ESSENTIAL.&quot; (Deputy Principal)</td>
</tr>
<tr>
<td></td>
<td>&quot;An adequate level of technology. At least one computer per four students.&quot; (Principal)</td>
</tr>
<tr>
<td></td>
<td>&quot;A good supply of laptops, printers, desktops, scanners, etc.&quot; (Teacher)</td>
</tr>
<tr>
<td>Budget:</td>
<td>&quot;Sufficient funds.&quot; (Deputy Principal)</td>
</tr>
<tr>
<td></td>
<td>&quot;Sufficient funds to support all aspects of the program and further initiatives that may develop from the program.&quot; (Deputy Principal)</td>
</tr>
<tr>
<td></td>
<td>&quot;Realistic levels of funding based on informed forecasts. Included should be a component to cater for regular (a) updating of equipment and (b) repairs.&quot; (Registrar)</td>
</tr>
<tr>
<td></td>
<td>&quot;Money - money - money!&quot; (Deputy Principal)</td>
</tr>
<tr>
<td>Training and Professional Development:</td>
<td>&quot;Ongoing professional development programs for teachers.&quot; (Deputy Principal)</td>
</tr>
<tr>
<td></td>
<td>&quot;Development/training of teachers so this is ongoing.&quot; (Registrar)</td>
</tr>
<tr>
<td></td>
<td>&quot;1. Teachers need time to feel comfortable with the technology. 2. Need initial training and support.&quot; (Teacher)</td>
</tr>
<tr>
<td></td>
<td>&quot;Staff fully trained in information technology.&quot; (Head of Department)</td>
</tr>
<tr>
<td></td>
<td>&quot;Effective professional development of school admin. team and teachers.&quot; (Project Officer)</td>
</tr>
<tr>
<td></td>
<td>&quot;Inservice of teachers to a stage where they can integrate technology to meet curriculum demands.&quot; (Principal)</td>
</tr>
</tbody>
</table>
The implication is that any future project planning needs to consider personnel, resources, budget, and training and professional development issues to ensure that effective structures exist. Within those broad issues, more specific project management decisions can be taken which involve the key participants in project decisions to facilitate their ownership of the project’s educational rationale and its activities. In that way, for example, teachers and the schools’ administrations could participate in budget formulation and monitoring of project costs to enhance the match between prioritising resource acquisition and the pursuit of the educational objectives of the project.

Conclusion

This chapter has presented the findings and results of a situational analysis of the project and analysis of the project management. The ‘official’ view of why the QSC Project was established and the project’s goals were described and then analysed through examining participants’ views. All of the QSC teachers and the schools’ administration members found to believe that the QSC was unique when compared with other computer initiatives in schools. The project’s setting and context, participants, history and future plans were described and reviewed.

Findings were reported about the management of the project in terms of people, equipment, money, and training and professional development through the comparison of information about what was intended and what happened. Significant personnel changes had occurred through the restructuring of the Department of Education in Queensland. Despite changes which threatened the life of the QSC Project, the ownership and management of the project has moved successfully, although with some trepidation, from Central Office to the South Coast Region and the schools involved. There were challenges such as funding uncertainties and the provision of school-based and region focused leadership of the project’s management that emerged as a result of that transition. Those challenges were found to be addressed more as the project proceeded throughout 1992.
From the analysis of the participants' perceived strengths and weaknesses of the QSC project management, and from their suggestions for successful project planning, four issues were identified. Those four issues which need to be addressed carefully to maximise the success of future learning technology initiatives in schools were personnel, resources, budgets, and training and professional development. It was suggested that those issues need to be examined through an approach which complemented the development an educational rationale for the planned project. Inherent in that planning should aid the involvement of the key participants of that learning technology initiative (e.g. the school's administration and teachers) to enhance their ownership of and commitment to the particular project.
CHAPTER SIX

FINDINGS

- (b) IMPACT OF THE PROJECT

This chapter presents and analyses the findings of the program evaluation relating to the impact of the QSC Project through examining the following questions:

Impact of the Project:

What impact did the Queensland Sunrise Centre Project have upon the teaching and learning context in terms of classroom management and organisation?

What are the implications of the new and emerging technologies for curriculum design?

Have there been changes in student learning through the use of laptop computers and immersion in a technology-rich environment?

In what ways have the students been advantaged and/or disadvantaged by being involved in the program?

Were there any gender differences; e.g. do girls react differently to technology compared with boys?

How did teachers come to grips with the new technologies? What are the implications for the training and professional development of teachers?

What were the concerns and perceptions of parents?

The following presentation, therefore, provides an analysis of the project impact within the framework (see Figure 3.11, p.110) of presenting findings through focusing on what happened in terms of processes and results; i.e. what we did (processes) and what actually happened (results). The questions being addressed are organised, as displayed in Figure 6.1, according to the key issues to which they refer. Those key issues were found to impinge upon each other. For example, whilst gender differences was identified as a key issue, gender differences are identified and discussed throughout the examination of curriculum implications and changes in student learning.
Table 6.1: Chapter Six - Organisation of the Evaluation Questions and Issues

<table>
<thead>
<tr>
<th>Impact of the Project:</th>
<th>Issues / Headings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation Questions</td>
<td>Classroom Organisation and Management</td>
</tr>
<tr>
<td></td>
<td>Curriculum Implications</td>
</tr>
<tr>
<td></td>
<td>Changes in Student Learning</td>
</tr>
<tr>
<td></td>
<td>Advantages and Disadvantages of QSC Involvement</td>
</tr>
<tr>
<td></td>
<td>Gender Differences</td>
</tr>
<tr>
<td></td>
<td>Technical and Professional Support for Teachers</td>
</tr>
<tr>
<td></td>
<td>The Concerns and Perceptions of Parents</td>
</tr>
</tbody>
</table>

6.1 Impact of the Project

6.1.1 Classroom Organisation and Management

In 1992, the two sites for the QSC classes were a multiple area classroom at Coombabah State School in which Year 7 QSC students were taught by two teachers, and two classrooms located in the Mathematics Block at Coombabah State High School, in which the Year 8 QSC students had 'home' rooms and had many of their lessons.

6.1.1a Year 7 QSC Classroom - Coombabah State School

Both teachers organised, negotiated, and shared responsibilities for the planning, imple-
mentation, and evaluation of the various curriculum areas including the use of computers. They indicated that they felt that they worked very effectively as a teaching team:

"I like the fact that we [Karen and I] have a class which we teach cooperatively. We don't have ends. I like the way the kids sit, we discuss, we negotiate lots of things that are happening." (Year 7 QSC Teacher, August, 1992)

"Barb and I work together really well. ...Now we've got a focus centre area. We tend to relate to sixty kids rather than thirty kids each." (Year 7 QSC Teacher, August, 1992)

The classroom organisation as depicted in Figure 6.1 illustrates the physical setting adopted by the teachers working cooperatively. Each student had their own home desk and was a member of a group. Eight groups of approximately 6-9 members were physically arranged to allow a centre focus area in which students could gather for small and whole group presentations. The classroom provided students with easy access to a range of technological resources such as printers, CD ROM, scanner, Keylink, and battery chargers.

Figure 6.1: Year 7 QSC Classroom - May, 1992 - Coombabah State School

According to those two participating teachers, the QSC Project was found to have had considerable impact upon their perceptions of their classroom organisation and management, their teaching approaches and their relationships with students. The changes had
been transformational for them rather than incremental as evidenced by their responses to interview questions about the project impact.

"Incredible change. I've really had to throw away all the ideas... They say that when you're a teacher, no matter what you do in College, when you're insecure you usually teach how you were taught and I've had to really throw away finally after so many years a lot of those things. They would have worked in a classroom when you had kids in rows and it was very much teacher focused." (Year 7 QSC Teacher, August, 1992)

"For me, it was a big change... Totally changed teaching styles from a very traditional to a very liberal approach. I suppose you'd call it. I'm surprised how comfortable I was with that." (Year 7 QSC Teacher, August, 1992)

In terms of student-teacher relationships, the teachers believed that through the project they had encouraged students to utilise a more collaborative, cooperative approach as outlined by various writers (Sharan and Sharan, 1989; Cohen, 1990; Robinson, 1990; Willis, 1990; Winnebrenner, 1990; Matthews, 1992) to solving problems and doing projects. Both teachers cited examples of situations in which students helped other students as well as the teachers. That was considered to be the normal operation of the class. A teacher highlighted how significantly her approach with students had changed:

"I am more honest with kids and I am allowed now to tell kids that I don't know how to do something. When I was a student teacher in Alice Springs, they gave me a Grade 2 class which I'd never taken before and they asked me to teach this lesson and I didn't know much about it. I actually told the children, 'Listen, I don't know much about this but I'm sure you've done some work and you can give me a hand and together we'll work it out'. The teacher was really upset that I said that. She said, 'You never admit to a class that you don't know something' and I got bad marks for that and that stuck with me all that time. And finally, I mean, I was right! It is really nice to go back and reflect on that twenty years ago, no, maybe fifteen years ago and say I was right... It's nice to collaborate with kids... and I find the kids helping others don't put them down. They're really quite gentle." (Year 7 QSC Teacher, August, 1992)

One of the original QSC teachers who had been involved in the project for three years provided further evidence of the major changes he had made in his teaching approach, and classroom organisation and management:

"It really has been the only time when I've gone and said to kids, 'I wonder what will happen if we do this?' or I hop on a path of discovery without having the answer and it took a while to be brave enough to do it and particularly to let the kids sort of chart their own course as much as possible... to actually get the kids to try and chart their own learning was difficult and that's probably the hardest thing I've had to do in this program. When it started, I think that two of the three of us... I don't think that you would have found more traditional teachers and the project has completely turned our way of doing things on its ear... and I've been teaching a long time." (Year 8 QSC Teacher, August, 1992)
Students also expressed the view that the classroom approach had enabled them to use other students as a source of learning about computers. According to the Year 7 QSC students, teachers and other students were the main sources of learning about computers with 48% of them ranking teachers as their main source, and a further 32% ranking them second. 29% of students indicated that other students had been their main source and a further 30% ranked students second. Table 6.2, which shows students' perceptions of where they had learned most about computers, also suggests students used a variety of sources other than their teachers. Those students who had either older brothers or sisters in Year 8 in the QSC expressed that they had been helped by them.

**Table 6.2: Where have you learned most about computers?**

<table>
<thead>
<tr>
<th>Source</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ranking*</td>
<td>Ranking*</td>
<td>Ranking*</td>
</tr>
<tr>
<td></td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 2 3</td>
</tr>
<tr>
<td>Teachers</td>
<td>15 7 5</td>
<td>12 11 2</td>
<td>27 18 7</td>
</tr>
<tr>
<td>My classmates</td>
<td>8 8 3</td>
<td>8 9 7</td>
<td>16 17 10</td>
</tr>
<tr>
<td>Brother/Sister</td>
<td>1 2</td>
<td>4 2 2</td>
<td>5 4 2</td>
</tr>
<tr>
<td>Parents</td>
<td>2</td>
<td>3 4 1</td>
<td>3 4 3</td>
</tr>
<tr>
<td>Computer Books/Manuals</td>
<td>1 3 6</td>
<td>2 7</td>
<td>1 5 13</td>
</tr>
<tr>
<td>Myself</td>
<td>1 1 3</td>
<td>2</td>
<td>1 1 5</td>
</tr>
<tr>
<td>Natural Ability</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

*Ranking: 1 = the most important

Classroom observations by the evaluator during 1992 revealed a classroom in which the teachers and students worked collaboratively. The behaviour of students was very respectful and cooperative. There was a variety of grouping strategies employed with the main emphasis being on students planning and completing projects. While students worked with their own laptop computers and accessed other technological resources in the room, they often sought assistance from and shared ideas with other students. Students, for example, moved freely around the room either to access printers or to discuss their work with other students. The two teachers worked largely in small group situations, ran
workshops with some students, and conferenced individual students. There were attractive displays of students' work. In summary, the classroom reflected the positive, collaborative approach by the teachers and the students in which there was a very high level of use by students of the technological resources.

6.1.1b Year 8 QSC Classrooms - Coombabah State High School

The Year 8 QSC students had been placed in either Year 8G or 8D at Coombabah State High School. Those two classes had 'home' rooms adjacent to each other in the Mathematics building, as depicted in Figure 6.2. Students in each of those two groups remained together for most of their subjects. They were required to move for most of their lessons in a similar way to other Year 8 classes. Some security provisions had been made for the storage of the computers in lockable cupboards at the side of the classrooms and security grilles had been placed on the sliding doors and windows. Unlike the primary school classroom, other classes had also been timetabled to use those two classrooms.

Figure 6.2: Year 8 QSC Classroom - May, 1992 - Coombabah State High School
Contrasts between the Year 7 and Year 8 QSC classrooms reported by teachers and students

showed differences in school organisation between the primary school and the secondary

school. Unlike the primary school in which students were mainly taught by the same two

teachers, the Year 8 QSC students were exposed to different teachers for each of the subjects

they studied. In addition, the secondary school QSC teachers indicated that they had

timetabling constraints as lessons ('periods') started at a certain time and had to end at a

given time because students were required to move to other rooms for their next lessons.

The primary teachers were not constrained to the same extent and had a great deal of

flexibility in timetabling. Moreover, the secondary teachers suggested that they had more

difficulty communicating with the other QSC teachers due to the secondary school

organisation. One teacher indicated, in his view, that this had contributed to students being

turned off Logo programming when he had them in an afternoon lesson after previous

teachers might have done intensive programming activities with them in earlier lessons on

that particular day.

The Year 8 QSC teachers expressed concerns about the behaviour and attitude of some of

the students as they contributed to management problems. A teacher stated that:

"My most frustrating classes are the Sunrise classes... ...It took me awhile to pick up that...there

was a definite use of...wiping disks as an excuse for not handing in work...It's very hard to collect

assignment work from these kids. Giving a set date is something they find very hard to get

done...

...they all know the rules but have since let them slip and that's something to do probably either

at the end of the primary school and certainly happened this year during the course of the high

school... So I find there is a lot of discipline problems that have come about ..." (Year 8 QSC

Teacher, September, 1992)

While the students had remained together as a group as intended by the QSC Project

planning, several of the Year 8 QSC teachers and many of the students strongly felt that this

had not been good for the students. A teacher indicated that:

"I think they resent it [being kept together in Year 8]. I've taken Grade 8 kids on camps before,
done interviews with kids on what they like about high school. The things they like are having
different teachers, different classrooms, moving around between classrooms, mixing with
different kids in their classes... and these kids don't get that. They were looking forward to it.
They feel like they are still in primary school." (Year 8 QSC Teacher, August, 1992)

The Year 8 QSC students were asked whether or not they believed that keeping the same
Group of students together for the transition from Year 7 to Year 8 had been good. As shown in Figure 6.3, only 27% of students agreed that it had been good to be kept together. That finding supported the views expressed by several of the secondary school QSC teachers that the project intention of keeping the students together had contributed to some of the negative attitudes which had emerged amongst some of the students. There was found to be a significant relationship between gender and the agreement with that statement ($\chi^2 = 81.83, p < .01$). While 42% of Year 8 QSC boys agreed that it was good to be kept together, only 9% of Year 8 QSC girls agreed.

**Figure 6.3: Year 8 QSC Students’ Level of Agreement With the Statement**
- Keeping the same group of students together when we moved from Year 7 to Year 8 was good.

Collaborative learning had been encouraged throughout many of their assigned tasks at the secondary school. While there had been some resentment by some students to having been kept together in Year 8, some discipline concerns, and the emergence of negative attitudes had been identified, teachers believed that there had been some positive changes which related to classroom management and organisation. There was general agreement by the teachers that the students were able to take responsibility for their own learning and that most students were willing to work collaboratively. The following vignette from a teacher highlighted his observations of the positive impact upon classroom operation and hinted at the potential implications that collaborative learning might have for curriculum:

**Chapter Six**

Findings - (b) Impact of the Project
...if I was to compare these kids with other Grade 8 groups, they have more of the characteristics of Senior students. They take on more responsibility for their own learning, that they do spend more time negotiating it, keeping track of what they're doing...so that sort of in-built self-responsibility for learning is being inculcated at an age when normally we're yelling at them to write this down and do this and do that. It seems to me that if we can bring in these sorts of things at a Grade 8 level, it has lots of implications for the high school curriculum. We can change the way we teach a lot of subjects and again that comes down to the mode of learning...
...These kids have a way of going about it that maybe they can do it better, or maybe they enjoy it more, or maybe they get more pride out of it, because they can present it this way...and that's all part of the impact it's had on these kids." (Year 8 Teacher, August, 1992)

As illustrated in Table 6.3, the Year 8 QSC students were found to have learned about computers from a variety of sources, similar to that reported about Year 7 students. In particular, their teachers and their classmates were the two most highly ranked sources.

Table 6.3: Where have you learned most about computers?
- Year 8 QSC Students

<table>
<thead>
<tr>
<th>Source</th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ranking</td>
<td></td>
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<td>Ranking</td>
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<tr>
<td></td>
<td>1 2 3</td>
<td></td>
<td>1 2 3</td>
<td></td>
<td>1 2 3</td>
<td></td>
</tr>
<tr>
<td>teachers</td>
<td>9 15 1</td>
<td></td>
<td>13 6 3</td>
<td></td>
<td>22 21 4</td>
<td></td>
</tr>
<tr>
<td>my classmates</td>
<td>12 7 5</td>
<td></td>
<td>9 10 4</td>
<td></td>
<td>21 17 9</td>
<td></td>
</tr>
<tr>
<td>myself</td>
<td>3 2 2</td>
<td></td>
<td>3 2 2</td>
<td></td>
<td>3 2 2</td>
<td></td>
</tr>
<tr>
<td>parents</td>
<td>2 1 0</td>
<td></td>
<td>2 2 2</td>
<td></td>
<td>2 3 2</td>
<td></td>
</tr>
<tr>
<td>computer books/manuals</td>
<td>1 1 3</td>
<td></td>
<td>2 2 2</td>
<td></td>
<td>1 1 5</td>
<td></td>
</tr>
<tr>
<td>brother/sister</td>
<td>1 2 1</td>
<td></td>
<td>2 2 2</td>
<td></td>
<td>2 2 2</td>
<td></td>
</tr>
</tbody>
</table>

*Ranking: 1= the most important

Significant relationships were found to exist between Year 7 and Year 8 and agreement with the statement that using laptop computers does not stop students from discussing their work ($\chi^2=10.53; p < .01$). As shown in Figure 6.4, more Year 7 students (95%) than Year 8 students (81%) agreed with that statement. Furthermore, there was a significant relationship between Year 8 girls and boys ($\chi^2=6.18; p < .05$) with only 77% of Year 8 girls compared with 85% of boys agreeing with the statement. Rowe (1992) reported in her study, undertaken in 1991, that students were unanimous in their agreement that using laptop
Computers did not stop them from discussing their work. Year 8 students and, in particular, Year 8 girls had become less convinced. Those findings together with the finding that only 9% of Year 8 girls thought that keeping the same group together was a good idea, suggested that the level of some aspects of collaborative learning in the Year 8 QSC classrooms had decreased for some students. The implications of this finding are discussed later in this chapter (see 6.15 Gender Differences, p.225).

![Graph showing the level of agreement with the statement: Using laptop computers does not stop students from discussing their work.](image)

**Figure 6.4: QSC Students' Level of Agreement With the Statement**  
- Using laptop computers does not stop students from discussing their work.

### 6.1.2 Curriculum Implications

The preceding discussion focussed on classroom organisation and management. Throughout that analysis, some implications for curriculum emerged. Indeed, one of the goals of the QSC Project was:

"to investigate the implications for curriculum implementation, classroom organisation and management, and teaching and learning strategies of adopting the new environment [i.e. technological resources] in schools." (Grimmett, 1991, pp. 4-5)

In addition to that, the research question relating to examining the implications of the new and emerging technologies for curriculum design was formulated by the key QSC participants and subsequently was ranked by them as the most important of the research.
questions. The following discussion synthesises those findings directly related to implications for curriculum.

The distinctions between learning *with* computers and learning *about* computers has been made elsewhere (Groundwater-Smith, 1987). According to Crawford et al (1989, p. 32), computer literacy needs to take into account both of those orientations. Furthermore, it had been made clear in the Department of Education, Queensland (1988) document, *Computer Literacy for Teachers in Queensland Schools - competencies, strategies and resources* that the:

"computer literate teacher is aware of a range of educational computer applications, has a positive attitude to the use of computers, and is able to undertake computer-related teaching/learning activities with students to achieve educational objectives." (Department of Education, Queensland, 1988, p. 10)

Thus, it has been argued that teachers and students need to know not only how to use a computer and to know something about the nature of the technology, but they should also be able to use computers in a variety of ways across a range of curriculum areas to achieve a range of educational objectives. Crawford et al (1989, p. 32) refer to the importance of understanding that using computers "can be represented in a number of different ways, each of which has a different consequence". To clarify their argument, Crawford et al (1989) described Taylor's (1980) framework in which the computer can be used as a *tutor*, *tool*, or *tutee*. Where the computer is used as a *tutor*, the computer instructs the student; e.g. drill and practice, tutorial programs. Where the computer is used as a *tool*, the student utilises the computer to assist in organising, managing, recording, and interpreting information; e.g. word processing, data base management, and spreadsheeting. Where the computer is used as a *tutee*, the student becomes actively involved in instructing the computer using a programming language; e.g. Logo, Basic, Fortran, and Pascal.

More recently, Grimmett (1992) has provided a similar framework in which he provides a classification in terms of *computers as amplifiers, computers as actualisers, and computers as intellectual tools*. According to Grimmett, computers used as *amplifiers* enable those engaged in the educative process to progress more quickly towards their goals through automating low level or physical tasks using mainly productivity software; e.g. applica-
Information was gained about the curriculum applications for which students used their computers at school. As displayed in Figure 6.5 below, 51% of Year 7 QSC students used their computers most in English Language Arts and a further 42% used them most in Social Studies, while 77% of Year 8 QSC students indicated that they used computers in Humanities the most.

Figure 6.5: Subject Areas in Which Students Used Their Computers Most
In response to being asked in which subject areas they enjoyed using the computer the most, 77% of Year 8 QSC students named Humanities which reflected closely the finding that it was the subject area in which they used their computers the most. As shown in Figure 6.6 below, 38% of the Year 7 QSC students stated that they enjoyed using the computer the most in Social Studies, 33% indicated English Language Arts, and a further 18% stated that they enjoyed Mathematics most.

![Bar chart showing subject areas enjoyed by Year 7 and Year 8 QSC students](image)

**Figure 6.6: Subject Areas in Which Students Enjoyed Using Their Computers Most**

Students were asked to indicate the most common applications for which they used their laptop computers in the various subject areas. Table 6.4 shows the curriculum applications used by Year 7 QSC students and Year 8 QSC students respectively. The Year 7 students indicated that they used their computers in all subject areas with considerable use being made of them in English Language Arts, Social Studies, Mathematics, and Science. That information contrasted with the Year 8 QSC students who indicated that they mainly used their computers in Humanities, Science, and Mathematics. That could be largely explained due to the QSC staffing in the secondary school mainly involving four teachers with two of them teaching Humanities to the QSC Year 8 classes, one of them teaching Science, and one of them teaching Mathematics. However, it is clear that the availability of students having their own personal laptop computers had not impacted significantly in terms of a transfer of them being used in other secondary school subject areas.
### Table 6.4: Computer Applications at School

#### Year 7 QSC Students at Coombabah State School

<table>
<thead>
<tr>
<th>Subject</th>
<th>WP</th>
<th>DB</th>
<th>LP</th>
<th>DP</th>
<th>G</th>
<th>SS</th>
<th>SIM</th>
<th>GR</th>
<th>TT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eng. Lang. Arts</td>
<td>44</td>
<td>38</td>
<td>43</td>
<td>24</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>12</td>
<td>25</td>
<td>197</td>
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<tr>
<td>Mathematics</td>
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<td>28</td>
<td>45</td>
<td>2</td>
<td>12</td>
<td>18</td>
<td>5</td>
<td>17</td>
<td>18</td>
<td>152</td>
</tr>
<tr>
<td>Social Studies</td>
<td>23</td>
<td>45</td>
<td>43</td>
<td>10</td>
<td>16</td>
<td>2</td>
<td>2</td>
<td>26</td>
<td>19</td>
<td>186</td>
</tr>
<tr>
<td>Science</td>
<td>21</td>
<td>39</td>
<td>32</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>24</td>
<td>18</td>
<td>150</td>
</tr>
<tr>
<td>Art</td>
<td>5</td>
<td>10</td>
<td>19</td>
<td>9</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>34</td>
<td>9</td>
<td>101</td>
</tr>
<tr>
<td>Music</td>
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<td>8</td>
<td>46</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>7</td>
<td>72</td>
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<td>Health and P.E.</td>
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<td>2</td>
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<td>1</td>
<td>1</td>
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<td>52</td>
<td>61</td>
<td>27</td>
<td>8</td>
<td>118</td>
<td>99</td>
<td>871</td>
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<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP</td>
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<td>55</td>
</tr>
<tr>
<td>DB</td>
<td>77</td>
<td>97</td>
</tr>
<tr>
<td>LP</td>
<td>112</td>
<td>118</td>
</tr>
<tr>
<td>DP</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>G</td>
<td>37</td>
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<td>SS</td>
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<td>GR</td>
<td>45</td>
<td>54</td>
</tr>
<tr>
<td>TT</td>
<td>407</td>
<td>464</td>
</tr>
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</table>

#### Year 8 QSC Students at Coombabah State High School

<table>
<thead>
<tr>
<th>Subject</th>
<th>WP</th>
<th>DB</th>
<th>LP</th>
<th>DP</th>
<th>G</th>
<th>SS</th>
<th>SIM</th>
<th>GR</th>
<th>TT</th>
<th>Total</th>
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<tbody>
<tr>
<td>Humanities</td>
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<td>39</td>
<td>36</td>
<td>15</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>17</td>
<td>11</td>
<td>161</td>
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<tr>
<td>Mathematics</td>
<td>10</td>
<td>24</td>
<td>40</td>
<td>3</td>
<td>10</td>
<td>7</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>109</td>
</tr>
<tr>
<td>Japanese/Italian</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Science</td>
<td>22</td>
<td>38</td>
<td>33</td>
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<td>6</td>
<td>1</td>
<td>0</td>
<td>17</td>
<td>7</td>
<td>129</td>
</tr>
<tr>
<td>Art</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Music</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Phys.Ed.</td>
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<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Manual Arts</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>HKE</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>65</td>
<td>104</td>
<td>111</td>
<td>24</td>
<td>32</td>
<td>9</td>
<td>3</td>
<td>48</td>
<td>28</td>
<td>424</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP</td>
<td>32</td>
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<tr>
<td>DB</td>
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<tr>
<td>LP</td>
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<td>50</td>
</tr>
<tr>
<td>DP</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>G</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>SS</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>SIM</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>GR</td>
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<td>21</td>
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<tr>
<td>TT</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>213</td>
<td>211</td>
</tr>
</tbody>
</table>

**Code:**
- WP: Word Processing
- DB: Data Base Management
- LP: Logo Programming
- DP: Desktop Publishing
- G: Games
- SS: Spreadsheets
- SIM: Simulations
- GR: Graphics
- TT: Touch Typing
The most used computer applications listed by the Year 7 QSC students were Logo programming (230), database management (174), graphics (118), word processing (102), and touch typing (99). Year 7 boys and girls reported similar levels of use of the range of computer applications although the girl's total number of applications (464) was higher than that of the boys (407). Year 7 girls were found to be marginally higher than the boys in their use of Logo programming (girls = 118 > boys = 112), database management (girls > boys = 77), spreadsheets (girls = 14 > boys = 13), and touch typing (girls = 54 > boys = 45), and they were substantially higher in their use of graphics (girls = 72 > boys = 45). These findings strongly indicated that the students used the computers as intellectual tools through the use of Logo. Classroom observations also revealed that Year 7 students used Logo programming for word processing, database management, and graphics. As there had been a common perception that girls participate in computer activities less than boys (Rowe, 1992), those findings suggested that for the Year 7 QSC students that perception was not true. Furthermore, it provided evidence to support Crawford et al.'s (1989, p. 38) suggestion that:

"Most significantly, Logo is a language which computer novices can use. It may well be that with the more sustained and carefully sustained take up of Logo in schools, girls would feel greater confidence in using the computer for programming. It should be emphasised that by increasing girls' confidence in programming we shall increase their overall competence in using the computer." (Crawford et al., 1989, p. 38)

The total of computer applications listed by Year 8 QSC students (424) was less than half of the number listed by Year 7 QSC students (871) which reflected the use of their computers in a more limited range of subject areas in the secondary school. Use of their computers was found to be largely confined to the Humanities (161), Science (129), and Mathematics (109). The most used computer applications listed by Year 8 QSC students were Logo programming (111), database management (104), and word processing (65). Graphics and touch typing were used by Year 8 students less than by Year 7 students. Year 7 students were observed to be still undertaking daily touch typing drill sessions using Type!, while teachers at the secondary school felt that the Year 8 QSC students had already acquired effective touch typing skills. Touch typing skills had become to be seen merely as routine, physical skills which students used to assist them in undertaking set tasks and functions in very
similar ways that learning handwriting was viewed. The levels of use of the computer applications listed by Year 8 boys (213) and girls (211) were not significantly different.

Computer access and use was not confined to use during timetabled lessons. QSC students were able to use their personal laptop computers both at school and at home. This was different from many situations for other non-QSC students as access was usually restricted to classroom use and/or access to computer labs within schools. Thus, students had been able to use their computers in their free time; e.g. on weekends, during evenings, and lunch time. Table 6.5 displays the information gained from students when asked to indicate the computer applications which they used most in their own time.

Table 6.5: Computer Applications Used by Students in Their Own Time

<table>
<thead>
<tr>
<th>Computer Applications</th>
<th>Year 7</th>
<th></th>
<th>Year 8</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
<td>Girls</td>
<td></td>
</tr>
<tr>
<td>Games/Making Games</td>
<td>18</td>
<td>15</td>
<td>1</td>
<td>10</td>
<td>44</td>
</tr>
<tr>
<td>Logo Programming</td>
<td>9</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Assignments/Projects</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Homework</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Databases</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Graphics</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Word Processing</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Touch Typing</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Letters</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Programming Music/Songs</td>
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<td>2</td>
<td>0</td>
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</tr>
<tr>
<td>Animation</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total (Applications)</td>
<td>52</td>
<td>52</td>
<td>16</td>
<td>21</td>
<td>141</td>
</tr>
<tr>
<td>Total (%)</td>
<td>69%</td>
<td>85%</td>
<td>38%</td>
<td>55%</td>
<td>62%</td>
</tr>
<tr>
<td>No Response</td>
<td>9</td>
<td>4</td>
<td>16</td>
<td>10</td>
<td>39</td>
</tr>
<tr>
<td>No Response (%)</td>
<td>31%</td>
<td>15%</td>
<td>62%</td>
<td>45%</td>
<td>38%</td>
</tr>
</tbody>
</table>

While 62% of students stated that they used their computers in their own time, substantial and disturbing differences were found to exist between the Year 7 and the Year 8 students with 62% of Year 8 boys and 45% of Year 8 girls not indicating any use of the computers in their own time. Of those Year 8 students who indicated that they used their computers in their own time, the most used application was playing and making games. The low level
The use by Year 8 students was supported by several teachers' statements that many of the Year 8 students no longer valued the resource that they had been given use of during the last three years. Most of the secondary school QSC teachers indicated that some students even carelessly left their computers behind in their 'home' rooms when they moved to other classrooms or went home and subsequently did not even realise that they had done so. Moreover, a teacher suggested that a major reason for the loss of interest was that the 'novelty' effect was no longer evident to the extent that it was when the students were given their computers nearly three years earlier. Another secondary school QSC teacher supported that suggestion by referring to the dissatisfaction of the Year 8 QSC students with the hardware and the prolonged use of Logo. He also indicated that he was frustrated with the hardware and the reliance on Logo and suggested that after such a sustained period of involvement, students required more variety and more advanced resources:

"They're obviously frustrated with the hardware and so am I. There's only so many things you can do with Logo before you run out of options and we ran out of options earlier this year and we kept rerhashing stuff...
That was the hardest thing for me was to try and pick things up that were different and would excite the kids." (Year 8 QSC Teacher, September, 1992)

In addition to differences between Year 7 and Year 8 students, gender differences were found with more girls than boys in both Year 7 (85% of girls compared with 69% of boys) and Year 8 (55% of girls compared with 38% of boys) listing curriculum applications used in their own time. That result contrasts with that reported elsewhere by Sinclair and Groundwater-Smith (1985) in which they found that there was an unequal pattern of use by boys and girls when computers were made available outside class time with computer use dominated by mostly boys. They reported, for example, that it was most striking before and after school which led them to infer that girls' lack of participation at those times was due to domestic responsibilities or a reluctance on the part of parents to permit their daughters to participate in activities outside school hours. The evidence gained in the present study has clearly shown that the group which indicated that they used computer applications most at school and in their own time was the Year 7 QSC girls. Moreover, the Year 7 QSC students listed substantially more computer applications at school and in their own time than the Year 8 QSC students. Those findings would be interesting to pursue...
Further, it might well be that the QSC Project had a very positive impact on the Year 7 QSC students through making a particularly positive contribution in addressing some of the important gender issues as they relate to technology use.

Collectively, the findings relating to computer use suggest that, where students are given the use of computers, strategies for enhancing the responsibility and ownership of the resources require careful attention. Moreover, there is evidence that supports the claims by some of the teachers that students required new challenges and needed to be 'excited' by being exposed to more updated computer hardware and software. The laptop computers were new and exciting in 1990 at the commencement of the project. However, by 1992, the models used by the QSC students were no longer even being made and had subsequently been superseded by more powerful and attractive hardware. That pace of change represents major challenges for schools in terms of the costs involved in upgrading resources.

To complement the information gained from students about the curriculum applications for which they used computers, students were asked to name and identify the extent to which they used various software. Figure 6.7 below shows that 100 of the 106 students surveyed used **Logowriter** to a great or very great extent. Other software used included **Newsmaster, Typel, PC Globe, Forte, Printmaster, and XTree.**

![Figure 6.7: Software Used by QSC Students](chart.png)
Apart from *Newsmaster* being used for publishing students' work, *Type!* being used as a typing tutorial program, and *PC Globe* used mainly as a database program for accessing information, students relied heavily upon *Logowriter* for many of those curriculum applications reported earlier (see Tables 6.4 and 6.5). That had been the intention of the QSC Project planning for students to use Logo to enable them to mainly use their computers as intellectual tools rather than using them as amplifiers in which a wide range of commercially produced software programs would have been used.

Throughout the latter half of 1992, the secondary school QSC teachers formulated a proposal for 1993 that the QSC Project explore further the curriculum implications of students working within a technology-rich environment. Six *Anticipated Outcomes* of that proposal were:

1. A trialled model will be available for other schools to access when implementing the new curriculum framework.
2. The development of functional competencies which can be applied to the non-disciplinary curriculum goals.
3. Provide an example of meaningful learning experiences which may be undertaken in part or wholly over a range of contexts.
4. Teachers will encourage social learning and co-operative problem solving, as well as fostering individual learning and development.
5. Students will have developed skills of critical and creative thinking in a technological tool based environment.
6. Students develop competence on confidence in their ability to collect, process, reconstruct and present a personally derived knowledge structure." (Sunrise Proposal Year 8 1993, Unpublished manuscript, p. 4)

The implied use of computers in that proposal was for them to be used predominantly as intellectual tools in which students would synthesise their own knowledge through the collection, processing, and reconstruction of information. Approaches to learning and teaching aimed to focus on cooperative problem solving, and the development of critical thinking skills across curriculum areas using the technological resources. Observations of the operation of the QSC classrooms and comments from QSC teachers suggested that implications for curriculum design had emerged from their use of technological resources. However, the general feeling reported by teachers was that adequate documentation of those implications had not occurred. A significant aim of the QSC Project had been the
investigation of implications for curriculum. In 1992, Bev Pacey, an Educational Adviser (Technology) was appointed to undertake the role of curriculum writer to produce a curriculum planning document derived from the QSC experience. That document represented a significant means for addressing the concern that there needed to have been the production of tangible curriculum documents derived from the QSC experience.

During interview sessions, when asked if there were implications which they saw for curriculum design, the QSC teachers referred to the development of revised curriculum models, changes in emphasis towards how information is obtained rather than memorising information, the importance of developing higher order thinking skills, redefinition of curriculum goals, and changes in assessment procedures to appropriately reflect the changed learning-teaching situation. One teacher took a deterministic view that curriculum change was inevitable. He strongly argued that the secondary school curriculum was still largely based on a 19th Century orientation in which discrete subjects were defined and particular areas of knowledge were taught and tested. Furthermore, he suggested that while it had been suitable to organise the curriculum that way a hundred years ago, he believed that there were now more intelligent ways to go about acquiring knowledge and skills than through compartmentalising everything. He stated that:

"I see this as a process that is going on in society and it's a process that is very much going on in schools...being resisted a bit here and there but I can see it as an inevitable change because it is a change through the media and technology in society that is changing the way we all think about what we do and the way we do things...and I think that what this project's doing is accelerating that process for this particular group of kids and it's showing potential in lots of other areas of the curriculum for doing similar types of learning. If we are to take Humanities as an example - it's three subjects which are integrated into one and the kids here don't learn any less about geography because we integrate it with say communication and a bit of history. They don't learn any less English because they're writing and they're communicating in other sections of the curriculum instead of always it coming out of novels or poems or whatever...

We can integrate across traditional curriculum areas." (Year 8 QSC Teacher, August, 1992)

The use of an integrated approach was evident in the Year 7 classroom and had been utilised in curriculum planning by the QSC teachers in 1990 and 1991 when the students were in Years 6 and 7. Some exemplars of unit planning had been produced in which learning activities were organised around themes; e.g. the Golden theme which integrated
language, mathematics, art, science, and social studies. That approach had continued to be employed effectively by the two Year 7 teachers during 1992. Also, during 1992, the Year 8 QSC teachers had begun formulating suggestions and ideas for disposing of the traditional areas studied in Year 8 and proposing alternative curriculum planning based on a non-disciplinary approach. According to the Year 8 QSC teachers, the essential outcomes and competencies of the traditional subject areas would be retained and achieved by the students through their working through themes. They provided the following diagrammatic representation shown in Figure 6.8 as an example to conceptually present their revised model.

![Diagram](image-url)

**Figure 6.8: Proposal for a Non-Disciplinary Approach to Learning With Technology**
That approach was similar to that advocated and used in the primary QSC classes and reflected the need for an examination of possible structural and organisational changes in secondary schools. Teachers reported that those challenges in the secondary school could not be explored as there were factors (e.g. timetabling, school organisation, assessment processes) over which they had no control. For change to occur, they felt that the process should not be entirely left to the QSC teachers as they were only one small part of a large organisation. Several of the secondary school QSC teachers felt that unless there was improved project management, support, and funding for 1993, they were very reluctant to continue being involved with the QSC Project. For example, a teacher stated that:

"I think...the bottom line has been that there has been a lot of personal blood, sweat and tears on behalf of all the teachers and a lot of times there it's easy to sort of keep it personal rather than go to the big picture and look at the whole thing. I found I had to do that and had great difficulty in doing it when I had to write up the submission [1993 Proposal]. ...It seemed to me that the high school teachers started to lose enthusiasm as the year went on and I suppose it was just my stubbornness not to be too wittily involved with the turkey...but I decided that I would write up a proposal of what we could do... I started to look at the big picture whereas if that had not been the case I would have been content to just sit and whinge about how it [the QSC Project] messed me around... So I found that difficult to write that because it was difficult to come out of this personal feeling and try and look at the bigger picture... Once you start doing that, you start looking around and ask why was this left to us to do?" (Year 8 QSC Teacher, September, 1992)

The project transition from the primary school to the secondary school had met with problems which can be related primarily to the non-reappointment of a Project Officer who, among other roles, was to have assisted the secondary school teachers in their clarification of the project philosophy and activities. More evident, however, there emerged a need for improved communication between the primary and secondary QSC sites. Despite some of the teachers making suggestions for communication between sites early in 1992, the strategy which was employed was for meetings to be held only when they were needed. Observations of those meetings revealed that they were crisis meetings rather than meetings which positively explored, for example, curriculum issues through sharing experiences across the two school sites. It had been left largely to the teachers to manage and maintain the project which detracted from their capturing, documenting, and sharing the implications for curriculum. Teachers believed that important implications had emerged from their work with the QSC Project and those needed to be documented to
The implications for curriculum which emerged were not confined to a reorganisation of subject areas by integrating them and adopting a non-disciplinary approach. Several teachers indicated that the new and emerging technologies had prompted a redefinition of curriculum goals which was one of the purposes of the project and modification of current syllabuses to take into account more adequately ways of incorporating the new technologies:

"The way I look at it is...we've been trying to achieve the curriculum goals using technology so you're still trying to achieve your curriculum goals. I think we need the curriculum goals to be redefined though.

...OK, well let's look at the technology and tools we've got - how can we plan a unit of work and see ...well, let's use that program...

I think teachers have got to be given the skills and ideas of how to generate those programs incorporating technology." (Year 7 QSC Teacher, August, 1992)

"The curriculum that we've got needs to be adapted. I've found it difficult to match the syllabus with the technology. I think the curriculum needs to be modified to give us more leeway to accommodate the more advanced things. The kids themselves don't even realise how difficult some of the things they do are. It's beyond what the normal 12 year old should be into. I mean... some of their programs are so complicated..." (Year 7 QSC Teacher, August, 1992)

It was as a result of those kinds of changes that in 1990 and 1991, the QSC teachers were forced to redefine the assessment procedures they used. The formal school report card became inadequate for use as an effective instrument for communicating to parents the new range of knowledge, skills, and attitudes being learned through the children's use of the technological resources. An insert was provided with the students' report cards in 1990 and a revised report card was formulated in 1991. Changes included new criteria such as keyboarding skills (words per minute and accuracy), word processing (editing skills, summarising, notetaking and proofreading), Logo (animation, using shape tables, and debugging), and Lego (problem solving and social skills).

In summary, the implications which the new and emerging technologies have for curriculum design are significant in terms of redefining curriculum goals, providing a catalyst for exploring non-disciplinary approaches to curriculum in secondary schools, and urging
schools to revise their assessment and reporting procedures to appropriately reflect changes resulting from technology use. The data presented showed differences in the computer applications used by Year 7 and Year 8 QSC students both at school and in their own time. Gender differences in computer applications were also identified and provided evidence that the Year 7 QSC girls used more computer applications at school and in their own time than any other group. The software used by QSC students was investigated and Logewriter was found to be most used by the students. Collectively, the information gained about computer applications, software use, and subjects in which students used their computers suggested that computers were being used mainly as intellectual tools by the students. While problems have been identified, possibilities and implications for curriculum also emerged through the analysis of the findings reported.

6.1.3 Changes in Student Learning

This section adds to the knowledge reported by Rowe (1992) who undertook research of the QSC classes in 1991. As indicated earlier, the QSC provided a unique opportunity for providing longitudinal information about students who had been kept together in the project. A Follow-up Computer Questionnaire for Students (see Appendix F) was administered in September 1992. Some of the items on that questionnaire were similar to those used by Rowe in questionnaires administered to students in April 1991 and November 1991. That approach enabled insights to be gained about changes in student learning over a period in excess of one year. In particular, student perceptions about using computers and changes in attitudes were analysed. In reporting those changes in the following discussion, considerable reference is made to Rowe’s findings. Moreover, gender differences are examined in relation to those changes.

6.1.3a Interest in Computers

Students were asked to indicate the extent to which they believed that they were interested in computers before their involvement in the QSC and the extent to which they were
interested now (i.e. May, 1992). As shown in Figures 6.9, 6.10, 6.11 and 6.12 below and on the following pages, substantial changes occurred in students' interest in computers over time.

**Figure 6.9: Year 7 QSC Boys - A Comparison of the Extent to Which They Were Interested in Computers BEFORE Their QSC Involvement and the Extent to Which They Are Interested NOW.**

**Figure 6.10: Year 7 QSC Girls - A Comparison of the Extent to Which They Were Interested in Computers BEFORE Their QSC Involvement and the Extent to Which They Are Interested NOW.**
Figure 6.11: Year 8 QSC Boys - A Comparison of the Extent to Which They Were Interested in Computers *BEFORE* Their QSC Involvement and the Extent to Which They Are Interested *NOW*.

Figure 6.12: Year 8 QSC Girls - A Comparison of the Extent to Which They Were Interested in Computers *BEFORE* Their QSC Involvement and the Extent to Which They Are Interested *NOW*.
Significant changes had occurred in the extent to which students perceived they were more interested in computers now when compared with their interest before their involvement in the QSC for Year 7 boys ($\chi^2 = 14.86; p < .01$), Year 7 girls ($\chi^2 = 32.04; p < .01$), and Year 8 boys ($\chi^2 = 14.76; p < .01$). However, there had been no significant change in computer interest for the Year 8 girls ($\chi^2 = 2.86$). All of the Year 7 girls, 79% of the Year 7 boys, and 74% of the Year 8 boys indicated that they were now interested in computers to a great or very great extent. Only 4% of Year 8 girls stated that they were interested in computers to a great or very great extent. Rowe (1992) also reported concerns amongst that group of students when they were in Year 7. In particular, she noted that by November 1991, those girls were becoming less enthused about computing. Rowe found that there was an increase in the perceived anxiety of those girls which she suggested was the likely result of their declining feelings of being comfortable with computing. According to Rowe (1992), they "report not to be coping, they feel that they have been left behind and that they are so far behind especially in procedures that they can no longer catch up". Thus, the problems with that group had begun to emerge before the end of their primary school QSC involvement. To pursue that further, Year 8 students were asked if they were more interested in computers in Year 8 than when they finished Year 7. Again, there was a significant relationship between gender and agreement to the statement ($\chi^2 = 14.61; p < .01$) as only 5% of girls and 58% of boys agreed that their interest in computers had increased since leaving Year 7. Furthermore, gender differences were identified as only 5% of the Year 8 girls compared with 50% of the Year 8 boys, indicated that there were more interested in learning than when they finished Year 7 ($\chi^2 = 12.3; p < .01$). Implications emerging from these gender differences are discussed later in this chapter (see 6.1.5 Gender Differences, p.225).

6.1.3b Perceptions About QSC Involvement

Negative feelings about the QSC Project by the Year 8 girls were found to exist through further analysis. Year 8 QSC students, many of whom had been participants for almost three years and for whom the project officially ended in 1992 were asked a series of questions relating to their involvement. Significant relationships existed between gender
and agreement with the statements that students had been pleased to be involved in the project (χ² = 13.37; p < .01) and that to have had the use of a laptop computer of their own had been beneficial for their progress at school (χ² = 15.12; p < .01). As displayed in Figures 6.13 and 6.14 respectively, only 32% of the Year 8 girls agreed that they were pleased that they had been involved in the project, and only 32% of them agreed that having had their own personal laptop computer had been beneficial for their progress at school.

Figure 6.13: Year 8 QSC Students' Level of Agreement With the Statement
- I am pleased that I have been involved in the project.

Figure 6.14: Year 8 QSC Students' Level of Agreement With the Statement
- To have had the use of a laptop computer of my own has been beneficial for my progress at school.
There was no significant relationship between gender and Year 8 students' perceptions that they would miss not having a computer of their own after the project finishes. 54% of Year 8 boys and 41% of Year 8 girls agreed that they would miss not having a computer of their own. The findings support the contention that there had been a continued decrease in interest and positive attitude towards using computers amongst Year 8 students and a specifically concerning indication that considerably more Year 8 girls than boys perceived that using computers had not been beneficial for their progress at school.

Rowe (1992) reported that, in April 1991, nearly all Year 6 and Year 7 students disagreed that they would be happier in a class where they did not use computers. By November 1991, the Year 6 students' response had not changed, but 17% of boys and 11% of Year 7 girls (now in Year 8) agreed. In September 1992, no change had occurred with the students who proceeded from Year 6 to Year 7, however, 27% of the girls who had moved to Year 8 previously 17%) and 8% of boys (previously 11%) agreed. Further investigation is needed to be able to explain why there had been a continuing decline in positive attitudes and interest in computing amongst those Year 8 girls. The Year 8 QSC teachers when asked if they had noted gender differences all expressed concern about some Year 8 girls. It was difficult to distinguish whether or not the reasons for those concerns were related to the technological aspects and the project involvement, or whether or not they were related to problems that existed independent of the project. Certainly, changes had been noted by Rowe and while the present study provided evidence to show that gender differences continued to occur in the Year 8 students, the Year 7 findings brought into question Rowe's assertion that:

"No gender differences were observed with respect to computer awareness, feelings and attitudes about computers and computing in the responses of Year 6 [now Year 7 in 1992] students to the questionnaires administered in April. However, at that stage some significant gender differences were evident in Year 7 students [now Year 8 students in 1992]. The latter students had had their computers for one year longer than the Year 6 students. It would appear that gender differences are not generic but develop with computer familiarity and use." (Rowe, 1992)

Similar findings did not emerge amongst the 1992 Year 7 QSC students after they had the use of their computers for a year longer than when Rowe conducted her study. The fol-
Following evidence showed that no significant gender differences existed in Year 7 in student perceptions about using computers for learning. However, further evidence is presented which highlighted differences between Year 7 students and Year 8, and gender differences between the QSC students in Year 8.

In April 1991, Rowe (1992) found that 84% of Year 6 students (83% of boys, 84% of girls) and 88% of Year 7 students (87% of boys, 72% of girls) agreed that using computers was fun. By November of that year, Rowe reported that 85% of students still agreed, but that Year 7 students’ agreement had decreased to 70% (86% of boys, 54% of girls). Almost one year later, the present study revealed that the percentage of Year 7 (previously Year 6 in 1991) students agreeing that computers were fun had substantially increased to 96% (93% of boys, 100% of girls). It was also found that the percentage of Year 8 boys (previously Year 7 in 1991) had remained at a similar level with 88% agreeing. However, there were only 18% of Year 8 girls who felt that using computers was fun. Significant differences were found to exist between Year 7 and Year 8 classes ($\chi^2 = 24.64; p < .01$) and between Year 8 boys and Year 8 girls ($\chi^2 = 24.15; p < .01$). Those differences over time are graphically displayed in Figure 6.15 below.

![Figure 6.15: Changes in QSC Students’ Level of Agreement With the Statement - Using computers is fun.](image-url)
Confidence in Using Computers

Year 7 students portrayed very high levels of confidence with 95% of them (90% of boys; 100% of girls) agreeing that they were confident in their ability to use computers. In contrast, despite having been involved in the QSC Project for one year longer than the Year 8 students, only 60% of Year 8 students (81% of boys; 36% of girls) felt confident. A significant relationship was found to exist between Year level and confidence ($\chi^2 = 11.69; p < .01$) with a higher proportion of Year 7 students confident in their ability to use computers than Year 8 students. In addition, there was a significant relationship in the Year 8 students between gender and confidence ($\chi^2 = 14.55; p < .01$) as 81% of Year 8 boys were confident compared with only 36% of Year 8 girls.

No significant differences were found between either year levels or gender in levels of agreement with the statement that computers scared students. None of the Year 7 and Year 8 boys, and only 4% of Year 7 girls and 5% of Year 8 girls indicated that they were scared of computers. As shown in Figure 6.16 below, that was a substantial continued decrease in anxiety about using computers consistent with the trend Rowe (1992) reported in which 40% of Year 6 students and 54% of Year 7 students in April 1991 stated that computers did not scare them. By November 1991, there were 30% more Year 6 students and 20% more Year 7 students who were not scared by computers.

![Figure 6.16: Changes in QSC Students' Level of Agreement With the Statement - Using computers does not scare me.](image-url)
While all groups perceived that computers did not scare them, a disproportionate number of Year 8 girls were found to have low levels of confidence in their ability to use computers. It had already been reported that the Year 8 girls had not significantly changed in their interest in computers throughout the project while Year 8 boys, and Year 7 boys and girls had shown significant gains in interest. The findings suggested that as both the confidence and interest in using computers for many of the Year 8 girls was low, their project involvement had not significantly impacted positively upon them.

The present study reaffirms Rowe's assertion that through students being accustomed to computers their anxiety towards them had decreased. As shown in Figures 6.17 and 6.18, that trend was found to exist as the students' length of involvement in the project increased, with students perceived that computers made them nervous, and that very few students were frightened that they might break their computers. There was a significant relationship between year level and the statement that students are frightened that they might break their computers ($\chi^2 = 8.54; p < .05$); only 4% of Year 8 students indicated that they were frightened they might break their computer, while 18% of Year 7 students were still concerned about the potential of breaking their computers.

![Figure 6.17: Changes in QSC Students' Level of Agreement With the Statement](image)

- Using computers makes me feel nervous.
Figure 6.18: Changes in QSC Students' Level of Agreement With the Statement 
- I am frightened that I might break my computer.

6.13 Students' Perceptions of Learning Using Computers

Students' perceptions of learning using computers were obtained by seeking their levels of agreement about a series of statements. No significant differences were found in the responses to those statements between the Year 7 boys and girls. However, as shown in Table 6.6 on the following page, gender differences were identified between the Year 8 boys and girls to six of the statements with the Year 8 boys expressing more positive perceptions toward all of the following statements:

* Computers are as important to students as textbooks ($\chi^2 = 7.05; p < .05$),

* Learning to work with computers is just as important as reading, mathematics and spelling ($\chi^2 = 10.01; p < .01$),

* Using computers makes learning more difficult ($\chi^2 = 15.54; p < .01$),

* The computer makes mathematics learning easier ($\chi^2 = 8.62; p < .01$),

* The computer would never be the cause of a student doing better in schoolwork ($\chi^2 = 14.07; p < .01$), and

* Once I start working on the computer, I find it hard to stop ($\chi^2 = 63.4; p < .01$).
Significant relationships were identified between Year 7 and Year 8 students and their agreement with the following statements:

- *I use the computer in many subject areas* ($\chi^2 = 40.75; p < .01$),
- *Using computers makes learning more difficult* ($\chi^2 = 23.88; p < .01$),
- *The computer makes mathematics learning easier* ($\chi^2 = 10.57; p < .01$), and
- *Once I start working on the computer, I find it hard to stop* ($\chi^2 = 10.17; p < .01$).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Yr 7 Boys Agree (%)</th>
<th>Yr 7 Girls Agree (%)</th>
<th>$\chi^2$ Values*</th>
<th>Yr 8 Boys Agree (%)</th>
<th>Yr 8 Girls Agree (%)</th>
<th>$\chi^2$ Values*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers are as important to students as textbooks</td>
<td>55</td>
<td>58</td>
<td>2.85</td>
<td>77</td>
<td>41</td>
<td>7.05</td>
</tr>
<tr>
<td><em>I use the computer in many subject areas</em></td>
<td>100</td>
<td>96</td>
<td>0.00</td>
<td>62</td>
<td>36</td>
<td>3.96</td>
</tr>
<tr>
<td>Learning to work with computers is just as important as doing mathematics and spelling</td>
<td>62</td>
<td>50</td>
<td>0.87</td>
<td>65</td>
<td>23</td>
<td>10.01</td>
</tr>
<tr>
<td>Using computers makes learning more difficult</td>
<td>4</td>
<td>8</td>
<td>0.53</td>
<td>19</td>
<td>41</td>
<td>15.54</td>
</tr>
<tr>
<td>The computer makes mathematics learning easier</td>
<td>52</td>
<td>38</td>
<td>1.7</td>
<td>50</td>
<td>9</td>
<td>8.62</td>
</tr>
<tr>
<td>The computer would never be the cause of a student doing better in school work</td>
<td>31</td>
<td>15</td>
<td>4.15</td>
<td>12</td>
<td>55</td>
<td>14.07</td>
</tr>
<tr>
<td>Students who use computers will do better in their schoolwork</td>
<td>31</td>
<td>17</td>
<td>2.3</td>
<td>42</td>
<td>13</td>
<td>5.54</td>
</tr>
<tr>
<td><em>Once I start working on the computer, I find it hard to stop</em></td>
<td>59</td>
<td>62</td>
<td>0.12</td>
<td>46</td>
<td>9</td>
<td>63.4</td>
</tr>
</tbody>
</table>

*Chi Square Values ($\chi^2$): Three set of values were calculated; viz.
Yr 7 B/G to examine relationships between Year 7 Boys and Girls,
Yr 8 B/G to examine relationships between Year 8 Boys and Girls, and
Yr 7/8 to examine relationships between Year 7 and Year 8 students.

Critical values for significance:

- Level of significance
  - df  0.05  0.01
  - 2  5.99  9.21

N.B. Significant values have been underlined and highlighted in bold print.

The perceptions of the Year 7 students and the Year 8 boys toward the use of the computer for learning were found to be generally more positive overall than the Year 8 girls. Interestingly, Rowe (1992) reported that in April 1991, approximately 20% of Year 6 and
only 10% of Year 7 students disagreed with the statement that children who used computers do better in their schoolwork. By November 1991, there had been no change in Year 6, but the Year 7 students who disagreed had increased to 20%. In comparison, by September 1992, substantially more Year 7 and Year 8 students disagreed. Only 25% of Year 7 students (31% of boys and 19% of girls) and only 29% of Year 8 students (42% of boys and 5% of girls) believed that, by using computers, students would do better in their schoolwork. Discussions with the teachers indicated that high expectations had been placed on the role that computers would play in improving students' academic performance. Some teachers felt that early in the project, some people outside the project (i.e. some other teachers and some parents) thought that by the provision of technological resources, students would all be assured of success. That is, there was a view held that children and lots of computers equated with automatic success. However, as the project proceeded, it became evident to many of the students that academic success was contingent on many additional factors. One teacher highlighted the way in which a student, who had previously had difficulties with schoolwork, had been given a 'fresh start' through his interest being stimulated and he had been prepared to work very hard. Despite those increases in interest and work habits, that particular student was still obtaining very similar grades to those he had been awarded prior to his QSC involvement. It was possible that students had become more realistic in their beliefs about the effect which using computers might have in terms of improved school results.

### 6.1.3e Teachers' Perceptions of Changes in Student Learning

A Year 7 teacher who was very pleased with the students' progress cautioned that, despite the technological resources and effective learning and teaching occurring, not all students had experienced success. When interviewed about changes in student learning, she stated:

"Now students get more done in less time. They are getting better at choosing the right resources for whatever the topic is. But not all of them. Some are still having the same problems." (Year 7 QSC Teacher, August, 1992)

A secondary school QSC teacher who had worked with the students since the project's
beginning referred to the enormous amount of work students were prepared to do:

"The thing when we first started that really surprised me was the time that kids were prepared to put in...

Particularly, in the second half of the first Grade 6 year [1990] you would be amazed to see how much on task the kids were. That has eased quite a lot since then but I still think the kids here [Year 8-1992]...turn out an incredible volume of work. ...kids would be surprised at how much they would have done normally without the technology." (Year 8 QSC Teacher, August, 1992)

All of the teachers when interviewed about changes in student learning conveyed the belief that the project had encouraged students to take on more responsibility for their own learning which had resulted in the students developing effective research skills:

"...they research more. They’re better at research and they look for more places to get information. They tend to be more willing to draw graphs, and interview each other... I’ve found them more willing to do that sort of thing than other Grade 8 classes. They do have a bigger range of research techniques than other Grade 8 classes." (Year 8 QSC Teacher, August, 1992)

A teacher suggested that the QSC students had become empowered learners and he observed that the students were prepared to solve problems, take up challenges, and were prepared to take risks:

"...the impact on the kids here I feel is that they have been empowered...that, for most of them, they have more confidence about how they go about what they do. They feel a little bit more in control of their learning and I think being able to negotiate part of the curriculum is part of that but I think having the tools they’ve developed over the past two years has been an important part of that too. They do feel when they need to do something - oh yeah, I did that - I can draw on this particular thing I did in the past and I can use that. And they’re not frightened of challenges... Problem solving seems to be an important part of the whole ethos in Sunrise and that being wrong is not necessarily something they tend to be afraid of... A lot of kids at particularly Grade 8 level are afraid of being wrong." (Year 8 QSC Teacher, August, 1992)

4.1.3 Parents’ Perceptions of Changes in Student Learning

Parents were asked to provide their insights into changes they had observed in their children’s learning. A questionnaire (see Appendix H) was administered which sought parents’ perceptions of positive and negative changes. The positive and the negative changes cited by parents were categorised and these are presented in Table 6.7. The most frequent positive changes related to students enthusiastically and conscientiously doing their homework, project work, assignments, and research. Parents indicated that they were
pleased with the touch typing and keyboarding skills which the students had acquired, and observed improvements in children in their development of positive attitudes toward learning. The use of computers had also led some parents to perceive that their children were more willing than before to edit written work, and to present and publish their work more professionally. The list of 'negatives' provided by parents was less than that of the 'positives' provided by them with forty-two sets of parents stating that they saw no negative changes at all. The negative changes most frequently cited by parents related mainly to handwriting. Parents indicated that they felt that through the students using the computer instead of mainly a pen that the childrens' handwriting skills had become worse.

Table 6.7: Parent Perceptions of Changes in Student Learning

<table>
<thead>
<tr>
<th>Changes in Student Learning</th>
<th>Year 7 Parents*</th>
<th>Year 8 Parents**</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects/Assignments/Research</td>
<td>18</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>Homework</td>
<td>15</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>Motivated/Enthusiastic/Pride in work</td>
<td>16</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>Positive Attitude/Thirst for knowledge</td>
<td>11</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>Touch typing/Keyboarding Skills</td>
<td>7</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Self-confidence/Confidence</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Programming Interest/Skills</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Does extra work willingly</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Planning Skills/ Organisation</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Collaborative Learning</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Responsibility</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Spelling</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Excitement about attending school</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Knowledge improved</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Communication</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td>50</td>
<td>148</td>
</tr>
<tr>
<td>No changes</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Negative Changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handwriting</td>
<td>7</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Inability to do simple mental tasks</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Frustration</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Lack of content</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Group work</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Getting bored with the program</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The novelty has worn off</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>At times, should use more pen and paper</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Not doing much schoolwork</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Depressed</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>No negative changes</td>
<td>29</td>
<td>13</td>
<td>42</td>
</tr>
</tbody>
</table>

* Year 7 Parents N (Questionnaires Retrieved) = 46 ; Response Rate = 78%
** Year 8 Parents N (Questionnaires Retrieved) = 27 ; Response Rate = 57%
Parents, teachers, and students generally perceived that through students using their own computers, the amount and the quality of work which most students produced had improved. During teacher interviews, teachers referred to research skills and project planning and presentation, and parents generally perceived that the students’ development of touch typing skills and skills in using computers and printers had facilitated improved assignment work. Conversely, there was a perception by students and their parents that while touch typing skills were worthwhile, there were concerns by them that handwriting skills had deteriorated.

As displayed below in Figure 6.19, 86% of Year 7 boys, 82% of Year 7 girls indicated that using computers were easier than using a pen or pencil. However, 58% of Year 8 boys and only 29% of Year 8 girls felt that computers were easier than writing with pens or pencils. That finding is complemented by the differences in students' preferences, shown in Figure 6.20, for using either pen/pencil or computers for preparing or publishing a written task. Fewer girls than boys preferred, when given the choice, to use only a computer for preparing and publishing their work. However, most students indicated they would prefer to use either only a computer (33%) or mainly a computer (49%). Only 9% of students stated that they would prefer to use only a pen and a further 8% preferred to use mainly a pen.

![Figure 6.19: Student Responses to the Question](image-url)

*Figure 6.19: Student Responses to the Question*

- Compared to writing with a pen or pencil, do you find using your computer harder, easier, or the same?
Figure 6.20: Students' Preferences for the Use of Either Computers or Pen When Preparing and Publishing a Written Task

Important changes in student learning reported by parents, teachers and students have been identified. However, the findings also revealed that not all students perceived that positive changes had occurred for them. Gender differences were identified which raised concerns about the impact of the project on girls in Year 8 and their feelings about technology. There was evidence, for example, which suggested that more Year 8 girls than Year 8 boys had substantially lower levels of confidence, interest, and less positive attitudes toward using technology. Indeed, after almost three years of being involved in the QSC Project, only 32% stated that they were pleased to have been involved in the project. In contrast to that, the findings indicated that the Year 7 girls as well as the Year 7 boys had shown high levels of interest and confidence in computers. Some differences between Year 7 students and Year 8 students were also highlighted. It was also reported that, with the exception of the Year 8 girls, the longer the students had been involved in the QSC Project their interest in computers had increased. For all groups, it was found that as the project progressed students became less anxious about computers.
6.1.4 Advantages and Disadvantages of QSC Involvement

Teachers, students, and parents were asked through the survey instruments to indicate their perceptions of the ways in which they believed that students have been advantaged and disadvantaged by having been involved in the QSC Project.

6.1.4a Advantages - Teachers' Perceptions

Teacher perceptions related strongly to their views on the changes in student learning. That is, in addition to the students having been given access to learning in a technology-rich environment, teachers believed that the students had been advantaged by their development of skills which enabled them to undertake learning tasks more effectively and more enthusiastically. The following statements from teachers and school level administrators highlighted those advantages and also indicated additional areas in which the students had been advantaged; e.g. students became more confident in using computers, took responsibility for their own learning, developed communication skills, negotiation skills, and learnt to work cooperatively:

b) Respect for the ideas of others and learning to give credit to others for their ideas,
c) Learning to work cooperatively and efficiently with others,
d) Gaining in self-esteem - valuing your own abilities and the abilities of others,
e) Having the confidence to tackle and solve problems in a critical way; i.e. choosing the best solution. Not being afraid to take risks." (Year 7 QSC Teacher, May, 1992)

"The students have had the opportunity to become a part of the decision making in their own learning.
The students have developed self-confidence in the use of technology.
The students have developed higher-order thinking skills and now possess more advanced research skills." (Year 7 QSC Teacher, May, 1992)

"- confidence to attempt to solve any problem given to them
- confidence to use computers
- ability to take responsibility for their own learning." (Year 8 QSC Teacher, May, 1992)

"Students - empowerment, personal involvement, control of learning environment, enjoyment." (Year 8 QSC Teacher, May, 1992)
In addition to those advantages, some of the teachers' comments emphasised not only the improved knowledge but the improved ways in which students accessed, organised, and reconstructed knowledge. For example, the former Project Officer indicated that the students had demonstrated that their learning could be enhanced through the functional use of computers as intellectual tools. The following comments reflected that identification of students' use of knowledge:

"The students appear to have very advanced research skills, especially in the areas of electronic information sources. The students have the ability to create modules of information and by linking these modules themselves, create their own data structures." (Year 8 QSC Teacher, May, 1992)

"... enhance children's learning - intellectual tool concept appears functional. Positive step to enable education to move with society into the post-industrial age." (Former Project Officer, May, 1992)

4.4b Advantages - Parents' Perceptions

Parents were generally very positive about the advantages they saw that the QSC involvement held for their children. As summarised in Table 6.8, parents perceived that their children had been advantaged mainly through increased knowledge of computers, the development of computer skills and use of the technological resources, becoming computer literate, and improved confidence and self-esteem. Parents' comments conveyed an optimism for their children's futures. The following comments were typical of many parents who felt that their children had been given an early insight into using computers:

"It has given my child an early insight into what computers can do for them at an age where pupils are looking towards the future." (Parent, September, 1992)

"I feel that my child has learnt so much in the Sunrise Project, that he would never have learnt until University. I feel privileged he was chosen. His knowledge of computers and programming will be a great advantage in his years ahead." (Parent, September, 1992)

"They now have knowledge which many people using computers in the workforce do not have. This is going to put them 'ahead' (hopefully) in their future studies." (Parent, September, 1992)
<table>
<thead>
<tr>
<th>Advantages</th>
<th>Year 7 Parents*</th>
<th>Year 8 Parents*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition of computer skills</td>
<td>19</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>(e.g. touch typing, using computers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of computers</td>
<td>14</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>Computer literacy</td>
<td>10</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Improved confidence/self-esteem</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Cooperation/Social skills/Working in groups</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Works independently</td>
<td>2</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Enjoy experimenting/Widening the horizons and limitless scope of possibilities</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Better assignment presentation</td>
<td>7</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Willingness to learn</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Thinking skills/Problem solving skills</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Fun/Enjoyment</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Proud to show others what he/she has done</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Cost benefit for parents</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Programming</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Care for electronic equipment</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Benefit of having been taught by teachers</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Committed to the project</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>98</td>
<td>71</td>
<td>169</td>
</tr>
</tbody>
</table>

* Year 7 Parents N (Questionnaires Retrieved) = 46; Response Rate = 78%
** Year 8 Parents N (Questionnaires Retrieved) = 27; Response Rate = 57%

6.1.4c Disadvantages - Teachers' Perceptions

Several of the teachers indicated that they did not perceive that there had been any disadvantages for students. Surprisingly, when asked about the disadvantages, some of the teachers who had been involved with the project for a considerable length of time were defensive about identifying disadvantages for students. A teacher cautioned that:

"The project will be blamed for negative outcomes rather than positive ones - e.g. behaviour problems which would be so regardless and learning difficulties that were and always will be apparent." (Year 7 QSC Teacher, August, 1992)

Similarly, the former Project Officer expressed concern that:

"Sometimes I fear too much has been attempted and that the investigation is expected to provide all the answers rather than provide us with knowledge which enables us to frame intelligent questions." (Former Project Officer, May, 1992)
The establishment of the project was carefully implemented to minimise setting unrealistic expectations for student outcomes. However, through sharing the significance of the project with the local and wider educational communities, the students and teachers inevitably became the focus for critical observation. Some of the teachers felt that they had been subjected to some unwarranted criticism which they suggested more often occurred when they shared their successes.

Disadvantages suggested by other teachers related to project management concerns which had impacted upon their classroom operation. In particular, the secondary school QSC teachers and administrators suggested that problems had been noticed as a result of the students being kept together when they moved to Year 8, tensions existed between the secondary school curriculum and school organisation with the QSC philosophy, there had been a lack of research information made available to them, and that the technological resources which were now almost three years old had become outdated:

"(1) Meeting curriculum demands across three subjects in Humanities while allowing time for programming and other activities.
(2) Lack of available research data on the project after 2 years.
(3) Lack of resources in the High School." (Year 8 QSC Teacher, May, 1992)

"The students’ perception that they are not ‘normal’.
The possibility of debasing concentration skills away from a computer.
The students’ ability to process non-electronic information sources.
The outdated technology in a supposed high-tech activity.
Financing of resources to allow a functional program.
THE DELAY IN PROVIDING SURVEY STATISTICS.” (Year 8 QSC Teacher, June, 1992)

"Students have been together too long, are sick of one another, and some are sick of computers. Some students have learnt from working in groups - not to share anything with others to do little work and rely on others.
Some students still confuse quality and quantity in research assignments.
Very difficult to set a settled teaching environment when real tangible support changes so much." (Year 8 QSC Teacher, May, 1992)

"The students seem to be having some difficulty in the area of social skills with each other. Frictions between them seem to have arisen because they’ve been together for longer than other Year 8 groups.” (Deputy Principal, May, 1992)

"Adapting to ‘normal’ classes, curriculum, etc in 1993.
Labelling of students as being different.
Maintenance of resources."
Disadvantages - Parents' Perceptions

Parents' perceptions revealed that they felt that there were considerably less disadvantages for their children than the advantages which they had identified. More than half of the parents who responded stated that there were no disadvantages at all. Some of those parents even wrote positive comments to the question which asked them to describe the disadvantages. The following comments from two of the parents were indicative of that:

"NONE - we were pleased our children could participate in the project. I will be interested to read your final report to see if learning has been facilitated other than skill development in computer usage." (Parent, September, 1992)

"As far as I am concerned, at this point in time there are no major disadvantages in being in the project. It remains to be seen how the children will handle their first year back to 'normal' classes, but I hope there will still be a large amount of computer activity in their class." (Parent, September, 1992)

As shown in Table 6.9, parents felt that there were disadvantages related to handwriting, there were some concerns about what might happen to the children when the project ended, and mathematics. The perceived deterioration in handwriting was seen by parents largely as a result of the improved efficiency in students' touch typing skills. A parent summarised that concern:

"The only negative change I have found is a definite deterioration of his handwriting. Mainly through impatience, I think, because he is so used to getting such a quick result from speed typing. His handwriting slows him down so he tends to try to write as fast as he types." (Parent, September, 1992)

Some Year 8 parents highlighted similar concerns to those expressed by the secondary school teachers and administrators, by suggesting that the students had been disadvantaged through a lack of interaction with the other Year 8 classes. A Year 8 student's parents stated that:

"We feel, as do a lot of parents, that three years has been too long and should have been solely a primary school project. By taking it through to high school the students have had an added problem of being segregated from the rest of Grade 8." (Parents, September, 1992)
From an analysis of questionnaire data, those perceptions of some of the Year 8 parents, secondary school teachers and administration, and the finding reported earlier in this study that only 27% of Year 8 QSC students (42% of boys and 9% of boys) agreed that keeping the same group of students together from Year 7 to Year 8 had been good, raised a serious concern about the project intention of keeping the students together. Moreover, according to the secondary school personnel, that transition in 1992 had not been accompanied by adequate project support and management. Significant decreases in interest and confidence toward using computers had also been identified among the Year 8 girls, in particular, with only 5% of them indicating that they were more interested in computers in Year 8 than they were in Year 7. The picture which emerged strongly suggested that an appropriate educational response needed to be formulated to accommodate more effectively the transition from Year 7 to Year 8 of the second 'wave' of QSC students in 1993.

There are challenges which have been identified for project management in terms of the need for identifying personnel who will provide leadership and support through that transition, adequate funding for resources maintenance and repair, and the training and professional development of the secondary school teachers. Furthermore, the Year 7 students who had shown very high levels of interest, confidence, positive attitudes, and curriculum applications in using computers need to be monitored to identify and evaluate any changes that might occur during that transition from Year 7 to Year 8.

**Table 6.9: Parent Perceptions of Disadvantages for Students Through Their QSC Involvement**

<table>
<thead>
<tr>
<th>Disadvantages</th>
<th>Year 7 Parents*</th>
<th>Year 8 Parents**</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>When the project ends...?</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Handwriting</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Computer breakdowns/Loss of work</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Lack of interaction with other classes</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Not enough on standard school work</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Need for more communication with parents</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Carrying the computer</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Difficulties at high school</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Lost interest in school</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>28</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>

* Year 7 Parents N (Questionnaires Retrieved) = 46; Response Rate = 78%

** Year 8 Parents N (Questionnaires Retrieved) = 27; Response Rate = 57%
1.5 Gender Differences

Gender differences in technology use have been addressed throughout the presentation and analysis of findings related to curriculum implications and changes in student learning. The QSC Project had provided a setting in which gender differences in relation to technology over time can be investigated. Rowe (1992), in her study of the QSC classes in 1991, indicated that:

"Gender differences in attitudes to computing, and to motivation and computing achievement develop over time in students who are learning with computers. In situations of guaranteed equal access to computers, gender differences are not evident before the students have had considerable experience in computing." (Rowe, 1992)

Furthermore, Rowe (1992) stressed that gender differences in relation to learning with computers appeared to be related to many factors such as the impact of differential societal images, perceived expectations and the expectation of different life goals for boys and girls, the structure of learning tasks, the nature of the feedback in performance situations, the organisation of classroom settings, and the overt reactions of teachers to their female students. Similarly, Crawford et al (1989, p. 3) urged that there was a need for greater understanding of the factors involved,

"... in the development of computer literacy and the effects of educational applications of computer technology in all aspects of the curriculum in relation to gender. If computer technology is as empowering as the rhetoric suggests then it is vital that girls are enabled to be equally participative in engaging with technology as boys." (Crawford et al, 1989, p. 3)

Hattie and Fitzgerald (1988) reported in a meta-analysis of data from many studies on gender differences and technology use that, although there were no reported significant differences between girls and boys at primary level in the use and attitudes towards computers, gender differences became evident as students progressed through secondary school. The findings reported by both Rowe (1992) and those of the present study have been consistent with that observation. In this study, no significant gender differences in interest and use of computers were evident between Year 7 students. However, significant gender differences were identified between Year 8 students. In addition to that, some significant differences were reported between Year 7 and Year 8 students in their attitudes, interest,
and use of computers in school and in their own time at home.

The implementation of the QSC Project required the classes to consist of similar numbers of girls and boys. Also, all QSC students had the use of their own personal laptop computers to enhance equal access to computers. However, as Crawford et al. (1989, p. 5) indicate, making computer resources equally available to boys and girls represents equal access at its crudest level. Rather, they state that a more sophisticated notion of equal access relates to both boys and girls being equally participative in a range of computer applications available in the curriculum. This study found that, while each QSC student had access to their own computer, the participation of students in curriculum applications using computers differed substantially between Year 7 and Year 8 students, but did not differ substantially between boys and girls within either of those two Year levels. However, significant gender differences were reported in relation to a range of statements reflecting student interest, attitudes, and uses of computers for learning.

All students indicated that they thought that computers were for use by boys and girls. However, further investigation of the computer activities which students liked and disliked doing revealed some gender differences in computer activities which students preferred. The activities most liked by Year 7 boys and girls and Year 8 boys and girls were Logo programming which was a central feature of the QSC with Logowriter being the most used software program. However, while 81% of the Year 7 boys and 75% of the Year 8 boys liked programming, 42% of Year 7 girls and only 29% of Year 8 girls liked programming. None of the Year 7 girls disliked programming, and only 12% of year 7 boys and 27% of Year 8 boys disliked Logo programming, but 67% of Year 8 girls disliked programming most. Thus, given that Logo programming was the most liked computer activity of the Year 8 girls and only 29% of them liked it, the interest and participation in class activities for many of the Year 8 girls would be expected to be adversely affected. Indeed, none of the Year 8 girls indicated that they enjoyed using a computer to a great or very great extent, compared with 70% of Year 8 boys, 75% of Year 7 boys, and 96% of Year 7 girls. Teachers, when interviewed about gender differences, also confirmed that some of the Year 8 girls had
negative attitudes toward using computers. Students' perceptions of their future use of computers were explored by asking students what they believed they might use computers for when they are thirty years old. A survey by Kreinberg and Stage (1983) at the Lawrence Hall of Science at the University of California at Berkeley was conducted which asked the same question of 445 boys and 428 girls. They reported that typical answers from boys were that they would use them for finance, data processing, and games. The girls thought they would use them for helping them with housework. As displayed in Table 6.10 below, the most frequent responses showed that Year 7 students and Year 8 boys believed that they would be using computers in careers, work, and jobs. That category was the second most frequent response from Year 8 girls although those responses referred to secretarial and office work. Examples of responses were:

"I think I will be using a computer for business purposes when I am thirty." (Year 7 Boy, September, 1992)

"I feel that I will use computers mainly in my career when I am thirty years old." (Year 7 Girl, September, 1992)

"Publishing documents as a lawyer." (Year 8 Boy, September, 1992)

"Secretary or office work." (Year 8 Girl, September, 1992)

Table 6.10: Students' Perception of How They Will Be Using Computers When They Are Thirty Years Old

<table>
<thead>
<tr>
<th>Classification of Students' Responses</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Boys</td>
</tr>
<tr>
<td>Career/Work/Jobs</td>
<td>16</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Playing/Making games</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Negative Responses</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Multi-uses; e.g. games, typing...</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Home uses/Children</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not sure</td>
<td>0</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>No response</td>
<td>6</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>26</td>
<td>26</td>
</tr>
</tbody>
</table>

The most frequent response by the Year 8 girls related to the classification of responses to home and children. Given that there has been an emphasis on gender equity issues in
in recent years and there had been some significant initiatives which aimed to address gender stereotyping, the following responses indicated that for some girls they did not see a role for technology beyond helping them with their work at home or for helping their children:

"I don't really want to use a computer when I am thirty but I think if I did I would use it for home uses." (Year 8 Girl, September, 1992)

"I would probably just help my children use them but not use it myself." (Year 8 Girl, September, 1992)

"As a present for my kids at Christmas." (Year 8 Girl, September, 1992)

"Microwaves, etc. I won't be using computers in my future or career." (Year 8 Girl, September, 1992)

"At home." (Year 8 Girl, September, 1992)

Disturbingly, some of the Year 8 girls and boys provided negative responses which indicated their extreme dislike for using computers. Some of them attributed that dislike to their QSC involvement, indicating that for them that the immersion in a technology-rich environment had been counter productive.

"No I won't. 3 years was long enough." (Year 8 Boy, September, 1992)

"No way! I am sick of them. They make you angry." (Year 8 Boy, September, 1992)

"I don't think I will use them when I am that old." (Year 8 Girl, September, 1992)

"I don't think that I'll need computers for my career choice." (Year 8 Girl, September, 1992)

"I don't think I will use computers when I get a job. Won't use any." (Year 8 Girl, September, 1992)

While this study revealed some insights into gender differences among the QSC students, gender differences in access, participation, and outcomes related to students' use of technology requires further investigation. In particular, it is suggested that the Year 7 QSC students who had very positive interest in computers and high levels of computer applications should be followed to monitor any changes over time and to examine the complex range of factors influencing their use of technology. While other studies (for example, Hattie and Fitzgerald, 1988; Rowe, 1992) suggested that gender differences occur
over time, the findings reported here indicated that both the Year 7 boys and girls had become more positive in their use of computers the longer they had been involved in the QSC Project. That trend is in contrast to that found for the Year 8 students. It may be that the critical antecedents and conditions required for maximising access, participation, and outcomes for both boys and girls in their use of the new and emerging technologies were evident in the Year 7 QSC classroom. Further research is required to attempt to identify what those antecedents might be. Clearly, the two teachers working with the Year 7 students had become committed to and familiar with the QSC philosophy and goals, both were female teachers to provide role models for the girls, both had the benefit of extensive training and professional development in using the technological resources through their earlier QSC involvement, and both portrayed a confident, competent approach to classroom management. Some or all of those factors might provide starting points for that investigation. This study, along with Crawford et al (1989) and Rowe's (1992; 1993) findings suggests that merely providing all students with access to the technological resources was not enough to address gender differences in technological use.

6.1.6 Technical and Professional Support for Teachers

This section provides insights into how teachers came to grips with the new technological resources to which they were introduced. Subsequently, implications for the training and development of teachers in using technological resources are suggested.

Prior to their QSC involvement, most of the teachers had little or no experience in using computers. None of them stated that they had undertaken any preservice computer courses. A teacher reflected upon her Teacher's College days and, in relation to computers, could only recall "the people in white coats" who had something to do with large computers in air conditioned rooms. Similarly, another teacher could remember "punching out cards, people with white coats, and programming". Rowe (1992) investigated a sample of teachers using computers in Victoria and New South Wales and then presented their preferences and recommendations to the QSC teachers for their evaluation and comment. In terms of
those recommendations, all teachers, including the QSC teachers recommended that micro-computer based instruction should be incorporated throughout preservice teacher education programs. A secondary school teacher who had developed a strong background in using technology subsequent to his preservice teacher education indicated that he had: "taught PCM and IPT and also done the course [Graduate Diploma in Computer Education] and also Journalism which is very technology oriented..." (Year 8 QSC Teacher, September, 1992)

He suggested that courses such as the Graduate Diploma in Computer Education had been available for some years and he questioned why the establishment of the QSC Project had not started off using teachers who had already a strong background in using computers because he stated that "those teachers are certainly out there in the system". Ryan (1991, pp. 28-29) also noted that:

"The three teachers [who commenced in the QSC Project in 1990] had no formal training in educational computing in either pre-service or in-service form. One teacher had experience with an home computer and a small amount of tutorial use within the classroom.

...Before the project began formally, the teachers received a small amount of informal tuition in the use of Logowriter. They received little or no instruction on how to use other devices in the classroom or how to operate basic software such as the operating system or a word processor." (Ryan, 1991, pp. 28-29)

Before the project expanded to involve additional secondary school teachers in 1992, all of the QSC teachers undertook an in-service program in December 1991. The Project Officer and two lecturers from Monash University (Dr Anne McDougall and Jeff Richardson) negotiated a program with those teachers with the main focus being on the use of Logo. Feedback from teachers was very positive. However, during 1992, the secondary school QSC teachers felt that they required ongoing in-service which had not been provided. Their perceptions were congruent with those reported by Rowe (1992) of the primary school QSC teachers who recommended that teachers should have a series of workshops. They had suggested that those workshops should average about ten hours in duration with as much hands-on experience as possible. The secondary school QSC teachers attributed the inadequate in-service program provided for them to project management and, in particular, the non-appointment of the Project Officer. The experiences of the QSC teachers at the beginning of the project in 1990, and those of the secondary school QSC teachers at the commencement of their involvement in early 1992, strongly suggested that teachers
required intensive training using the technological devices before their introduction into the classroom milieu. The Primary Teacher Computer Competency Program being implemented in the various regions throughout Queensland aims to develop teacher competencies in using computers before teachers use them in classrooms. The QSC experience showed that approach was desirable as teachers needed to become competent users of the hardware and software as a precondition for computers to be used as an integral classroom resource. However, training by itself, would not ensure that the technological resources would be used by teachers. For teachers to effectively incorporate that technology into the learning-teaching experiences, professional development activities were also required. The importance of professional development grew from the recognition that the QSC teachers were involved in far more than using computers and software. They were required to make critical, professional decisions and judgments about curriculum, classroom organisation, and assessment.

Professional development activities for the QSC teachers included attendance at conferences, participation in workshops, the development of informal collegial networks with other teachers, tertiary lecturers, and consultants, and undertaking formal tertiary studies in educational computing. Those activities had involved teachers in a range of activities both in-school and out-of-school time. All teachers indicated that involvement in the QSC Project had involved them in many hours of their personal time (e.g. holidays, evenings, weekends) undertaking professional development activities. A teacher made the following comment which typically reflected those made by the teachers:

"...I did spend time writing programs in Logo over my Christmas holidays and in the early parts of the year and a lot of the projects I set the kids just for my own interest because I do like programming. I actually write my own versions of those activities...at night...stacks of time, but I'd probably spend about 2 or 3 hours a night for 2 to 3 nights a week and every now and again if I had a free Saturday or Sunday morning I'd sit down for a couple of hours and work on something..." (Year 8 QSC Teacher, September, 1992)

From the teacher questionnaire, it was found that teachers perceived that a strength of the Project resource provisions was that they had each been given a laptop computer which they could use at school and at home. That facilitated many 'at home' activities in addition to the expected 'at school' activities in which they could explore the possibilities of those
computers. Familiarity of the functions and capabilities of those computers was enhanced. A teacher who had left the project and had to return her computer was reported to have felt a great personal loss after having used that computer for two years. Teachers indicated that they required high levels of computer access. After they had developed skills and explored the possibilities which computers offered, they became reluctant to have to operate without them.

Teachers also identified the need for technical support and assistance. Teachers had found that they were required to spend large amounts of time arranging for computers to be repaired and dealing with students’ having equipment problems. A teacher, for example, stated that he had spent many hours of his own time arranging for computer repairs. The teachers asked the pertinent question - was that part of their teaching role? The registrars at both schools also reported concerns about the funding and procedures associated with the high levels of computer repairs. The schools’ administrations indicated that neither school could afford the level of the repair bills and, subsequently, relied directly upon Departmental funding for maintaining the project. As increasingly more computers became acquired and used in schools, the issues related to developing adequate means for providing access to technical support and assistance needs to be addressed to avoid the inefficient use of school personnel’s time and to examine ways of reducing the costs of those repairs.

While teachers came to grips with the demands and challenges posed by the technological resources through a range of strategies, the following implications emerged:

* There is a need for pre-service teacher education courses to include courses in educational computing.

* The training and professional development of teachers in educational computing is essential for ensuring that technology is effectively integrated into classroom activities.

* Teachers require training in the use of technological resources before they use them in classrooms to develop and enhance teacher competencies and confidence in using computers.

* Teachers require high levels of personal access to computers.

* Professional development activities need to be ongoing and responsive to the needs of teachers.
A variety of strategies were suggested which the QSC teachers had found to be effective; e.g. workshop participation, formal tertiary education courses in educational computing which related closely to their teaching, and the development of informal collegial networks.

* Access to technical support which is both time and cost efficient needs to be provided.

### 6.1.7 The Concerns and Perceptions of Parents

A questionnaire was administered in which parents were asked a series of questions about their attitudes toward and interest in computers, and they were asked to indicate perceptions about changes that had occurred in their children's learning. The overall response rate was 69% as 78% of Year 7 parents and 57% of Year 8 parents completed and returned the questionnaire. Those figures included some parents who had children in both the Year 7 and Year 8 classes. Perceptions of parents related to the positive and negative changes in student learning have been reported earlier in this chapter (see Table 6.7). Also, the advantages and disadvantages which parents believed that the QSC involvement had for their children are presented (see Tables 6.8 and 6.9).

Almost all parents (99%) believed that children should learn about computers at school. As shown in Table 6.11, when asked to indicate why they believed that children should learn about computers at school, parents' responses related strongly to the development of skills and knowledge which would prepare students for jobs, and to prepare them for a future technological society which they saw as inevitable. Many parents also suggested that learning about computers at school would assist their children to cope now as computers were seen by them to already be an integral part of everyday life. The concern by parents with employment prospects for their children reflected Cerych's (1985) sociological and economic factors associated with the introduction of technology into education. While the QSC Project was largely intended to be a pedagogic investigation of how technology could enhance learning and teaching, only one parent directly stated that computers could assist learning processes. Some parents, however, referred to the development of computer
literacy and computer skills. Overwhelmingly, though, the major issue for parents was the relationship which they believed existed between learning about computers at school and the workforce. The following comments by parents were indicative of that:

"Without computer skills, young people entering the workforce will be placed at a disadvantage to those with computer skills." (Parent, September, 1992)

"By the time they are in the workforce everyone will need to use computers." (Parent, September, 1992)

**Table 6.11: Parent Perceptions - Why children should learn about computers at school.**

<table>
<thead>
<tr>
<th>Classification of Responses</th>
<th>Year 7 Parents*</th>
<th>Year 8 Parents**</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce/Jobs</td>
<td>28</td>
<td>27</td>
<td>55</td>
</tr>
<tr>
<td>Need to know how to use computers</td>
<td>14</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td>as they are an integral part of everyday life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation for the future</td>
<td>21</td>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td>technological age/society</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer literacy and computer skills</td>
<td>13</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Information processing</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Learning process</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

* Year 7 Parents N (Questionnaires Retrieved) = 46; Response Rate = 78%
** Year 8 Parents N (Questionnaires Retrieved) = 27; Response Rate = 57%

Many parents made statements which reflected the view of a determined technological future for society and, consequently, children needed to learn about computers in schools:

"Obviously the future will be based on computer technology and we feel children should have access to computers from Grade 1." (Parent, September, 1992)

"Learning with computers at school will equip them with essential skills and knowledge which future job employers will have come to regard as mandatory." (Parent, September, 1992)

Parents provided information, as displayed in Figures 6.21 and 6.22, which indicated that
their interest in computers had increased during the time that their children had been involved in the QSC Project. It might well be that through students taking their laptop computers home and sharing their work with their parents that parents had become more interested in computers. Those increases complemented the perceived importance parents were found to have of children learning about computers in schools.

Figure 6.21: Year 7 Parents - A Comparison of the Extent to Which They Were Interested in Computers BEFORE Their Children Were Involved in the QSC and the Extent to Which They Are Interested in Computers NOW.

Figure 6.22: Year 8 Parents - A Comparison of the Extent to Which They Were Interested in Computers BEFORE Their Children Were Involved in the QSC and the Extent to Which They Are Interested in Computers NOW.
Parents were asked to indicate the extent to which they believed that they had encouraged their children to learn more about computers. As Figure 6.23 displays, 67% of Year 7 parents and 41% of Year 8 parents believed that they had encouraged their children to learn about computers to a great or very great extent. A further 28% of Year 7 parents and 48% of Year 8 parents had encouraged their children to some extent in learning more about computers. Those perceptions compared with students' perceptions shown in Figure 6.24 in which 50% of Year 7 students and 64% of Year 8 students indicated that their parents had encouraged them to learn about computers.

![Bar chart](image)

**Figure 6.23: Parent Perceptions of the Extent To Which They Had Encouraged Their Children to Learn More About Computers**

![Pie charts](image)

**Figure 6.24: Student Perceptions of Whether Their Parents Had Encouraged Them to Learn More About Computers**
In summary, the findings related to parents' perceptions reflected an increased interest among them in computers, and parent attitudes which suggested that children learning about computers was important for jobs, coping with everyday life in which computers had become an integral part, and to prepare students for the future technological age which they tended to see as being inevitable. The concerns and perceptions of parents in relation to changes in student learning and the perceived advantages and disadvantages of QSC involvement further highlighted the sociological and economic factors influencing the perceived importance of computers in schools as well as computers being used as a pedagogic tool to enhance learning and teaching.

4.2 Conclusion

This chapter presented findings related to processes and results through focussing on the impact of the QSC Project. To examine and assess the impact of the project, issues related to seven research questions were addressed; i.e. classroom organisation and management, curriculum implications, changes in student learning, advantages and disadvantages of QSC involvement, gender differences, technical and professional support for teachers, and the concerns and perceptions of parents.

Differences between the classroom organisation and management of the Year 7 and Year 8 classrooms resulted mainly from differences in school organisation. In particular, timetabling constraints were more evident in the secondary school. It was also found that teachers and students at the secondary school QSC site agreed that there had been some negative effects in keeping the students together in the transition from Year 7 to Year 8. Collaborative learning was evident at both school sites with students indicating that they had used mainly their teachers and their classmates as sources for learning about computers.

The new and emerging technologies provided significant implications for curriculum design in terms of redefining curriculum goals, providing a catalyst for exploring non-
disciplinary approaches to curriculum in secondary schools, and implying that schools
need to revise their assessment and reporting procedures to appropriately reflect the
changes in what is taught and learnt as a result of the changes in technology. The analysis
of the QSC Project revealed that curriculum design needed to provide mechanisms for
accommodating technological changes. Furthermore, in that process of curriculum re-
newal, educational scrutiny is urged to encourage educational decision making processes
which avoided assumptions that the provision of technological resources automatically
equated with more effective learning and teaching for all students.

Changes in student learning reported by teachers, students, and parents were identified.
The findings revealed that not all students perceived that QSC involvement had resulted
in positive changes for them. Findings were reported which suggested that student
interest, attitudes, and curriculum applications at school and at home were higher among
the Year 7 students than the Year 8 students. Furthermore, gender differences were
identified in relation to a range of issues. It was found that, with the exception of the Year
8 girls, the longer that the students had been involved in the QSC Project, their interest in
computers had increased. For all groups, it was reported that, as the project progressed,
the students had become less anxious about computers. Of particular concern was the
reported decrease in interest in, attitudes toward, and perceptions of computers held by
many of the Year 8 girls. In contrast, the findings relating to the Year 7 girls requires further
research to be conducted to follow that group to ascertain future trends in their use of
computers.

The perceived advantages and disadvantages for students resulting from their QSC
involvement were identified. The advantages which were reported by teachers related
strongly to changes in student learning. Teachers also indicated that students had become
more confident in using computers, took responsibility for their own learning, developed
communication skills, negotiation skills, and had learnt to work cooperatively. Parents
perceived that their children had been advantaged through their increased knowledge of
computers, the development of computer skills and use of the technological resources, the
development of computer literacy, and they had improved confidence and self-esteem. There were less disadvantages than advantages identified by both teachers and parents. However, the disadvantages suggested by the teachers related primarily to project management concerns which had impacted upon their classroom operation. The secondary school QSC teachers and administrators highlighted problems associated with the students being kept together in their move from Year 7 to Year 8, tensions which existed between the secondary school curriculum, school organisation, and the QSC philosophy, the lack of research information which had been made available to them, and that there were inadequacies with the technological resources which had become outdated. Parents’ concerns related to perceptions that the students’ handwriting had deteriorated, they were concerned about what happened to the children when the project ended, and some parents were concerned about the learning of key mathematics skills.

Important gender differences in attitudes towards, interest in, and use of computers have been highlighted. While all students had similar access to computers through having a personal laptop computer to use at school and at home, and all students agreed that they thought computers were for use by boys and girls, the reported gender differences suggested that a more sophisticated notion of equal access needed to refer to both boys and girls being equally participative in a range of computer applications available in the curriculum. The longer that the Year 7 boys and girls had been involved in the QSC, the more positive they became in their interest, attitudes and use of computers. An unexpected finding revealed that the Year 8 girls became increasingly negative toward computers. That finding was consistent with and extends the research evidence provided by Crawford et al (1989) and Rowe (1992; 1993).

The need for technical and professional support for teachers was identified. The distinction between training and professional development was described. Implications which emerged included pre-service teacher education courses to include courses in educational computing, training and professional development of teachers in educational computing is essential, training in the use of technological resources should occur before teachers are
required to use them in classrooms, teachers require personal access to computers, pro-

duction development needs to be ongoing and responsive to the needs of teachers, and 

access to technical support needs to be provided.

Finally, additional concerns and perceptions of parents were presented. Almost all parents 

agreed that learning about computers at school was now very important. Parents 

suggested that children learning about computers was important for jobs, coping with 

computers which had become an integral part of everyday life, and to help prepare students 

for the future technological age which they saw was inevitable. In addition, parents were 

found to have developed an increase in their interest in computers during the period in 

which their children had been involved in the QSC.

The following concluding chapter provides a summary of the evaluation.
CHAPTER SEVEN

SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

This final chapter provides a summary of the thesis by restating the purpose of the thesis, presenting the evaluation questions addressed, outlining the evaluation model formulated to guide the evaluation, and describing the research methodology employed. An appraisal of the model used to guide the evaluation is then made. Subsequent to that summary and appraisal, the major findings, their implications, and recommendations are presented. A review of the evaluation is then provided and suggestions are made for further research.

7.1 Purpose of the Study

The central problem which this thesis addressed was to provide information, implications and recommendations derived from an evaluation of the QSC Project which would assist educational policy formulation and implementation strategies for integrating learning technology into the curriculum in Queensland schools. The purpose of the study was to provide an evaluation of the QSC Project being implemented by the Department of Education in Queensland. The QSC Project represented a significant innovative investigation of the potential of the new and emerging technologies through the establishment of technology-rich learning environments at a primary school and a secondary school. The data collection for this thesis took place in 1992 during the third year of operation of the QSC. Furthermore, the evaluation provided additional information to complement two previous research studies (i.e. Ryan, 1991; Rowe, 1992; 1993) which were undertaken during the first two years of the QSC Project. Specifically, this program evaluation of the QSC focussed on situational analysis, project management, and the impact of the project. In addition, the thesis aimed to make a theoretical contribution to the literature on evaluation by developing and implementing a model based on 4GE principles for evaluating the integration of learning technology in schools by directly involving stakeholders in that evaluation process.

The study was significant at a State, national, and international level for two important
reasons. Firstly, it provided a response to the challenges and demands made by Worthen and Sanders (1988) and Fishman (1992) for the development of case studies using 4GE methodologies. Once the 4GE approach had been identified as the basis of the evaluation, all evaluation activities were then directed through continuing negotiations with relevant stakeholders. This enabled an assessment to be undertaken of the advantages and limitations of the 4GE approach for school-level evaluation. Secondly, the QSC was initiated as a site to enable intensive research investigations to be undertaken to explore practical ways in which to enhance and extend learning for students through the use of emerging information and communication technologies. Therefore, the study gained significance as it provided a substantial evaluation of a major learning technology initiative in Queensland schools. While a range of other learning technology initiatives had been undertaken in Queensland, there was a dearth of thorough evaluations undertaken of those initiatives which could be used to assist further project decision making. Thus, this evaluation was prompted by the recognition of the importance of the QSC as a research site due to the opportunity it provided for gaining essential knowledge for assisting future policy formulation and implementation strategies aimed at achieving the Department of Education's Development Plan (1992 - 96) (Department of Education, Queensland, 1992) goal that "information technology for learning is integrated into educational programs".

7.2 Evaluation Questions

An essential element, through employing a 4GE approach to the evaluation, was the identification of, negotiation with, and the involvement of the key participants in that evaluation. In essence, the principles of 4GE which provide encouragement and guidance for teachers who wish to be more actively involved in classroom evaluation (Guba and Lincoln, 1989; Russell and Willinsky, 1995, p. 2) were made operational through utilising sound evaluation practices described and developed by Stake (1967, 1972, 1975, 1978), Batchler (1982a, 1982b), Thorne (1990) and Owen (1992, 1993). Consequently, participants were involved in the formulation of the evaluation questions to be explored. Those questions were developed through a process involving three stages which were implemented by the researcher in his role as project evaluator.
In the first stage, the evaluator formulated a set of questions related to the major organising ideas contained in the evaluation brief; i.e. - Situational Analysis, Project Management, and Impact of the Project. The tentative questions related to those headings were formulated following a synthesis of issues gained from an extensive review of the literature. In the second stage of the process, those questions developed by the researcher were presented to participants at a workshop session in which they assisted in the identification of the evaluation questions. That workshop session enabled the questions suggested by the participants to be checked with those formulated by the researcher. There was considerable congruence between those questions tentatively posed by the researcher and those formulated by the workshop participants. However, in the third stage of the process, several questions needed to be reframed and subsequently modifications were made to ensure that the evaluation questions focused more directly on the questions raised by the key participants. The evaluation headings and the evaluation questions formulated are presented in Table 7.1.

Table 7.1: Evaluation Headings and Evaluation Questions

<table>
<thead>
<tr>
<th>Evaluation Heading</th>
<th>Questions</th>
</tr>
</thead>
</table>
| Program Evaluation of the Queensland Sunrise Centre: Situational Analysis | Why was it initiated?  
What is its setting and context?  
Who participates in the program?  
What is the program's history? How long is it supposed to continue? |
| Program Evaluation of the Queensland Sunrise Centre: Project Management   | What was intended and what happened in terms of program management?  
What are the implications for the management of further initiatives to integrate learning technology in schools in terms of personnel, resources, budgets, and training and professional development? |
| Program Evaluation of the Queensland Sunrise Centre: Impact of the Project | What impact did the Queensland Sunrise Centre Project have upon the teaching and learning context in terms of classroom organisation and management?  
What are the implications of the new and emerging technologies for curriculum design?  
Have there been changes in student learning through the use of laptop computers and immersion in a technology-rich environment?  
In what ways have the students been advantaged and/or disadvantaged by being involved in the program?  
Were there any gender differences; e.g. do girls react differently to technology compared with boys?  
How did teachers come to grips with the new technologies?  
What are the implications for the training and professional development of teachers?  
What were the concerns and perceptions of parents? |
| Appraisal of the Model for Program Evaluation                             | Was the model used suitable for evaluation of the Queensland Sunrise Project?  
How effective was the model for identifying the key components of the Queensland Sunrise Project?  
What contribution does the program evaluation make for program improvement? |
The Evaluation Model Developed to Guide the Study

Following an extensive review of the literature relating to technology and education, and an evaluation, an evaluation model was developed to guide the program evaluation of the QSC Project. An unproductive search for an existing model that had been used for evaluating technology initiatives, and which would have been suitable to use in this evaluation, highlighted the lack of evaluation studies in educational computing. That search found that, while the evaluation studies that could be located outlined their methodological approaches, they did not provide evaluation frameworks derived from the evaluation literature. Consequently, a strategy was employed in which an evaluation model was developed to suit the purposes of this evaluation and the needs of the various stakeholders.

Following a review of evaluation models and the successive generations of evaluation leading to constructivist inquiry, referred to as fourth generation evaluation (Guba and Lincoln, 1989), a model, as displayed in Figure 7.1, was developed in which the evaluation activities occur through continuing negotiations with the relevant stakeholders. That model was a modification of the Augmented Stake-Batchler Model developed by Thorne (1990). To assist the formulation of the evaluation model, Owen's (1992) concept of evaluation Form provided guidelines for choosing an evaluation approach. Owen discusses each of the Forms according to the dimensions of orientation (i.e. the fundamental reason for undertaking the evaluation), state of the program (i.e. the degree to which the program under review has been implemented at the time of the proposed evaluation), focus (i.e. the component/s upon which the evaluation is likely to be concentrated), timing (i.e. the temporal link between the evaluation and the program delivery) and evaluation approach. The evaluation Forms which most closely related to the QSC evaluation were process evaluation and impact evaluation. Those guidelines provided the basis for choosing an appropriate methodology and was included as a component in the model formulated to guide this evaluation. All of Owen's five Forms were included in the model as they could provide the basis for organising, clarifying, and choosing appropriate evaluation approaches for evaluating other learning technology initiatives.
Identify, negotiate with and involve key people in the program in the evaluation process. Identify the research questions.

**PROJECT RATIONALE:**

**Creating an EVALUATION FORM (Owen, 1992)**

<table>
<thead>
<tr>
<th>FORM</th>
<th>DIMENSION</th>
<th>EVALUATION</th>
<th>PRESENTATION</th>
<th>PROGRAM EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Form One</td>
<td>Impact</td>
<td>Evaluation</td>
<td>Impact</td>
</tr>
<tr>
<td>2</td>
<td>Form Two</td>
<td>Evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Form Three</td>
<td>Process</td>
<td>Evaluation</td>
<td>Clarity</td>
</tr>
<tr>
<td>4</td>
<td>Form Four</td>
<td>Design</td>
<td>Development</td>
<td>Clarification</td>
</tr>
<tr>
<td>5</td>
<td>Form Five</td>
<td>Evaluation for Development</td>
<td>Synthesis</td>
<td>None</td>
</tr>
</tbody>
</table>

**WHAT WAS INTENDED**

- Situational Analysis.*
- Project Management.*
- Impact of the Project.*

**WHAT HAPPENED**

- Situational Analysis.*
- Project Management.*
- Impact of the Project.*

**WHAT WAS INTENDED**

- What we needed.
  - people
  - equipment
  - budget
  - training

**WHAT HAPPENED**

- What we had.
  - people
  - equipment
  - budget
  - training

**RESOURCES**

**PROCESSES**

**RESULTS**

**ISSUES AND IMPLICATIONS**

Appraisal of the Model for Program Evaluation*

Denotes Evaluation Headings for the Evaluation Questions

*Figure 7.1: The Model for Guiding the Program Evaluation of the Queensland Sunrise Centre Project

Chapter Seven

Summary, Implications and Recommendations
That model highlighted the importance of identifying, negotiating with, and involving the participants in the QSC Project in the evaluation. The evaluation headings - Project Management, and Impact of the Project to which the evaluation questions related provided key headings in the model. Also included in the model is an appraisal of the model itself. That appraisal is presented later in this chapter.

1.4 Summary of the Research Methodology

A naturalistic and participant-oriented approach was used to enable the program evaluation to be responsive to the concerns of the individuals for whom the evaluation was being conducted. The evaluation became perceived as having a dual role of providing feedback to the participants as well as assisting in identifying and analysing issues which would aid the formulation, implementation, and evaluation of further learning technology initiatives in schools. Consequently, the evaluation strategies were implemented in a spirit consistent with 4GE principles in which the evaluator worked in a collaborative and cooperative way with the teachers, students, and administration at both QSC sites. The method used was an evaluative case study (see Figure 4.1, p.120) undertaken of the QSC classes located at Coombabah State School and Coombabah State High School in the South Coast Region of the Department of Education, Queensland.

Similarly, 4GE principles were observed when the research methodology and the specific data collection procedures were formulated as the evaluator discussed, shared, and negotiated these with the teachers. All school personnel directly involved in the QSC Project, and senior South Coast Regional Officers (i.e. Deputy Executive Director, and the Assistant Executive Director (Studies)) were presented with an overview of the program evaluation data collection and validation (refer to Table 4.4, p.132), the steps outlining the program evaluation process (refer to Figure 4.2, p.122), and the program evaluation timeline (see Table 4.5, p.133). Agreements were reached between the evaluator and those stakeholders that the data collection procedures were appropriate. An additional feature of the approach was that continuing negotiations took place with stakeholders throughout
The evaluation. Progress reports were presented at South Coast Regional Technology Group meetings and informal discussions were held with teachers during regular site visits. During the data gathering phase (i.e. May - September 1992), the researcher in his role as evaluator made regular weekly site visits and also made additional visits as required (e.g. for interviews with teachers) following the negotiation of agreed times with the teachers concerned. The evaluator endeavoured to be non-threatening and collegial in his approach with teachers (Finger and Russell, 1994, p.54). In reflection, all teachers and school administration teams with whom the evaluator worked provided support and constructively assisted the evaluation.

Multiple sources of evidence were used and a variety of data collection procedures were employed as outlined in Chapter Four (see Table 4.4, p.132, and Table 4.5, p.133). That approach assisted in ensuring validity through triangulation of data using those multiple sources and multiple methods. Both quantitative and qualitative data related to the evaluation headings and the evaluation questions, shown in Table 7.1 (p.243), were collected.

Questionnaires were developed to gather data related to issues identified in the review of the literature, and to address the evaluation questions. Two questionnaires were administered to the QSC students - Initial Computer Questionnaire for Students - May 1992 (Appendix E) and the Follow-up Computer Questionnaire for Students - September 1992 (Appendix F). Teachers and school level administrators were surveyed in May 1992 using the Questionnaire for Teachers and School-level Administrators (Appendix G). In addition, a questionnaire - Questionnaire for Parents of Sunrise Students (Appendix H) - was administered to parents of the QSC students in August 1992. Semi-structured interviews (Appendix I) were conducted with all of the QSC teachers during August 1992. Also, informal discussions were had with those teachers during site visits.

As well as the use of both questionnaires and interviews, data were collected from classroom observations, perusal of samples of students' work, document perusal and analysis, and meeting notes gained from attendance at QSC meetings.
A Post-Evaluation Check (Appendix J) was undertaken in November, following the presentation of draft copies of the evaluation to the teachers, school level administrators, and regional officers involved with the QSC Project. That post-evaluation check strategy was designed to enable a meta-evaluation of the report to be conducted. The framework for the post-evaluation check was derived from the guiding principles provided by the Standards for Evaluations of Educational Programs, Projects and Materials (Joint Committee on Standards for Educational Evaluation, 1981) which presented standards related to four aspects of an evaluation; i.e. utility, feasibility, propriety, and accuracy. Those principles were modified using the ideas for meta-evaluation suggested by Worthen and Sanders (1988). In addition, the post-evaluation check strategy adhered to 4GE principles as it sought responses from participants about questions relating to an appraisal of the model used for the evaluation in terms of its perceived suitability, effectiveness for identifying key components, and the contribution the evaluation made for program improvement.

### 7.5 Summary of the Major Findings, and Their Implications

A presentation and analysis of the findings of this study were reported in Chapters Five and Six. Chapter Five presented findings related to Situational Analysis and Project Management, while Chapter Six outlined findings related to the Impact of the Project. The following section presents a summary of those findings, and their implications. The findings are summarised in terms of Situational Analysis, Project Management, and Impact of the Project.

#### 7.5.1 Situational Analysis of the Project

The Situational Analysis of the Project was explored through an examination of the following questions:

- Why was it initiated?
- What is its setting and context?
- Who participates in the program?
- What is the program's history? How long is it supposed to continue?
There was found to be considerable congruence between the 'official' Queensland Department of Education's endorsed view of the goals of the QSC Project and the views held by the administrators, former Project Officer, and teachers directly involved in the QSC about why the QSC was established. They all agreed that the project was a significant 'lighthouse' technology initiative. They believed that the QSC's significance was that it was established:

* to explore the possibility of using computers as intellectual tools,
* to investigate students operating in technology-rich learning environments,
* to examine the financial implications of introducing technology in schools,
* to provide insights into professional development required by teachers,
* to develop knowledge about the implications for curriculum posed by the new and emerging technologies,
* to explore new approaches to learning,
* to encourage students to be more responsible for their own learning, and
* to explore the use of Logewriter as a central feature of the Project.

Considerable congruence was also found between the 'official' Department of Education aims for establishing the QSC and the views of the school-level administrators and teachers directly involved in the QSC at the two school sites. However, closer scrutiny and investigation of what happened revealed important differences between the QSC initial plans and what occurred in practice. Singh (1990), elsewhere, has identified the mismatch between policy and practice in relation to primary school computer education in Queensland. She warns that:

"...myths about the potential of computer technology to solve educational problems are promoted by state officials. One means of myth building is through the structure of language in state official documents" (Singh, 1990, p. 220)

The importance of the QSC Project was further highlighted by the statement by a Principal that the implications identified would provide valuable systemic information. It was also suggested that the length of the project and its use as a research site through involving two groups of children during the planned four years was also significant.
Consistent with planning intentions, most of the students (>80%) and most of the teachers had remained in the project. The students participating in the QSC Project were found to have had limited access to computers at school and at home before their QSC involvement. Moreover, only 8% of students were found to be interested in computers to a very great extent and a further 22% to a great extent before their QSC participation. Students also reported that their understanding of and skill in using computers was low before their QSC involvement. Only 8% believed that they had gained an understanding and skill in using computers to a great or very great extent. Findings were similar for boys and girls, although Year 8 girls were found to have used computers at home to a less extent than the Year 8 boys. The QSC teachers, with the exception of one of the secondary school teachers, were also reported to have had little or no background in using computers before they were involved in the QSC.

This study reported that the restructuring of the Department of Education in Queensland throughout 1991 had impinged greatly upon the management and coordination of the QSC. That restructuring had resulted in uncertainties about the QSC Project's survival. However, it was noted that, in response to the shift in responsibility for the project moving substantially from Central Office to the South Coast Region and to the two school sites, support had been provided by the South Coast Region for the QSC to continue throughout the second semester of 1991 and throughout 1992. There had also been an explicit statement that the Regional commitment was for the QSC Project to continue to its planned completion in 1993.

7.5.2 Project Management

The Project Management of the QSC was examined in relation to the following questions:

- What was intended and what happened in terms of program management?
- What are the implications for the management of further initiatives to integrate learning technology in schools in terms of personnel, resources, budget, and training and professional development?

Major findings related to those questions are summarised in the following sections.
15.2a Personnel

Since the project's conception, significant personnel changes had occurred. Whilst it was reported that the QSC Project operated throughout 1990, 1991, and 1992, and that there had been little change in the composition of the QSC students and the teachers, the project management structure and coordination underwent major changes. The restructuring of the Department of Education in Queensland resulted in many personnel changes and revised roles and structures at Central and Regional Office levels. That had a significant impact on the QSC Policy Group and the Steering Group. Some of the representatives on those groups sought newly created positions, and some chose to leave the Department of Education. By mid-1991, neither the QSC Policy Group nor the Steering Group continued to exist. Consistent with the transition process accompanying the restructuring, the management of the project was transferred to the South Coast Region. Other significant changes were that the Australian Council for Educational Research (ACER) and the University of Queensland did not continue as active project partners, and the Sunrise Central Group (SCG) did not directly liaise with the QSC. In addition, a Project Officer was not appointed in 1992. Support for the QSC became almost totally derived from within the schools involved and from the South Coast Region.

15.2b Resources

Changes were also identified in relation to resources between project intention and what happened. A decision was made through consultations between the Project Officer and the QSC teachers in November 1990 to recommend that all students in the project have their own personal laptop computer. Consequently, when the project expanded in 1991, almost 120 Year 6 and Year 7 students had a laptop computer for their own use at school and at home. That represented a significant increase in resource provisions compared with the original project intention of providing approximately 60 students in two year levels with their own personal laptop computers.
7.5.2c Budget

While that level of resourcing needed to sustain the QSC Project exceeded the original planned intention, the decision-making reflected a strategy in which the teachers were being encouraged to participate more in project decision making. Although teacher input was sought on resource acquisition during 1990 and 1991, neither the schools nor the South Coast Region had any direct control over the QSC budget. As the project proceeded in 1992, funding decisions and issues about the project direction devolved to the South Coast Region and to the schools involved. Funding uncertainties emerged in first semester 1992, and concerns were evident within the schools that even basic repairs to computers could not be funded and that the QSC might not continue. The repair costs experienced raise implications for other schools contemplating acquiring large numbers of laptop computers. Clearly, the budgetary implications of the repairs, maintenance, and upgrading of the hardware need to be considered.

7.5.2d Training and Professional Development of Teachers

The necessary training and professional development of the teachers, which Ryan (1991) observed had been largely missing in the early stages of the project, was reported to be provided throughout most of 1991. However, the QSC teachers received only several days of inservice in December 1991 before the project moved to the secondary school in 1992. The secondary school QSC teachers experienced similar problems to those observed by Ryan of the primary school teachers in early 1990. The Year 8 QSC teachers expressed criticisms about the lack of access to appropriate leadership, support, and inservice. They also suggested that there existed a lack of cohesive, effective project management and coordination.

The primary QSC teachers identified more personnel from whom they had had support than the secondary teachers. Both sets of teachers indicated that their teaching colleagues had been valuable sources for teaching ideas, strategies, and professional discussions. However, understandably the QSC teachers who had been involved in the project longer
The secondary school teachers listed a more extensive list of sources of support which included personnel from Central Office and South Coast Region, the Project Officer, Research Officers, their school administration, and tertiary lecturers. The implication here is that strategic inservice for the QSC teachers in terms of the timing and the quality of that inservice was required for teachers to enable them to be better prepared prior to their involvement in the QSC.

7.5.2e Strengths and Weaknesses of the Project Management

The perceived strengths of the QSC project management related strongly to the appointment and role played by the Project Officer, the personal and professional commitment of the QSC teachers, the initially generous budget, having an extra teacher number assigned to the project, administration with faith and confidence in the project, and the use of Logo-writer as the main tool of inquiry for the children. The perceived weaknesses were the non-replacement of the Project Officer, lack of continuity in Departmental support, inadequate teacher inservice, and uncertainties about funding and the future of the project. Uncertainties in funding were found to be linked with dislocations in the ownership of the project. Through increasingly stronger South Coast regional support, the project was maintained throughout 1992. More strategic project management emerged throughout 1992 which aimed to enable the project to continue in 1993 and be further refined.

7.5.2f Implications for the Management of Further Initiatives to Integrate Learning Technology in Schools

Important implications were identified which were able to be categorised according to the four areas - personnel, resources, budget, and training and professional development. Those four areas were found to interrelate. That is, uncertainties and problems associated with one of those planning components produced changes in other components. In particular, implications emerged which emphasised the importance of the personnel or human resources dimension of project management. Evidence emerged which suggested that the roles played by people had been substantially more influential than material resources in
determining the success or otherwise of the project. Strategic project management implications are summarised and shown in Table 7.2. Future project planning should consider personnel, resources, budget, and training and professional development issues to ensure that effective structures exist. Within those broad issues, specific project management decisions can be formulated which should involve the key project participants to facilitate and enhance their ownership and role in the development of the project’s educational rationale and its activities.

Table 7.2: Implications for Project Management of Learning Technology Initiatives

**Personnel:**
- A management structure needs to be established to coordinate, maintain, manage, and supervise the project.
- Changes in personnel need to be minimised.
- The level of repairs experienced by the QSC indicated the need for technical support.

**Resources:**
- Students should have equal access to resources.
- The acquisition of technological resources should ensure convenient access by students.
- Maintenance of the resource base requires funding provisions.

**Budget:**
- Budget provisions should be made for the acquisition, repair, and upgrading of the technological resources.
- Participants should be involved in budget planning; e.g., prioritising resource acquisitions, suggesting cost-effective resource management practices...

**Training and Professional Development:**
- Teachers need time to feel comfortable with the technology before they introduce it into the classroom.
- There is a need for high levels of initial training and support.
- Training and professional development programs need to be on-going and responsive to the needs of teachers.
- Inservice programs should aim to assist teachers to integrate learning technology to meet curriculum needs.

### 7.5.3 Impact of the Project

Findings were reported about the Impact of the Project which emerged from an investigation of the following evaluation questions:

What impact did the QSC Project have upon the teaching and learning context
In terms of classroom management and organisation?

What are the implications of the new and emerging technologies for curriculum design?

Have there been changes in students learning through the use of laptop computers and immersion in a technology-rich environment?

Were there any gender differences; e.g. did girls react differently to technology compared with boys?

How did teachers come to grips with the new technologies? What are the implications for the training and professional development of teachers?

What were the concerns and perceptions of parents?

### 7.5.3a Classroom Organisation and Management

One of the aspects of this study was to investigate possible changes to learning and teaching strategies used by students and teachers following the introduction of laptop computers. Substantial changes in classroom organisation and management, teaching approaches, and relationships with their students were reported by the QSC teachers. Teachers believed that through the project they had encouraged students to work more collaboratively with other students as well as with themselves in problem solving and assignment tasks. Students at both sites reported that teachers and their classmates had been the main sources of their learning about computers. The technological resources were accessed and used purposefully and readily by most students. Classroom observations also confirmed the willingness by students to discuss and share ideas with other students while working with their computers. Most students agreed that using laptop computers did not stop students from discussing their work.

Some contrasts between the Year 7 and the Year 8 QSC classrooms reflected differences in school organisation between the primary and the secondary school. In the primary school, the students were taught mostly in the same classroom by the same two teachers working cooperatively. The secondary school Year 8 QSC classes had 'home' rooms, but the students needed to be timetabled to move to other rooms for various lessons. They were taught by
larger number of teachers than the Year 7 students. There were some problems highlighted by some of the Year 8 QSC teachers and by the Year 8 QSC students which related to the group of students having been kept together as a group in the move from Year 7 to Year 8. Only 27% of the students agreed that it had been good for them to be kept together.

15.3b Curriculum Implications

The QSC students and teachers were found to have used Logowriter as the main software in which computers were used predominantly as intellectual tools. More than half of the Year 7 QSC students (51%) reported that they used their computers mostly in English Language Arts, and a further 42% of them used them mostly in Social Studies. The subject in which the Year 8 QSC students used their computers the most was Humanities. An investigation of curriculum applications for which students used their computers at school revealed that the Year 7 QSC students used their computers in almost all of their primary curriculum areas, while the Year 8 QSC students used them in Humanities, Science, and Mathematics. The total number of computer applications listed by the Year 8 QSC students (424) was less than half of the number listed by Year 7 QSC students (871) which reflected their use of their computers in a more limited range of subject areas in the secondary school. The Year 7 QSC girls listed more computer applications at school and in their own time than any other group. An implication emerging from those findings is that the use of computers is more likely to be integrated across a broader range of curriculum areas by both boys and girls in primary school than in secondary school where computers had been mostly used in the Humanities. This is possibly due to the prevailing secondary school subject compartmentalization. Therefore, the implication for the secondary curriculum is to explore further the cross-curricular approach being employed in the Humanities area whereby the traditional subject areas of English, History, and Geography are integrated.

The QSC teachers indicated the general feeling that implications for curriculum design had emerged from their use of the technological resources. However, they suggested that adequate documentation of those implications had not occurred. It was noted that a
A curriculum writer had been appointed in 1992 and that would represent a significant means of addressing the concern that there needed to have been the production of tangible curriculum documents derived from the QSC experience. The suggested implications which the new and emerging technologies had for curriculum design were that curriculum goals required redefining, they provided a catalyst for exploring non-disciplinary approaches to curriculum in secondary schools, and they prompted schools to revise their assessment and reporting procedures to appropriately reflect changes resulting from technology use.

7.5.3c Changes in Student Learning

7.5.3c.1 Interest in Computers

Significant changes in interest were reported to have occurred in the extent to which students were more interested in computers now than when compared with their interest before their involvement in the QSC for Year 7 boys, Year 7 girls, and Year 8 boys. However, there was no significant increase in computer interest for the Year 8 girls. Indeed, only 4% of the Year 8 girls indicated that they were interested in computers to a great or very great extent. The findings relating to the Year 8 girls in terms of their decreasing interest in computers, and the findings reported in the following sections about the Year 8 girls raise important implications for schools to examine and address issues relating to girls and computers. In particular, the notion that improving access to computers will ensure increases in participation and improved outcomes for girls in terms of their computer use, interest and confidence in using computers.

7.5.3c.2 Perceptions About QSC Involvement

Negative perceptions about the QSC Project were reported to be have been expressed by the Year 8 girls. Surprisingly, only 32% of them agreed that they were pleased that they had been involved in the project, and only 32% of them agreed that having had their own personal computer had been beneficial for their progress at school. Apart from the Year 8
The level of agreement with the statement that using computers is fun increased for girls the longer they had been in the project. The implication arising from these findings is that for girls, in particular, ongoing monitoring and accompanying strategic intervention strategies need to be implemented to ensure that they enjoy using computers.

7.5.3c.3 Confidence in Using Computers

Year 7 students portrayed very high levels of confidence in using computers. In contrast, despite having been involved in the project for one year longer than the Year 7 students, only 43% of Year 8 students (81% of boys; 36% of girls) felt confident. A significant relationship was found to exist between Year level and confidence and a significant relationship was evident between gender and confidence among the Year 8 students with fewer Year 8 girls than Year 8 boys being confident in using computers. These findings suggest disturbing implications in relation to the Year 8 girls as the longer they had been involved in the QSC, they became less interested in computers and less confident in using them. Further examination is necessary to enable understandings to be gained about why these changes occurred to be able to provide advice to schools to address that disturbing finding.

7.5.3c.4 Students’ Perceptions of Learning Using Computers

No significant differences were found between Year 7 boys and girls in their responses to various statements about learning using computers. However, gender differences were identified between Year 8 boys and girls with the Year 8 boys expressing significantly more positive perceptions toward all of the following statements:

* Computers are as important to students as textbooks,
* Learning to work with computers is just as important as reading, mathematics and spelling,
* Using computers makes learning more difficult,
* The computer makes mathematics learning easier,
* The computer would never be the cause of a student doing better in schoolwork, and
* Once I start working on the computer, I find it hard to stop.

Significant relationships were reported to exist between Year 7 and Year 8 students in re-
In response to the following statements with Year 7 students more positive than the Year 8 students towards all of them:

- I use the computer in many subject areas,
- Using computers makes learning more difficult,
- The computer makes mathematics learning easier, and
- Once I start working on the computer, I find it hard to stop.

Clearly, as the Year 7 students, when compared with the Year 8 students, were found to use their computers in more subject areas and were more positive in their attitudes towards computers, an important implication for teachers and administrators concerned with the primary-secondary transition and interface is how to better understand and consequently manage those changes.

1.5.3c.5 Teachers' Perceptions of Changes in Student Learning

Teachers, while indicating that not all students had achieved improved outcomes, believed that most students had been encouraged to take on more responsibility for their learning, students had become empowered, and were more prepared to solve problems, take on challenges, and take risks. The teachers also suggested that students had developed more effective research skills through their QSC involvement. At the classroom level, this provides encouragement for using computers to facilitate more effective learning and teaching.

1.5.3c.6 Parents' Perceptions of Changes in Student Learning

Positive changes cited by parents related to students enthusiastically and conscientiously doing their homework, project work, assignments, and research. Parents were pleased with the touch typing and keyboarding skills that the students had acquired. Furthermore, some parents indicated that students were more willing to edit their written work, and to present their published work more professionally. The most frequently stated negative changes reported by parents were that the students' handwriting skills had deteriorated.
15.4 Advantages and Disadvantages of QSC Involvement

15.4a Advantages

Teachers indicated that, in addition to the advantage afforded students through the access and provision of technological resources, students had been advantaged through their development of skills which enabled them to undertake learning tasks more effectively. For example, they believed that students had become more confident in using computers, took more responsibility for their own learning, developed improved communication skills, negotiation skills, and had learned to work cooperatively. Parents were reported to perceive that their children had been advantaged through their increased knowledge of computers, the development of computer skills and use of the technological resources, the development of computer literacy, and improved confidence and self-esteem. Parents also conveyed optimism for their childrens' futures as they felt that they had been given an early insight into using computers.

The implication for schools is that parents perceived that the provision of computers for their children was desirable for the various reasons summarised above. Thus, parents seem to form perceptions of a school's image and worth upon its provision of technological resources for student use.

15.4b Disadvantages

Some of the teachers, when asked about the disadvantages, cautioned that the QSC Project might be blamed for effects (e.g. student outcomes, student behaviour) that would have occurred anyway. They highlighted some of the added demands placed upon them as the QSC inevitably became the focus for critical observation. Other disadvantages identified by teachers related to project management concerns which had impacted upon the teachers' classroom operation. In particular, the secondary school QSC teachers identified problems that had emerged among some of the Year 8 students that resulted from the students being kept together in the move from Year 7 to Year 8. There were problems
Identified by the teachers in terms of tensions between the secondary school curriculum and school organisation and the QSC philosophy, a lack of research information made available to them, and that the technological resources had become outdated.

More than half of the parents who responded to the questionnaire for parents stated that there were no disadvantages at all. Parents who reported disadvantages referred to concerns about students’ handwriting, raised questions about what might happen to the students when the project ended, and mathematics. Some parents of the Year 8 students also expressed concerns related to the students being kept together in the move from the primary school to the secondary school.

15.5 Gender Differences

In this study, no significant gender differences were found between the Year 7 boys and girls in their use of, interest in, and attitudes towards using computers. However, gender differences were identified between the Year 8 students. In particular, while the interest in computers of the Year 8 boys and the Year 7 students were found to increase the longer they had been involved in the QSC Project, no significant positive increase in interest was reported for the Year 8 girls. It was suggested that, while the QSC classes were composed of similar numbers of girls and boys, and both the boys and the girls had the use of their own personal computer, a more sophisticated notion of equal access needed to be employed in which both boys and girls were equally participative in a range of curriculum applications both at school and at home. For example, 67% of the Year 8 girls disliked programming the most, while 81% of Year 7 boys, 75% of the Year 8 boys, and 42% of the Year 7 girls liked programming the most. As the use of Logowriter had been a central feature of the QSC, the findings suggested that the Year 8 girls, in particular, experienced problems in interest and participation in class activities related to the emphasis on programming.

Teachers also raised concerns related to their observations that some of the Year 8 girls had developed negative attitudes toward using computers. In contrast, the Year 7 girls had very
high levels of interest and very positive attitudes towards using computers. It was suggested that while other studies (e.g. Hattie and Fitzgerald, 1988; Rowe, 1992) indicated that gender differences occur over time, the findings reported in this study indicated that both the Year 7 boys and girls had become more positive in their use of computers the longer that they had been involved in the QSC Project.

The findings reported in this thesis, together with Rowe's (1992) findings, suggest that merely providing all students with access to the technological resources was not enough to address gender differences related to technology use. The question about how gender differences might be addressed needs to be asked and more inclusive policies and practices need to be developed and implemented in schools in response to that question.

Further careful investigations are required to examine the direct and indirect influences upon student attitude toward and use of technological resources. Subsequently, it is imperative to challenge any stereotypical attitudes of teachers, students, and parents through raising their consciousness about delimiting the expectations for males and females in relation to technology use.

7.5.6 Technical and Professional Support for Teachers

Almost all of the QSC teachers were found to have had little or no training and professional development in the use of technological resources before their involvement in the QSC. Teachers were found to have come to grips with the demands and challenges posed by the technological resources through a range of strategies including attendance at conferences, participation in workshops, the development of informal collegial networks with other teachers, tertiary lecturers, and consultants, and undertaking formal tertiary studies in educational computing. Those activities involved teachers in both in-school and out-of-school time. In particular, it was found that many of those activities had involved them in many hours of their personal time (e.g. holidays, evenings, weekends). Implications for training and professional development of teachers emerged from the investigation of
Project Management (see Table 7.2, p.254) and the Impact of the Project. Those implications are presented in Table 7.3.

Table 7.3: Implications for the Training and Professional Development of Teachers

* There is a need for pre-service teacher education courses to include courses in educational computing.
* The training and professional development of teachers in educational computing is essential for ensuring that technology is effectively integrated into classroom activities.
* Teachers require training in the use of technological resources before they use them in classrooms to develop and enhance teacher competencies and confidence in using computers.
* Teachers require high levels of personal access to computers.
* Professional development activities need to be ongoing and responsive to the needs of teachers. A variety of strategies were suggested which the QSC teachers had found to be effective; e.g. workshop participation, formal tertiary education courses in educational computing which related closely to their teaching, and the development of informal collegial networks.
* Access to technical support which is both time and cost efficient needs to be provided.

1.5.7 The Concerns and Perceptions of Parents

Almost all parents of the children in the study sample believed that children should learn about computers at school. In particular, they believed that learning about computers would develop skills and knowledge which would prepare students for jobs, prepare them for a future technological society which they saw as inevitable. Many parents were also reported to believe that it would assist their children to cope now as they saw computers as already being an integral part of everyday life. The overwhelming issue for parents was the relationship which they believed existed between learning about computers at school and the workforce. They also made statements which reflected a view of a determined technological future for society which demanded that schools should teach students about computers. Parent interest in computers had increased during the time their children had been in the QSC. It was suggested that increased interest might have related to the students
taking their computers home and sharing their work with their parents.

In the following section of this final chapter, the responses collated from participants resulting from the conduct of a meta-evaluation of the evaluation are presented.

1.6 Meta-evaluation

Consistent with the program evaluation timeline (see Table 4.5, p.135), a meta-evaluation was conducted through a process whereby the key Department of Education officials involved in the QSC at a regional level, and the administration and teachers involved in the project at the two schools were invited to a presentation of draft copies of the evaluation report. Personnel who were unable to be present were either mailed copies or presented with copies the following day. Following a summary by the evaluator at South Coast Regional Office on 23 November 1992, those participants were requested to complete a post-evaluation check strategy (see Appendix J). They were given a week in which to peruse the draft evaluation report and indicate their levels of agreement with statements relating to the utility, feasibility, propriety, and accuracy of the report. Moreover, they were asked to indicate their perceptions to assist in appraising the model developed and used to guide the evaluation. The statements were formulated through adapting the Standards for Evaluations of Educational Programs (Joint Committee on Standards for Educational Evaluation, 1981). That provided a tangible instrument for addressing Guba and Lincoln's (1989, p.228) claim that:

"If we accept the definition of disciplined inquiry as set forth by Cronbach and Suppes (1969), it seems clear that standards for judging the quality of such inquiry are essential."

Moreover, Guba and Lincoln (1989, p.230) in discussing criteria for judging the adequacy of 4GE indicate that the Joint Committee "did not intend to devise criteria that would in any way inhibit the growth of evaluation as a field of professional undertaking". As Finger and Russell (1994, p. 52) suggest:

"...using elements from those standards as a basis for undertaking a meta-evaluation does not compromise the integrity of the 4GE model."

The purposes of that post-evaluation check strategy were to enable a meta-evaluation to be
conducted and to enhance the validation of the evaluation through gaining the participants' perceptions of the evaluation. Out of a total of nineteen copies distributed, fifteen post-evaluation check responses were obtained. Responses for each of the criteria are discussed in turn.

16.1 Utility

In this thesis, the concept of utility was important as the model formulated to guide the evaluation aimed to increase the likelihood of implementation of the recommendations developed from the findings. As Thorne (1990, p.70) has cautioned:

"To know that evaluations are not generally used places an extra burden of responsibility on the shoulders of the evaluator. A more dynamic evaluation should result if the evaluator so designs the evaluation framework as to increase the likelihood of implementation."

The model guiding this evaluation included a utilisation strategy and the 4GE methodology employed increased stakeholder "intimacy" (Norris, 1990, p. 141) through the evaluator getting closer to the stakeholders through continuing negotiations. Five statements relating to the utility of the evaluation were formulated. Those statements sought feedback about information scope and sequence, report clarity, report dissemination, report timelines, and evaluation impact. As shown in the following displays (Figures 7.2, 7.3, 7.4, 7.5, and 7.6), the respondents showed strong agreement to all of those five statements.

![Information Scope and Sequence](image)

**Figure 7.2: Information Scope and Sequence**

Statement: The information collected was of such scope and selected in such ways that the evaluation questions about the QSC were addressed.
Figure 7.3: Report Clarity
Statement: *The evaluation described the QSC and its context, the purposes, procedures, and findings of the evaluation, so that the audiences will readily understand what was done, why it was done, what information was obtained, what conclusions were drawn, and what recommendations were made.*

Figure 7.4: Report Dissemination
Statement: *Evaluation findings were effectively disseminated to participants through presentation of the evaluation report.*

Figure 7.5: Report Timelines
Statement: *The release of the report was timely, so that audiences can best use the reported information.*
Figure 7.6: Evaluation Impact

Statement: The evaluation was conducted in ways that encourage follow-through of the findings and recommendations.

According to the respondents, the information collected had adequately addressed the evaluation questions, and the evaluation had clearly described the QSC and its context, the purposes, procedures, and the findings of the evaluation. The respondents themselves had played an active role in identifying the evaluation questions and their continued involvement in the evaluation process might have positively impacted upon their perceptions of the adequacy of the evaluation.

Suggestions were made by some of the respondents that while the evaluation report had been effectively disseminated to the relevant Senior South Coast Region personnel, and to the administration and teachers directly involved in the QSC, there were suggestions for wider dissemination; e.g.

"...sufficient funds need to be available so that relevant sections of the report - e.g. recommendations - can be considered and acted upon by the wider educational community". (Deputy Principal, November, 1992).

The adherence to the timelines was well received and comments were made relating to the usefulness of the evaluation for planning for the final year of the QSC in 1993. One of the teachers wrote:

"A very thorough presentation. It is greatly appreciated that it is available before 1993. It is going to be useful in preparing for the '93 Grade 8's..." (Year 8 QSC Teacher, November, 1992)
Several respondents expressed admiration and acknowledgement of the comprehensiveness and quality of the evaluation report which was completed within the planned time:

"...I am really impressed with what I have read. Well done Glenn - to have achieved such a high standard of work in such a short time." (Year 7 QSC Teacher, November, 1992)

"Excellence requires no comment." (Former Project Officer, November, 1992)

One of the teachers indicated that she believed that an evaluation report such as this would have been useful, had it been possible, to have been available for the QSC teachers before the project commenced in 1990:

"It is a pity that a document like this, i.e. one which provides an excellent insight into using technology in schools, was not available when the QSP was initially started. If there was, we would have all had a better understanding and clearer picture of where we were heading." (QSC Teacher, November, 1992)

In relation to the impact of the evaluation, however, one of the teachers realistically stated "Unfortunately no evaluation guarantees follow through". Thus, while evaluations, effectively undertaken, can lead to improvements in educational policy, programs, and practices, improvements at the classroom and school levels can only be effected by those involved with the implementation of the particular project. Follow-through of the QSC recommendations arising from the evaluation and reflections on the study and further developments are discussed later in this chapter (see pp.279-281).

7.6.2 Feasibility

As Dunn (1992, p.34.6) indicates, The Joint Committee on Standards for Educational Evaluation (1981) highlighted the importance of considering the feasibility of evaluations and thus ensure "at the planning stage that intended procedures are indeed practicable" and for the evaluation to be cost-effective. Feasibility was examined through two statements which focused on practical procedures and the cost-effectiveness of the evaluation. As shown on the following page, respondents agreed that the evaluation procedures were practical and disruptions had been kept to a minimum. Moreover, they believed that the evaluation had
Produced information of sufficient value to justify the resources expended.

![Figure 7.7: Practical Procedures](image1)

Statement: *The evaluation procedures were practical, so that disruptions were kept to a minimum.*

![Figure 7.8: Cost-Effectiveness](image2)

Statement: *The evaluation has produced information of sufficient value to justify the resources expended.*

The researcher had been awarded a Research Scholarship by the Department of Education in Queensland during 1992 to enable an intensive, full time evaluation to be conducted. In obtaining that scholarship, two major criteria were met. Firstly, the evaluation addressed a very high departmental priority and, secondly, that the study could not be met by less costly means.

**7.6.3 Propriety**

Propriety was defined as relating to the frank and full disclosure of findings, the rights of
human subjects and balanced reporting were presented. As shown graphically below and
in the following page in Figures 7.9, 7.10, and 7.11, none of the respondents disagreed with
any of those three statements. It was inappropriate to attempt to use fictitious names for
the two schools as it was public knowledge that they were the sites for the QSC. It was also
inappropriate to call the QSC Project by any other name. However, it was possible to
ensure the confidentiality of the personnel involved in the evaluation (e.g. in interviews,
questionnaires, etc) through the non-disclosure of names in reference to statements.

**Figure 7.9: Frank and Full Disclosure**

Statement: *The written evaluation report is open, direct, and honest in the disclosure of pertinent findings, including the limitations of the evaluation.*

**Figure 7.10: Rights of Human Subjects**

Statement: *The evaluation was designed and conducted so that the rights and welfare of the human subjects were respected and protected.*
Figure 7.11: Balanced Reporting

Statement: *The evaluation is complete and fair in its presentation of strengths and weaknesses of the QSC so that strengths can be built upon and weaknesses addressed.*

1.6.4 Accuracy

The accuracy of the evaluation was examined in terms of the QSC’s main features had been clearly identified, the purposes and procedures of the evaluation were monitored and described in enough detail, and the adequacy of the information could be assessed through the description of the sources of information presented. As shown in Figures 7.12, 7.13, and 7.14 on the following page, respondents agreed with statements in the meta-evaluation relating to the accuracy of the evaluation report. Those responses by the QSC stakeholders provide further evidence, in addition to the steps taken to ensure validity and reliability through using multiple sources of data collection (see Tables 4.4, p.132 and 4.5, p.133), of the evaluation being reliable and valid. There were no responses which questioned the accuracy of the report. However, typing errors were identified by respondents during the post-evaluation check process, and subsequently those draft evaluation report copy errors were amended.
Figure 7.12: Object Identification
Statement: The QSC was sufficiently examined so that its main features were clearly identified.

Figure 7.13: Described Purposes and Procedures
Statement: The purposes and procedures of the evaluation were monitored and described in enough detail so that they could be identified and assessed.

Figure 7.14: Defensible Information Sources
Statement: The sources of information were described in enough detail so that the adequacy of the information could be assessed.
1.6.5 Appraisal of the Model for the Program Evaluation

As outlined in Chapter Three, a model was developed to guide the QSC evaluation (see Figure 3.11, p.110). It was noted that a search of the literature had been unfruitful in locating a suitable model drawn from the evaluation literature which had been used elsewhere for evaluating learning technology initiatives in schools. Subsequently, it was argued that the model developed for this evaluation might provide a basis for other evaluations of learning technology initiatives. Hence, an integral component of the approach was an appraisal of the model itself. Three evaluation questions were formulated for that appraisal; viz.

Was the model used suitable for evaluation of the Queensland Sunrise Project?
How effective was the model for identifying the key components of the Queensland Sunrise Project?
What contribution does the program evaluation make for program improvement?

Those evaluation questions were reframed to become statements which the participants were requested to indicate their levels of agreement with. The responses, presented in Figures 7.15 and 7.16, firmly reflected a belief by the participants that the model had been suitable for evaluating the QSC, and had been effective in identifying its key components. The model used was able to highlight the need for describing the project rationale, intended resources, processes, and results, and therefore satisfied Owen's (1992) criteria provided in his evaluation Forms. That description provided the basis for identifying issues and implications which emerged from that analysis of what happened.

![Figure 7.15: Suitability of the Model for Evaluation of the QSC](image)

Statement: The model used was suitable for the evaluation of the QSC Project.
Figure 7.16: Effectiveness of the Model

Statement: The model was effective in identifying the key components of the QSC Project.

A major aspect of the evaluation was to enhance the likelihood that the evaluation would assist program improvement. Specifically, the challenge existed for the evaluation to have utility through the findings, implications, and recommendations contributing to program improvement. There were concerns noted by the researcher when reviewing other evaluation studies about the perceived usefulness of reports. For example, Worthen and Sanders (1988, pp. 152-155) warned that some evaluations had not even reached closure. The researcher was aware of additional concerns that some reports had not been made available to the key participants within some projects evaluated, and some reports did not contribute to program improvement. Indeed, the theme of the 1992 Australasian Evaluation Conference focused on Evaluation: Making It Work due to the often limited utilization of many evaluations. At that conference, Rogers (1992, p. 85.1) drew attention to Patton’s (1986) ‘utilization-focused evaluation approach’ which was developed in response to widespread concern about the non-utilisation of evaluation.

Indications from the participants, as displayed in Figure 7.17, strongly suggested that they believed that the QSC evaluation could contribute to program improvement. Together with the strong agreement expressed in relation to the five statements about utility (see Figures 7.2, 7.3, 7.4, 7.5, and 7.6), participants indicated that the model used, the information scope and sequence, report clarity, dissemination, timelines, and impact of the evaluation could contribute to program improvement.
Figure 7.17: Contribution of the QSC Program Evaluation for Program Improvement

Statement: The program evaluation of the QSC can contribute to program improvement.

As a result of this review, the meta-evaluation feedback suggested that the model developed to guide the evaluation was suitable, effective, and could contribute to program improvement. Given the reported unfruitful search for suitable models drawn from the evaluation literature for evaluating technology initiatives elsewhere (see Chapter Three, pp. 101-103), the model provides an important contribution by enabling future evaluations to use the model as a framework for guiding those evaluations.

7.7 Recommendations

Recommendations derived from the findings and their implications reported in this thesis are presented in terms of specific recommendations for the QSC Project. Following the presentation of those QSC Project recommendations (see Section 7.7.1 below) to the Department of Education in Queensland in November 1992 (Finger, 1992), this thesis provides additional information about further developments and outcomes resulting from those recommendations (see pp. 279-281). Subsequently, systemic recommendations for managing and supporting learning technology initiatives in schools are then provided.

7.7.1 Recommendations for the QSC Project

The following eight specific recommendations which relate to the QSC Project were
derived from the findings and their implications reported in this study. Those recommendations were reported to stakeholders and the Director-General of Education of the Department of Education in Queensland in December 1992.

Recommendation 1. The QSC Project should continue to its officially planned completion in 1993.

The findings of the evaluation related to program management strongly suggested that the QSC Project should be managed to enable the goals outlined in the establishment of the QSC to be achieved (refer to Chapter One, p.14). However, whilst that final year of operation would involve only the second wave of students who would move from Year 7 (1992) to Year 8 in 1993, problems reported by students, the secondary school teachers, and some parents which related to the students being kept together in the transition from Year 7 to Year 8 need to be addressed.

Recommendation 2. Leadership and management of the QSC Project requires the identification of personnel to supervise, manage, and coordinate the project in 1993.

That support and leadership should be identified through processes consistent with the revised structures within the South Coast Region and the clarification of the business of schools. For example, in the report, FOCUS ON SCHOOLS The future organisation of educational services for students. (Department of Education, Queensland,1990d) the role of schools related to the key result areas of leadership and management, studies, human resources, and resources and administration while the key result areas of school support centres were identified as curriculum development, professional development, networking, materials production, and school/classroom support. Clearly, challenges exist for both the secondary school, the School Support Centre, and the South Coast Region to examine tangible ways in which the revised structures can appropriately manage and support the QSC Project in 1993. In particular, ownership of the project requires clarification - that is, who owns the project?

Recommendation 3. Funding concerns need to be addressed.
Uncertainties about funding during the first half of 1992 impacted upon the morale of the teachers and created uncertainties about the future of the project. By late November 1992, funding had been approved to enable the QSC Project to continue in 1993.

Recommendation 4. Curriculum implications derived from the QSC Project require documentation.

Whilst the project was established as a major curriculum investigation, little tangible curriculum documentation had resulted. That commenced being addressed by the appointment of a curriculum writer during 1992. This evaluation highlighted the potential of the QSC Project for identifying the implications of the new and emerging technologies for curriculum design. However, documentation is required to enable the clarification of those implications to facilitate dissemination within the wider educational community.

Recommendation 5. Appropriate training and professional development should be provided for the secondary teachers who will be involved in the QSC Project in 1993.

The teachers who were to be involved in the QSC in 1993 should be provided with adequate initial training in the use of the technological resources before they commence working with the students. The teachers should also gain insights into the knowledge and the skills which the students already have acquired in the primary school. Therefore, it was suggested that those teachers were provided with opportunities to visit the primary school QSC site before the end of 1992. Moreover, on-going professional development activities were required to ensure that the teachers became fully aware of the project's philosophy, rationale, and goals.

Recommendation 6. Further research is recommended.

Further research and evaluation studies of the QSC was recommended for 1993 when the second wave of students would be in Year 8 in the final year of the project. This evaluation
highlighted some positive and negative findings about that group of students in relation to their use of technology. Subsequent research recommendations include further investigation of gender differences in the use of technology, curriculum implications for the secondary school, and exploration of the needs of students as they move from the primary school to the secondary school (i.e. the Year 7 - Year 8 interface). Other projects being initiated (e.g. Eagleby Computer Project) as well as those which have been operating for some time (e.g. The Primary Teacher Computer Competency Program, The Technology for Language Project at Biggera Waters State School) in the South Coast Region could provide useful research information for dissemination regionally and systemically. Perhaps, it might be worthwhile establishing links between those projects to develop curriculum, research, and professional networks among the sites of the 'lighthouse' initiatives within the South Coast Region. Further suggestions for research are discussed later in this chapter.

Recommendation 7. The evaluation report of the QSC should be effectively disseminated.

It was recommended that copies of the early evaluation report Integrating Learning Technology in Queensland State Schools: A Program Evaluation of the Queensland Sunrise Centre (Finger, 1992) and this thesis upon its completion is presented to Senior Officers of the Department of Education, Queensland. In addition, it was recommended that sufficient copies be printed to facilitate dissemination to Senior Officers of the South Coast Region and to members of the South Coast Technology Education Reference Group, the Principals and members of the administration teams at both Coombabah State School and Coombabah State High School, the teachers who have been directly involved in the QSC and the former Project Officer. It was suggested that a copy be made available for the perusal of parents of the QSC students.

Furthermore, in recognition of the interest, support, and assistance of the Faculty of Education and the Arts at Griffith University Gold Coast, copies should be presented to the Dean of that division. Additional dissemination can be made at the discretion of Senior Officers of the South Coast Region; e.g. dissemination of findings and their implications through the State Studies Forum of the Department of Education, Queensland.
Recommendation 8. There should be debriefing sessions held for the teachers, students, and the parents of students who concluded their involvement in the QSC Project at the end of 1992.

Planning needs to be undertaken to ensure that the teachers, students, and parents who had been associated with the QSC and whose participation ended in 1992 should be appropriately debriefed. Appreciation of their involvement should be extended to them.

17.2 Reflections on the Study and Further Developments

Reflections on the study are discussed in relation to further developments which have occurred subsequent to the presentation of the recommendations outlined in the preceding section and contained in the evaluation report (Finger, 1992). Following that discussion, recommendations and implications for managing and supporting technology initiatives at the systems level are presented.

Consistent with the requirements of the research scholarship contract, the researcher presented copies of the earlier completed evaluation report titled Integrating Learning Technology in Queensland State Schools: A Program Evaluation of the Queensland Sunrise Centre (Finger, 1992) to Professor Roger Scott, Director-General of Education, Department of Education, Queensland in December 1992 (see Correspondence A). That evaluation report was subsequently referred to Brian Rout, A/Director, Studies Directorate who responded very positively to the utility of the evaluation (see Correspondence B):

"The department would like to congratulate you on your efforts in producing the report. The findings from this study will provide valuable knowledge for curriculum writers, school personnel and others. It is likely that many of the findings will inform the present revision of the Department's policy on use of computers in schools." (B. Rout, 16 Feb., 1993)

A draft of that revised policy called Guidelines for the use of Computers in Learning (Department of Education, Queensland, 1994a) has been published and, following further refinement, has resulted in the publication of a new Computers in Learning POLICY (Department of Education, Queensland, 1995a) and Guidelines for the use of computers in learning (Department of Education, Queensland, 1995b).
The process whereby a copy was required to be forwarded to the Director-General of Education was very effective in ensuring that it was read and disseminated. There was a very short time lapse between the report being received by the Director-General of Education (December 1992) and the very positive reply and feedback from Brian Rout (February 1993). Furthermore, it was indicated in that letter (Correspondence B) that copies of the evaluation report would be distributed to all regions in Queensland through Assistant Executive Directors (Studies) and other key learning technology personnel for their information and comment. In addition to the evaluation report assisting in the formulation and revision of policy, the findings and recommendations were influential in the formulation and development of the Computers in Schools Project in Queensland State Schools. That project aims "to ensure that by 1997 all students in Years 6-12 have access to computer resources to support and enhance their learning experiences" (Salmon, 1993, p.3). Thus, the evaluation was utilised at the systems level in terms of both the revision of policy and the development, implementation, and the launch of a major technological project.

At the Regional level, the Executive Director of South Coast Region read and responded to the evaluation report (see Correspondence C). In addition, other Senior Officers and personnel responsible for learning technology responded positively to the recommendations made. School-based administration and teachers directly involved in the QSC also were very supportive of the findings and recommendations. Indeed, all of the specific recommendations relating to the QSC have been addressed and implemented. The QSC Project continued to its planned completion in 1993 and that was largely successfully continued due to the increased ownership of the project by personnel at the secondary school and through the funding of $50 000 by the Department of Education, Queensland through their Support, Policy and Special Projects Funding. Those funds were allocated to "...support the fourth and final year of the Sunrise Project at Coombabah State High School. Research reports and curriculum documents produced as part of this project...have system wide implications..." (Salmon, 1993, p.5)

The recommendation which suggested that the curriculum implications derived from the QSC Project should be tangibly documented was also effectively undertaken. An educational adviser, Bev Pacey, was assigned the task of compiling that curriculum document.
The resulting document, *A Window or Peephole Into the Future* (Pacey, 1994), has been published and the South Coast Region distributed copies to all schools in that region.

The evaluation report (Finger, 1992), as indicated earlier, was disseminated to various significant personnel throughout Central Office and throughout the regions. In addition, the researcher, in conjunction with the former QSC Project Officer, have provided summaries of the evaluation at various Conferences (viz. *Sharing the Vision*, 11th Annual Australian Computers in Education Conference, Sydney, 1993; and *Creating Futures*, Queensland Society for Information Technology in Education State Conference, 1993) and through journal articles (Finger and Grimmett, 1993a, pp. 85-92; Finger and Grimmett, 1993b, pp. 78-91; Finger and Russell, 1994, pp. 43 - 54).

At the school level, administrators, teachers, parents and students involved in the QSC were included at various stages of the evaluation. Report findings and recommendations were shared with them. The final recommendation of the report which recommended that debriefing sessions should be held for the teachers, students, and the parents of students who concluded their involvement in the QSC Project at the end of 1992 was followed up by the Principal of the primary school and counselling and debriefing sessions were conducted by the Assistant Coordinator (Social Justice) of the Gold Coast North School Support Centre.

### 7.7.3 Recommendations and Implications for Managing and Supporting Technology Initiatives at the Systems Level

The following general recommendations and implications formulated and presented in this section were also derived from the findings which emerged from this evaluation study. New and emerging technologies such as computers, printers, telecommunications, CD-Roms and multimedia are being introduced by educators into the teaching learning and school administrative environments. However, from the findings of this evaluation, there is clearly more to introducing these technologies than simply purchasing the hardware and the supporting software. The following seven general recommendations and implications
are proposed to assist those involved in preparing, planning, implementing, and evaluating technology initiatives in Queensland State Schools.

**Recommendation 1. Develop an educational rationale for the use of the new technology.**

The first step in planning for the introduction of new technology in schools has little to do with the equipment at all. Evidence presented in this thesis revealed that stakeholders need to be made familiar with the educational goals associated with introducing new technology. For example, the intention was for the QSC Project to explore the use of computers as *personal intellectual tools* and to integrate the technology into classrooms as "delivery systems for teaching and learning in various curriculum areas" through using computers as *amplifiers* (Grimmett, 1991, p.3). Before considering the purchase of hardware and software, time needs to be spent in thinking about what the technology will be required to do, what software will assist in meeting those objectives, and what hardware will best run the software. That is, hardware and software should be purchased after having identified the educational purpose of the technology. The following ideas are proposed to assist in developing an educational rationale:

(a) Do an audit and examine what technologies are being used in the relevant area and why they are being used; viz.

What skills do staff currently possess? What staff development opportunities are available? Who is responsible for the school's overall technology use?

(b) Verify the audit findings with the users.

(c) Formulate a plan which specifies how the new technology will facilitate more effective learning and teaching.

(d) Establish a reasonable timeframe for implementation.

**Recommendation 2. Build ownership of the initiative with the key participants.**

Any new initiative must be owned and reflected in the beliefs and actions of the participants if it is to lead to altered professional behaviours. Through the employment of 4GE prin-
People throughout the evaluation, ownership of the project was enhanced. The role played by the Project Officer was reported as being perceived as a strength of the project management by the QSC teachers and school-based administration (refer to Chapter Five, pp. 173 - 174). The roles played by the Project Officer and the researcher in his role as evaluator involved sharing information and negotiating with the QSC teachers and administration teams at the QSC schools.

Without involvement and commitment, successful implementation will be difficult. Strategies should be developed for involving school administrators, teachers, parents and students in a participative, collaborative decision making process. Suggested strategies to consider include task forces, committees, regular communication, mentoring and awareness sessions.

Recommendation 3. Examine fully all budgetary considerations.

Budgetary implications emerged as being significant planning considerations (refer to Chapter Five, pp. 164-165). Based upon the QSC experience, funding for technology initiatives was found to extend beyond the initial purchase costs of hardware. Other considerations are maintenance, replacement and upgrading costs, as well as the costs of software, consumables, and staff training and professional development costs.

Recommendation 4. Develop a strategy for staff training and professional development.

Training and professional development emerged in this study as separate requirements to be met when introducing a new learning technology initiative. Training makes staff competent users of the technology, and professional development allows them to successfully incorporate the technology into the classroom experience. Thus, users need time to become familiar with the use of the new technological tools, such as copying files, adding graphics, crashing disks, losing files, and operating printers. Teachers then need time to effectively integrate the new technology into the teaching and learning environment.
Recommendation 5. Guarantee access to technical, curriculum and professional support.

Teachers were found to require access to a range of support services which enable them to integrate the technology into the classroom learning environment. Without such support, the technology can become little more than another imposition on staff, rather than a catalyst for improving the learning and teaching process. A variety of opportunities such as networking, journals, consultants, professional associations and assistance from technology suppliers themselves can be explored, accessed and implemented.

Recommendation 6. Evaluate the initiative.

An evaluative process must accompany any new initiative in order to enhance further program decisions. This evaluation study using a 4CE approach provided a model formulated from the evaluation literature which might be adapted or modified further to assist in undertaking such an evaluation.

Recommendation 7. Appreciate the value of people.

It is important to remember that a successful initiative depends on more than the mere injection of new technological equipment and materials into a school. It was evident in this study that the commitment, dedication, enthusiasm, skills and knowledge of teachers, students and others involved are vitally important.

7.8 Review of the Evaluation

7.8.1 Developing the Evaluation Design With Stakeholders

A considerable amount of time was given to this activity. All stakeholders in the evaluation were keen to talk about the appropriateness of the evaluation design. In this case, organising meetings of key stakeholders was not difficult as the evaluation coordinator was on
ic staff of one of the schools involved and key stakeholders outside the school agreed to attend meetings held at the school sites. The evaluation coordinator who was the Deputy Principal of the primary school was released from his normal duties for five months to conduct the evaluation. Thus, the planning and implementation of the evaluation using a 4GE approach was very time consuming and required intensive efforts in terms of meeting and negotiating with the various key stakeholders. Without the time release, the evaluation might not have been completed.

Those observations give credence to the concerns expressed by some writers (Caulley, 1990, p. 62; Fishman, 1992, p. 267) that the time needed for 4GE approaches using hermeneutic negotiation approaches may render the approach very difficult to implement. In this study, while the time taken was substantial, the teachers and senior Department of Education officials at regional and State levels considered that the time devoted to the evaluation was justified as the process and findings were able to be used to provide ongoing directions for improving learning and teaching using learning technology.

7.8.2 Identifying Concerns, Issues, Claims and Key Evaluation Questions

The evaluation literature is rife with examples of evaluations which have been conducted with unclear goals, sharply differing views of the role of evaluation, and confusion about reporting findings and ineffective dissemination of findings. This case study represented the first time that the QSC teachers had been involved in a complete school-level evaluation process from identifying the key claims, concerns and issues through to the final reporting stage. As Owen (1990) has pointed out, if this collaboration is repeated, there is the potential for increases in sophistication among site-level staff regarding the contribution the evaluations can make to effective program design, delivery, and outcomes, and staff enabled to be more effective and efficient contributors to future evaluations.

More recently, Scriven and Kramer (1994, pp. 3-16), in providing a critical account of empowerment evaluation, have questioned the extent to which staff of a program being
evaluated should have the chance to participate in shaping the design and/or the report of the evaluation. Also, Scriven and Kramer question the extent to which the evaluator should take part in shaping the program; i.e. the extent to which program staff should be assisted to improve the program by the evaluator. They claim that evaluation training for a program's staff "cannot be combined in the one job with evaluation of that program" (Scriven and Kramer, 1994, p. 13). The findings of the meta-evaluation reported in this evaluation refute those concerns. Indeed, the credibility of the evaluation as perceived by QSC participants and the contribution which the evaluation might make to program improvement were greatly enhanced through the use of 4GE principles. As Guba and Lincoln (1989) suggest,

"Only empowerment can invest people with a sense of self-efficacy, which enables them to act in productive ways. ...Fourth generation evaluation is a means of empowerment, both because of its process aspects and because it shares information (which is itself power)."

A challenge which existed was to employ strategies which enabled all participating stakeholders a basic understanding of the theory behind the 4GE process. Teachers and Department of Education officials involved had little difficulty with gaining that understanding through the ongoing meetings and negotiations which took place. However, parents and students, whilst being cooperative throughout the evaluation were not able to be adequately made aware of the evaluation approach. Problems existed in the availability of parents to attend meetings. Some parents were content to be passive, some parents were difficult to access, and many parents expressed that their main interest was only in the final evaluation report and the subsequent implications for their children. Thus, while key stakeholders such as teachers, Education Department officials and local University staff were involved with all steps in the process, difficulty was experienced in the inclusion of parents and students as equal participants with the other groups. The approach adopted in this study was to collect information on the QSC Project from parents and students by using survey, observation, and interview methods and then to attempt to validate the information gained by discussing findings with them in groups.
18.3 Inter-group Negotiations and Equality Amongst Constructions

Since this evaluation of the QSC Project was completed, O'Neill (1995, pp. 5 - 21) has provided reflections of his attempt to utilise 4GE principles in undertaking an evaluation of a Durham-based Science Education project from November 1992 until August 1993. O'Neill noted concerns relating to equality amongst constructions, stakeholder passivity, and power imbalances. O'Neill (1995, p.13) suggests that stakeholders at different levels see different parts of the operation and in different depths. Similar observations were noted in the QSC evaluation in which school-based staff were concerned about management of the project, resourcing, technological support, and professional training and development whilst parents and students were very focused in their perceptions about the advantages and the disadvantages of being their involved in the project. In addition, the constructions of the teachers were different from those of the Project Officer in that the Project Officer had a broader view of the significance of the QSC than the teachers who had largely, and understandably, a narrower and more personal classroom focus.

In the case of the QSC, power imbalances between stakeholders were inevitably present. However, through the employment of the 4GE principle of negotiating with teachers, which facilitated sharing of information, enabled the teachers to be involved in decision-making processes with other Department of Education officials. Thus, the balance of decision-making became more shared with teachers who adopted more influential reflective, participative decision-making processes which enhanced executive decision-making through taking into account classroom-based information. Teachers became aware of the project’s budget and made significant resourcing decisions. Unlike O’Neill’s observations in his study in which many teachers “were passive and nonchalant” (O’Neill, 1995, p.14), the QSC teachers became very actively engaged in all aspects of the QSC Project.

7.8.4 Collecting and Analysing Data

The stakeholders agreed that there should be both a systematic collection of qualitative perspectives of stakeholders as advocated by Guba and Lincoln (1989) in their portrayal of...
complemented with quantitative data to enrich the process. In essence, this is in direct
agreement with the plea by Fishman (1992) for the need to complement the so-called 'pure'
process exemplified in a type of hermeneutic dialectic by quantitative data. Moreover,
the collection and analysis of quantitative and qualitative data provided reassurances that

\[4GE\] does not preclude quantitative data as described by Sechrest (1992, p.2) in his criticism
of \[4GE\]:

"The methodology espoused in the Fourth Generation, and I think much more generally by
proponents of what is generally termed 'qualitative evaluation' is not proposed as an addition
to our field, to be used in conjunction with other, e.g. quantitative methods, but as a complete
replacement for other methods."

in completing this evaluation, balance between the need for qualitative and quantitative
data was obtained as part of the overall negotiation process. This form of reporting
appeared to meet the needs of various individuals with some preferring to read text
material and others making more use of graphs and charts.

7.9 Suggestions for Further Research

There needs to be an enhanced integral role for evaluation of learning technology initiatives
in schools. This study has made a significant contribution to knowledge through using the
QSC Project as the focus for an evaluative case study. In particular, the evaluation model
devised and shown to be effective in guiding the evaluation provides an important basis
for undertaking future evaluations. As outlined earlier in this chapter, there was evidence
of immediate utilisation of findings at both the school and regional levels with the
acknowledgement by senior Education Department officials for its potential for much
gerader use at a systems level. The Primary Computer Program for Years 6 and 7 has been
launched in which all state primary schools, special schools, and Schools of Distance
Education are involved. That project aims to provide funding to resource schools so that
all Year 6 and 7 classes have one computer for every ten students. In addition, funding is
to be allocated to professional development of teachers and for physical resources (e.g.
hardware, software, peripherals, power, security, furniture). Information for the evalua-
tion and management of the program is being collected as an integral part of the program.
schools are required to report to the Assistant Executive Director (Studies) in each of the regions about their expenditure and outcomes. The Assistant Executive Directors then report regional expenditure and outcomes to the Learning Technology Funding Committee (Salmon, 1993, p. 4). The formats for those evaluations are heavily focused upon accountability of expenditure of funds. Information sought about outcomes are limited to three survey items seeking boxes to be ticked relating to 'incorporation of learning technology in the curriculum', 'incorporation of objectives in the school program', and 'challenges in the program' (Department of Education, Queensland, 1994, pp.1-2). Given the significance of the Primary Computer Program in terms of its large capital expenditure, and, more importantly, its aim to enhance learning and teaching in schools, a more intense and innovative approach to evaluation is suggested. The 4GE approach utilised in this study could be further developed and used to assist in understanding what is happening in classrooms through the provision of the technological resources as well as assist in contributing to further program improvement and decisions.

Further research is suggested for examining gender differences in accessing and using learning technology. This study added to the research information about gender differences and further highlighted concerns about gender differences. Specifically, changes in attitude and interest in using computers were able to be identified over two years. As a result of the findings reported, future research is suggested in which longitudinal studies are undertaken to explore gender differences in using computers and related technology and to critically examine strategies being implemented in schools to address gender differences. Schools require assistance and guidance in developing meaningful, effective strategies for addressing these issues as part of their social justice policies and programs.

7.10 Concluding Remarks

It is now well recognised that the new and emerging technologies hold significant challenges for schools. The Department of Education, Queensland recognises that there are possibilities and problems which need to be examined, identified, and addressed. The goal
for schooling contained in the Development Plan (1992-96) (Department of Education, Queensland, 1991) which states that "Information technology for learning is integrated into educational program" provided clear earlier evidence of that recognition. That recognition has been further stressed in the most recently formulated Corporate Plan (1995-99) (Department of Education, Queensland, 1994b) which states that the strategic direction for primary and secondary schools in Queensland is for them to "explore emerging technologies to enhance the provision of educational programs for students". The revised Computers in learning POLICY (Department of Education, 1995a) identifies

"...student learning and teaching as a major issue and excellence in learning and teaching, within a social justice framework, as a corporate value. Learning technology has been identified as one of the Studies priorities in this plan. To support the pursuit of educational excellence, the integration of learning technology across P-12 curriculum has been suggested as a strategy."
(Department of Education, Queensland, 1995a, p. 2)

In response to those challenges and to enhance the realisation of those goals for schooling, significant initiatives and investigations have been undertaken in Queensland State Schools. The establishment of the QSC in 1990 was one of those significant innovative investigations. This thesis, in undertaking an evaluation of the QSC in its third year of operation, presented findings, implications, and recommendations which can contribute to further policy and program improvement at school and system levels. Recommendations were made which might assist schools and regions in formulating, planning, implementing, and evaluating their educational responses to the challenges which the new and emerging technologies pose.

A model developed from the evaluation literature using 4GE principles was presented and trialled. It provides a substantial basis for use in guiding similar evaluations in both Government and non-Government school sectors in their commitment to the pursuit of excellence in learning and teaching through the integration of learning technology into education programs.
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Appendix A

Overview of Research Presentation
Overview of Research Presentation
Queensland Sunrise Centre Professional Development Day
Coombabah State High School
Thursday, 28 May, 1992  12.30 - 1.30 p.m.

1. Details of Scholarship and Supervision of Program Evaluation of QSC.
   - Role of South Coast Region, Department of Education, Queensland.
   - Role of Gold Coast University College of Griffith University.
   - Queensland Sunrise Centre Timeline
   - Why is it important to undertake research of the QSC from April - December, 1992?

2. Program Evaluation.
   - Why undertake Program Evaluation of QSC?
   - Framework for Evaluation Studies.
   - Selection of a Naturalistic and Participant-Oriented Evaluation Approach.

   - Augmented Stake-Batchler Model
     - *Identify, negotiate with and involve key people in the program in the evaluation process*

4. The Report
   - Proposed Title:
     Integrating Learning Technology in Queensland State Schools
     A Program Evaluation of the Queensland Sunrise Centre
   - Proposed Chapter Plan for the Report. Participants to note the notion of 'areas of silence' (Bowers, 1989).
   - Research Questions - Nominal Group Technique.
     Identifying Questions and Concerns of Stakeholders

Worthen and Sanders (1988, p.212) indicate that they "cannot overemphasize the importance of garnering the questions, insights, perceptions, hopes, and fears of the evaluation study's stakeholders, for such information should be primary in determining the evaluation's focus". By grounding the evaluation plan in the concerns of key people, the evaluator takes steps to assure that the evaluation will be useful and responsive to constituents who may have differing points of view.

- Research Procedures

Appendices
Appendix B

Workshop Session

- Identifying and Selecting the Evaluation Questions for the Program Evaluation
Workshop Session

Identifying and Selecting the Research Questions for the Program Evaluation

Nominal Group Technique

The aim of this workshop is to take best advantage of both individual creativity and group process in identifying the questions and concerns of stakeholders and determining priorities for the program evaluation to address.

Facilitator: Glenn Finger (Researcher)
Time: 30 minutes

Step 1. Problem Area (3 minutes)
Program Evaluation of the Queensland Sunrise Centre - Identifying and selecting the research questions. Why involve the stakeholders?

Extract 1:
Worthen and Sanders (1988, p. 210) suggest that

"The evaluator's primary role is to gather and interpret information that can help key individuals and groups improve efforts, make enlightened decisions, and provide credible information for public consumption."

Furthermore, they indicate that they "cannot overemphasize the importance of garnering the questions, insights, perceptions, hopes, and fears of the evaluation study's stakeholders, for such information should be primary in determining the evaluation's focus" (Worthen and Sanders, 1988, p. 212).

According to Worthen and Sanders, the naturalistic and participant-oriented approach reminds us that we should listen to what stakeholders have to say even during informal conversations. The process of education is critical and we should understand the ways that people view it, the different meanings placed on it.

Extract 2:
Stake (1975, p.14) claims that educational evaluation is responsive evaluation

"If it orients more directly to program activities than to program intents; responds to audience requirements for information; and if the different value-perspectives present are referred to in reporting the success and failure of the program."

In addition, Stake (1978) indicates that a naturalistic and participant-oriented approach to evaluation appeals in four ways.

"Firstly, it helps audiences for the evaluation understand the program if we pay attention to the natural way in which we understand and communicate about things.
Secondly, knowledge gained from experience facilitates human understanding and extends human experience. Thirdly, naturalistic generalizations, which are arrived at by recognizing similarities of objects and issues in and out of context, are developed through experience. Fourthly, by studying single objects, people accumulate experiences that may be used to recognize similarities in other objects. In that way, we add to existing experience and human understanding."
Extract 3:
Walker (1983), in an article titled "Reflections on the educational potential and limitations of microcomputers" sums up by stating that

"Enormous practical, pedagogical, and technical problems must be solved before the potential of computers for education can be realized. Mistakes will be made. Failures will occur. Critics will have plenty to criticize. The pioneers will bear the burdens and endure the dangers of exploration, and all of those who come after will benefit from their experiences. Here is a chance for those favoured by circumstances to indulge their spirit of adventure and discovery while at the same time contributing to the general welfare.

The microcomputer and its relatives, the other information technologies, are the new tools that happen to have been invented in our time. Learning to use them wisely and well is one of the major challenges we face. We have the opportunity to explore a new and very powerful medium of education and expression. How can we let the chance slip away?"

Extract 4:
Bowers (1989) draws attention to "areas of silence within the mainstream of educational computing in the United States". Green and Bigum (1990, p. 370) are convinced that this can be generalized to other countries where computing in schools has become a major educational priority. They argue that it is these "areas of silence" which must be investigated and illuminated. They ask - What other stories might be told about the field as it currently understands itself? More strongly, what stories have been actively suppressed? Whose stories?

Extract 5:
☐ What do you believe have been **worthwhile outcomes**?

"Personally - HUGE growth in 'technological' knowledge - interest in programming, rethinking teaching style, 'buzz' at being a 'player' in an 'international' level of competition, willing to have a go at almost anything, much greater perseverance and raised frustration level, ability to see the positive outcomes of **any** situations.

I don't regard ANYTHING I have done in the project, no matter how frustrating or time intensive, as a waste of time."

---

What have been your **concerns** about the Queensland Sunrise Centre Project?

"The change in 'ownership' from the top. High level personnel have changed and initially knew nothing of the project. It has been left to the teachers to 'fight' for recognition. Lack of funding greatest concern..."

Teacher, Queensland Sunrise Centre - May, 1992.

☐ Of all the things you have learned to use the computer to do, what did you like

| Best | "I can tell it what to do (e.g. In Logowriter)." |
| Least | "When I make a mistake it has to remind me." |

Year 7 Student, Queensland Sunrise Centre - May, 1992.
Step 2. Individual Work  (5 minutes)
Each participant is to think about the problem area, individually and without discussion, and to write their ideas about possible research questions for the program evaluation.

Step 3. Report Questions  (10 minutes)
Each participant is to report one question from his/her list and the facilitator writes the questions on paper. This process is repeated until all research questions have been reported. New ideas can be encouraged and stimulated by those questions already reported. The facilitator assigns a letter of the alphabet to each question to facilitate later processing.

Step 4. Discussion of Questions  (5 minutes)
The questions are discussed to ensure that all participants understand the meaning of the words and the rationale for their inclusion in the list.

Step 5. Ranking of Questions  (4 minutes)
The questions generated are ranked by a vote. Each participant will be given five cards in order to identify and record, one per card, the five most important questions on the published list. The idea and its associated letter should be indicated. Participants then assign a rating 1-5 to the research questions, with number 5 being assigned to the question which the participant considers to be the most important.

Step 6. Totals  (3 minutes)
The facilitator collects the cards and totals the individual ratings for each research question. If a clear consensus among stakeholders is not reached, then additional voting steps will be necessary.
The Proposed Evaluation Questions:

Integrating Learning Technology in Queensland State Schools: A Program Evaluation of the Queensland Sunrise Centre

Program Evaluation of the Queensland Sunrise Centre: Situational Analysis

Why was it initiated?
What is its setting and context?
Who participates in the program? Who are other stakeholders?
What is the program's history? How long is it supposed to continue?

Program Evaluation of the Queensland Sunrise Centre: Project Management

How effectively was the Queensland Sunrise Project managed?
What was intended and what happened in terms of program management?
What are the implications for the management of future technology initiatives in schools in terms of personnel, resources, budget, training and professional development, and policy?

Program Evaluation of the Queensland Sunrise Centre: Impact of the Project

What impact did the Queensland Sunrise Centre Project have upon -
The teaching and learning context in terms of classroom organisation and management, the role of the teacher, the role of the learner, curriculum, and assessment?
Student learning through the use of laptop computers and immersion in a technology-rich environment?
Teachers and their training and professional development?
Parents? What were the concerns and perceptions of parents?
Appendix C

South Coast Region

Department of Education, Queensland
Appendix D

Site Description
INTEGRATING LEARNING TECHNOLOGY IN QUEENSLAND STATE SCHOOLS:

A PROGRAM EVALUATION OF THE QUEENSLAND SUNRISE CENTRE

Site Description

Name of School: ____________________________ Date: ____________

School Community:
- Location of school (District, Region, State)
- Description of Significant Local Features
- Socioeconomic Indicators

School:
- Description of School
- Enrolment
- Staff
- School Environment (Buildings, Grounds...)

Teachers:
- No. of Teachers
- Length of Involvement in QSC
- Experience with Computers
- Experience with Logo

Students:
- Year Level/s
- No. of Children
- Boy/Girl Composition
- Ability Range
- Experience with Computers
- Experience with Logo
- Access to Computers

The Classrooms:
- Classroom Organisation
- Timetabling
- Physical Setting

The Technological Resources:
- Description and Use

Support Staff:
- Personnel and Nature of Support and/or Leadership

Appendices
School Community:
Location of School (District, Region, State)

Description of Significant Local Features

Socioeconomic Indicators

School:
Description of School

Enrolment

Staff

School Environment (Building, Grounds...)

Appendices
### Site Description

#### Teachers:

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<th>No. of Teachers</th>
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<tr>
<th>Name/s</th>
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<th>Exp. with Computers</th>
<th>Exp. with Logo</th>
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#### Students:

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<th>Access to Computers</th>
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Appendices
Site Description

The Classrooms:
Classroom Organisation

Timetabling
(Collect samples of Teacher Timetables)

Physical Setting
### Site Description

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<th>Description</th>
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**Code:** *ST* - Students and Teachers  
SO - Student Only  
TO - Teacher Only
The Technological Resources:

<table>
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<tr>
<th>Description</th>
<th>No.</th>
<th>Used by</th>
</tr>
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</table>
|             |     | Code: *ST - Students and Teachers
|             |     | SO - Student Only  TO - Teacher Only |

Support Staff:
- Personnel who provide support and leadership to the Queensland Sunrise Project, as identified by the QSC Teachers.

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<tr>
<th>Name</th>
<th>Role/Position/Title</th>
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Appendices
Appendix E

Initial Computer Questionnaire for Students

May, 1992
**Aim:**

The aim of this research is to obtain information from participants in the Queensland Sunrise Centre to enable program evaluation to be undertaken.

**Questionnaire Distribution and Retrieval:**

All students involved in the Queensland Sunrise Centre will be asked to complete this initial Computer Questionnaire for Students.

Questionnaires will be distributed during the week commencing 18 May, 1992.

Questionnaires will be collected from students during the week commencing 25 May, 1992.

**Thank You:**

All answers remain confidential.

Thank you for your cooperation.

Glenn Finger: Queensland Sunrise Centre Research
South Coast Region, Department of Education, Queensland
Student Questionnaire

We would like to obtain some information about yourself by answering the questions below. You are asked to supply information for all sections of the questionnaire.

Name: ___________________________ Age: ______ Year Level: ______ Sex: ______
School: ___________________________
Length of Involvement in the Queensland Sunrise Centre: _______

Part 1. Before the Queensland Sunrise Centre Project
- Student Background to Using Computers.

1. Does your family have a computer in your home?
   Yes [ ]
   No [ ]

   If you answered yes, please answer the following questions.
   What kind of computer is it? ________________________________
   How long have you had it? ________________________________

2. Please indicate the extent to which you believe that you had used computers before you became involved as a student in the Queensland Sunrise Centre.
   At home
   Not at all [ ]
   Very little extent [ ]
   Some extent [ ]
   Great extent [ ]
   Very great extent [ ]

   At school
   Not at all [ ]
   Very little extent [ ]
   Some extent [ ]
   Great extent [ ]
   Very great extent [ ]

3. Please indicate your perception of the extent to which you had gained an understanding of and developed skills in using a computer (e.g. keyboarding, disk management, word processing, databases...) before your involvement through being a student in the Queensland Sunrise Centre.
   Not at all [ ]
   Very little extent [ ]
   Some extent [ ]
   Great extent [ ]
   Very great extent [ ]

Appendices
Student Questionnaire

Part 2. Interest in Using Computers

4. Have your parents encouraged you to learn about computers?
   Yes [ ]
   No  [ ]

5. Have your friends encouraged you to learn about computers?
   Yes  [ ]
   No  [ ]

6. Where have you learned most about computers?
   (Put a 1 in front of the source from which you have learned most, and continue numbering)
   teachers [ ]
   parents [ ]
   friends outside of my class [ ]
   my classmates [ ]
   brothers and/or sisters [ ]
   computer courses outside the school [ ]
   computer books, manuals, magazines [ ]
   other (please indicate) [ ]

7. Please indicate the extent to which you were interested in computers before you were involved in the Queensland Sunrise Centre.
   Not at all [ ]
   Very little extent [ ]
   Some extent [ ]
   Great extent [ ]
   Very great extent [ ]

8. Please indicate the extent to which you are interested in computers now.
   Not at all [ ]
   Very little extent [ ]
   Some extent [ ]
   Great extent [ ]
   Very great extent [ ]
**Student Questionnaire**

**Part 3. Student Access To and Opinions About Using a Computer.**

9. What level of access do you have to using a computer?
   - One computer for my own use
   - One computer shared with another student
   - One computer shared with several students
   - One computer shared with many students
   - No computers to access

10. What proportion of the school day would you estimate that you are using information technology (i.e. Computers, printers, CD-Rom, scanners, Keylink, etc) in your classroom?
   - Not at all
   - Very little extent
   - Some extent
   - Great extent
   - Very great extent

11. If you have a laptop computer, where do you use it?
   - Only at school
   - Only at home
   - At both school and home

12. To what extent do you enjoy using a computer?
   - Not at all
   - Very little extent
   - Some extent
   - Great extent
   - Very great extent

13. To what extent do you believe you would miss not having a computer to use?
   - Not at all
   - Very little extent
   - Some extent
   - Great extent
   - Very great extent

14. Are there things that you don't like about having your own computer to use?
   - Yes
   - No

If you said Yes, please indicate __________________________________________
15. Do you think that computers are for use by
   Boys
   Girls
   Both boys and girls
   Neither

16. Of all the things you have learned to use the computer to do, what did you like
   Best ______________________
   Least ______________________

17. Compared to writing with a pen or pencil, do you find using your computer
   Harder
   Easier
   The same

18. If you were given the choice of using either a computer or a pen for preparing and
   publishing a written task, would you prefer to use
   Only a computer
   Mainly a computer and some use of a pen
   Mainly a pen and some use of a computer
   Only a pen
   Neither, please indicate

19. Please list below the software you have used and circle the extent to which you have
   used the software.

   Name of Software
   Not at all
   Very
   Little
   Some
   Extent
   Extent
   Great
   Very
   Extent

   1  2  3  4  5
   1  2  3  4  5
   1  2  3  4  5
   1  2  3  4  5
   1  2  3  4  5

Appendices
Appendix F
Follow-up Computer Questionnaire for Students
September, 1992
**Aim:**

The aim of this research is to obtain information from participants in the Queensland Sunrise Centre to enable program evaluation to be undertaken.

**Questionnaire Distribution and Retrieval:**

All students involved in the Queensland Sunrise Centre will be asked to complete this Follow-up Computer Questionnaire for Students.

Questionnaires will be distributed and administered during the week commencing 14 September, 1992. The questionnaires will be administered during class time and collected from students when students have completed the questionnaires.

**Thank You:**

All answers remain confidential.

Thank you for your cooperation.
Student Questionnaire

We would like to obtain some information by your answering the questions below. You are asked to supply information for all sections of the questionnaire.

Name: __________________________ Age: ______ Year Level: ____ Sex: _____
School: __________________________
Length of Involvement in the Queensland Sunrise Centre: ______

Please indicate by placing a tick in the box which best reflects your perceptions.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Undecided</th>
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</table>
I feel confident about my ability to use computers.

Schools should provide computers which students can use at all times.

Using computers is fun.

Computers scare me.

Using computers makes me nervous.

I am frightened that I might break my computer.

Once I start working on the computer, I find it hard to stop.

I wish that I did not have to take the computer home at night.

I would be happier in a class where they do not use computers.

The computer is my friend and helper.

Students who use computers will do better in their schoolwork.

When I am an adult I will get a job where I can use computers.

Please describe the purposes which you think that you might use computers for when you are thirty years old. ____________________________________________

________________________________________

Appendices .
Curriculum Applications

Please indicate by placing a tick in the box which best reflects your perceptions.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Agree</th>
<th>Disagree</th>
<th>Undecided</th>
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<tbody>
<tr>
<td>Computers are as important to students as textbooks.</td>
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<tr>
<td>I use the computer in many subject areas.</td>
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<tr>
<td>Learning to work with computers is just as important as reading, mathematics and spelling.</td>
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<tr>
<td>Using computers makes learning more difficult.</td>
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<tr>
<td>The computer makes mathematics learning easier.</td>
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<tr>
<td>The computer would never be the cause of a student doing better in school work.</td>
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<tr>
<td>Using laptop computers does not stop students from discussing their work.</td>
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In which subject area do you use the computer the most? __________________________

In which subject area do you enjoy using the computer the most? __________________________

Please indicate the computer applications you use most when you use the computer in your own time; i.e. out of school time, lunchtime, at home, weekends, etc.

Please list below:

i) __________________________

ii) __________________________

iii) __________________________

iv) __________________________

Thank you for completing these sections of this questionnaire. Please continue to page 3 which is the final page of this questionnaire.
Student Questionnaire

Year 7 Students Only to complete this section
The following questions seek your opinions about computer use.

Drawing from the list below, please circle up to four of the most common computer applications which you use in the following subject areas:

<table>
<thead>
<tr>
<th>Code</th>
<th>Application</th>
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<tbody>
<tr>
<td>01</td>
<td>Word processing</td>
</tr>
<tr>
<td>04</td>
<td>Desktop Publishing</td>
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<tr>
<td>07</td>
<td>Simulations</td>
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<tr>
<td>02</td>
<td>Database</td>
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<tr>
<td>05</td>
<td>Games</td>
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<tr>
<td>08</td>
<td>Graphics</td>
</tr>
<tr>
<td>03</td>
<td>Logo Programming</td>
</tr>
<tr>
<td>06</td>
<td>Spreadsheets</td>
</tr>
<tr>
<td>09</td>
<td>Touch Typing</td>
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</tbody>
</table>

English Language Arts 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9
Mathematics 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9
Social Studies 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9
Science 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9
Art 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9
Music 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9
Health and Physical Education 1........ 2........ 3........ 4........ 5........ 6........ 7........ 8........ 9

Thank you for completing this questionnaire.
Your assistance is appreciated!
Student Questionnaire

Year 8 Students Only to complete this section
The following questions seek your opinions about computer use.

Drawing from the list below, please circle up to four of the most common computer applications which you use in the following subject areas:

01 = Word processing  02 = Database  03 = Logo Programming
04 = Desktop Publishing  05 = Games  06 = Spreadsheets
07 = Simulations  08 = Graphics  09 = Touch Typing

Humanities  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Mathematics  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Japanese/Italian  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Science  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Art  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Music  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Physical Education  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Home Economics  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
Manual Arts  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9
HRE  1.... 2.... 3.... 4.... 5.... 6.... 7.... 8.... 9

Please indicate by placing a tick in the box which best reflects your perceptions.

I am pleased that I have been involved in the project. □ Agree □ Disagree □ Undecided

To have had the use of a laptop computer of my own has been beneficial for my progress at school. □ Agree □ Disagree □ Undecided

I will miss not having a computer of my own to use at the end of this year. □ Agree □ Disagree □ Undecided

I am more interested in computers now than when I finished Year 7. □ Agree □ Disagree □ Undecided

I am more interested in learning now than when I finished Year 7. □ Agree □ Disagree □ Undecided

Keeping the same group of students together when we moved from Year 7 to Year 8 was good. □ Agree □ Disagree □ Undecided

Thank you for completing this questionnaire. Your assistance is appreciated!
Appendix G

Questionnaire for Teachers and School-level Administrators

May, 1992
Aim:

The aim of this research is to obtain information from participants in the Queensland Sunrise Centre to enable program evaluation to be undertaken.

Questionnaire Distribution and Retrieval:

All teachers and school-level administrators involved in the Queensland Sunrise Centre will be asked to complete this questionnaire.

Questionnaires will be distributed during the week commencing 18 May, 1992.

Questionnaires will be collected from respondents during the week commencing 25 May, 1992.

Thank You:

All answers remain confidential.

Thank you for your cooperation.

Glenn Finger: Queensland Sunrise Centre Research
South Coast Region, Department of Education, Queensland
Teacher and School-level Administrator Questionnaire

We would like to obtain some information from the key participants in the Queensland Sunrise Centre. You are asked to supply information by answering the questions below.

Please complete all sections of this questionnaire.

Respondents are reminded that all answers remain confidential. At no time during the reporting of this information will individual people be identified.

School: _____________________________________________

Role: _____________________________________________
(e.g. Principal, Deputy Principal, Head of Department, Teacher, Registrar...)

Length of Involvement in the Queensland Sunrise Centre: _____________

Part 1. Queensland Sunrise Centre

1. Why do you think the Queensland Sunrise Centre was established?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

2. Do you see anything unique about the Queensland Sunrise Centre when compared with other computer initiatives in schools?

Yes [ ]

No [ ]

If you indicated Yes, please explain why you believe it is unique.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. What do you believe have been worthwhile outcomes?
(e.g. For your school, students involved, other students, yourself, region, curriculum, technological resources... ?)

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Appendices
4. What have been your concerns about the Queensland Sunrise Centre Project? (e.g. For your school, students involved, other students, yourself, region, curriculum, technological resources...?)


Part 2. Project Management

As a key participant in the Queensland Sunrise Centre, your experiences with and involvement in a major innovative investigation about integrating information technology in schools can provide valuable insights and implications for future project management initiatives.

5. Please list below your perceptions of the strengths of the Project Management employed in establishing and maintaining the Queensland Sunrise Centre.


6. Please list below your perceptions of the weaknesses of the Project Management employed in establishing and maintaining the Queensland Sunrise Centre.


Appendices
7. Based upon your experiences and insights, what do you believe are essential strategic elements necessary for maximising the successful establishment, maintenance and institutionalisation of information technology initiatives in schools.

8. Please indicate below the personnel who have provided you with support and/or leadership during your involvement with the Queensland Sunrise Centre. Please indicate the nature of support and/or leadership provided.

<table>
<thead>
<tr>
<th>Personnel / Position (e.g. Name of person - Educational Adviser)</th>
<th>Nature of the Support (e.g. Logo Inservice and advice)</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Thank you for your cooperation in completing this questionnaire.
Appendix H

Questionnaire for Parents of Sunrise Students
20 August 1992

Dear Parent/s

I have been assigned the task through a research scholarship for the period May - December, 1992 from the Director-General of Education, Department of Education, Queensland to undertake an evaluation of the Queensland Sunrise Centre Project.

Never before has such an intensive, sustained technology project been implemented in Queensland. The project was initiated as an important 'lighthouse' initiative to help chart the course for future learning technology initiatives in schools. The importance of gaining information now is highlighted by the fact that the 'pioneers' - the first group of students who commenced in the project in 1990 - are now in Year 8 in their final year of involvement. In addition, the second group of students are now in Year 7. At the end of this year, the involvement by Coombabah State School in the project will officially end.

The evaluation being undertaken is gaining a wealth of information from the school administrations, teachers and students from Coombabah State School and Coombabah State High School. It is also important that information is sought from parents of the students involved in the project as you are important stakeholders in the project and ultimately in your child's progress and future.

Your views are considered to be very important as you have 'lived' with the project through your support and involvement in your child's learning. Consequently, you are requested to assist by completing the accompanying Questionnaire for Parents of the 'Sunrise' Students. Please complete the questionnaire and return it to your child's teacher as soon as possible. I shall collect the questionnaires from both schools on Wednesday, 26 August. If you wish to submit additional written comments then these can be attached to the questionnaires. Thank you for your assistance.

Kind regards

Glenn Finger
Aim:

The aim of this research is to obtain information to enable program evaluation of the Queensland Sunrise Centre to be undertaken. As parents of students involved in the Queensland Sunrise Centre project, your perceptions are considered important in providing valuable insights to assist the evaluation. The evaluation report is expected to be completed by December, 1992 for presentation to Senior Officers of the South Coast Region and to the Director-General of Education, Department of Education, Queensland.

Questionnaire Distribution and Retrieval:

All parents of students involved in the Queensland Sunrise Centre will be asked to complete this questionnaire.

Questionnaires will be distributed to parents on Thursday 20 August, 1992.

Questionnaires will be collected from students on Wednesday 26 August, 1992.

Thank You:

All answers remain confidential. When the evaluation report has been completed, parents will be welcome to access and peruse the report. Your involvement and your child’s involvement in this major technological innovative investigation is greatly appreciated. Your assistance through completing this questionnaire will provide additional insights and perspectives to those being gained from the school administration, teachers and students at Coombabah State School and Coombabah State High School.

If you require further clarification, I can be contacted at Griffith University Gold Coast - Telephone 948861. Thank you for your cooperation.

Glenn Finger: Queensland Sunrise Centre Research
South Coast Region, Department of Education, Queensland
Parent Questionnaire

We would like to obtain some parent perceptions about your child's / children's involvement in the Queensland Sunrise Centre Project by your answering the questions below. Your perceptions will be highly valued.

Name/s of Parent/s (optional): 

School/s at which your child/children involved in the Queensland Sunrise Centre Project currently attend:

<table>
<thead>
<tr>
<th>Part 1. Parent Attitudes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Please indicate the extent to which you were interested in computers before your child/ren was/were involved in the Queensland Sunrise Centre.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little extent</th>
<th>Some extent</th>
<th>Great extent</th>
<th>Very great extent</th>
</tr>
</thead>
</table>

| 2. Please indicate the extent to which you are interested in computers now. |

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little extent</th>
<th>Some extent</th>
<th>Great extent</th>
<th>Very great extent</th>
</tr>
</thead>
</table>

| 3. Please indicate the extent to which you believe that you have encouraged your child/ren in the Queensland Sunrise Centre to learn more about computers. |

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very little extent</th>
<th>Some extent</th>
<th>Great extent</th>
<th>Very great extent</th>
</tr>
</thead>
</table>
Parent Questionnaire

4. Do you believe that children should learn about computers at school?

[Yes or No]

If you indicated No, proceed to Question 5.

[Branching arrow]

If you indicated Yes, proceed to Question 6.

[Branching arrow]

5. Please indicate why you believe children should not learn about computers at school.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

6. Please indicate why you believe children should learn about computers at school.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Thank you for completing Part 1 of this questionnaire.

Please continue and complete Part 2 of this questionnaire.

Part 2. Parent Perceptions About the Queensland Sunrise Centre Project.

7. Positive Changes?
Have there been any positive changes in student learning (e.g. attitude to learning, skills, approach to homework and assignment tasks...) which you have observed through your child's/children's use of laptop computers and being immersed in a technology-rich classroom environment? Please describe.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Appendices
8. Negative Changes?
Have there been any negative changes in student learning (e.g. attitude to learning, skills, approach to homework and assignment tasks...) which you have observed through your child's/children's use of laptop computers and being immersed in a technology-rich classroom environment? Please describe.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

9. Advantages of Being Involved in the Queensland Sunrise Centre Project.
In what ways do you feel that your child/ren has/have been advantaged by being involved in the Queensland Sunrise Centre Project?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

10. Disadvantages of Being Involved in the Queensland Sunrise Project.
In what ways do you feel that your child/ren has/have been disadvantaged by being involved in the Queensland Sunrise Centre Project?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Thank you very much for the time and effort you have provided in completing this questionnaire. Your assistance is greatly appreciated!
Appendix I

Interview Schedule
INTEGRATING LEARNING TECHNOLOGY IN QUEENSLAND STATE SCHOOLS

A PROGRAM EVALUATION OF THE QUEENSLAND SUNRISE CENTRE

Interview Schedule for Interviews with Teachers

The following questions were asked in interviews with the teachers. They provided the basis for guiding the interviews, however teachers could pursue additional issues and questions. Opportunities were provided for clarification and elaboration. Responses were tape recorded to allow for post-interview analysis.

Project Management
What do you feel was intended in terms of program management?

What happened in terms of program management?

From your experiences from your involvement in the Queensland Sunrise Centre, what implications can you suggest for the planning and management of further initiatives to integrate learning technology in schools?

Suggested points for discussion:

Impact of the Project
What impact, if any, do you feel that the project had upon -
Classroom management and organisation?
Relationships between teachers and students?
Relationships between students and other students?

Do you perceive that there have been any changes in student learning through using laptop computers and immersion in a technology-rich environment?

What do you believe are the implications of the new and emerging technologies for curriculum design?

In what ways do you believe the students have been advantaged and/or disadvantaged by being involved in the project?

Do you perceive that there have been any gender differences in the use of the technology?

How did you come to grips with the new technology?
Appendix J
Post Evaluation Check
23 November 1992

Dear,

As you are aware, since May of this year, I have been conducting an evaluation study of the Queensland Sunrise Centre. Evaluations, effectively undertaken, can lead to improvements in educational policy, programs, and practices. Following this presentation of draft copies of the report and your subsequent perusal of the report, you are requested to respond to the items contained in the attached Post Evaluation Check so that I can gain information about the evaluation in terms of its utility, feasibility, propriety, and accuracy.

I have enjoyed greatly the opportunity to have been able to undertake an intensive study of an interesting project to which you have made significant contributions. I thank you for your positive support in assisting with the conduct of the evaluation and I trust that you find the report interesting.

Kind regards,

Glenn Finger
INTEGRATING LEARNING TECHNOLOGY IN QUEENSLAND STATE SCHOOLS:

A PROGRAM EVALUATION OF THE QUEENSLAND SUNRISE CENTRE

Post Evaluation Check November 1992

Name (Optional): _____________________________
Role (Optional): _____________________________

Please tick the one best response which you believe most accurately reflects your level of agreement with each of the following statements related to the utility, feasibility, propriety, and accuracy * of the evaluation conducted.

Utility
Information scope and sequence
The information collected was of such scope and selected in such ways that the evaluation questions about the QSC were addressed.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Report Clarity
The evaluation described the QSC and its context, the purposes, procedures, and findings of the evaluation, so that the audiences will readily understand what was done, why it was done, what information was obtained, what conclusions were drawn, and what recommendations were made.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Report Dissemination
Evaluation findings were effectively disseminated to participants through presentation of the evaluation report.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Report Timelines
The release of the report was timely, so that audiences can best use the reported information.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

* These statements have been adapted from the Standards for Evaluations of Educational Programs, Projects, and Materials (Joint Committee on Standards for Educational Evaluation, 1981).
Evaluation Impact
The evaluation was conducted in ways that encourage follow-through of the findings and recommendations.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>No Comment</th>
</tr>
</thead>
</table>

Feasibility

Practical Procedures
The evaluation procedures were practical, so that disruptions were kept to a minimum.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>No Comment</th>
</tr>
</thead>
</table>

Cost-Effectiveness
The evaluation has produced information of sufficient value to justify the resources expended.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>No Comment</th>
</tr>
</thead>
</table>

Propriety

Frank and Full Disclosure
The written evaluation report is open, direct, and honest in the disclosure of pertinent findings, including the limitations of the evaluation.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>No Comment</th>
</tr>
</thead>
</table>

Rights of Human Subjects
The evaluation was designed and conducted so that the rights and welfare of the human subjects were respected and protected.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>No Comment</th>
</tr>
</thead>
</table>

Balanced Reporting
The evaluation is complete and fair in its presentation of strengths and weaknesses of the QSC so that strengths can be built upon and weaknesses addressed.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>No Comment</th>
</tr>
</thead>
</table>
Accuracy

Object Identification
The QSC was sufficiently examined so that its main features were clearly identified.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Described Purposes and Procedures
The purposes and procedures of the evaluation were monitored and described in enough detail so that they could be identified and assessed.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Defensible Information Sources
The sources of information were described in enough detail so that the adequacy of the information could be assessed.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Appraisal of the Model for the Program Evaluation

The model used was suitable for the evaluation of the QSC Project.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

The model was effective in identifying the key components of the QSC Project.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

The program evaluation of the QSC can contribute to program improvement.

Strongly Disagree  Disagree  Agree  Strongly Agree  No Comment

Additional Comments
Please feel free to make any additional comments regarding the conduct and report of the evaluation.

_________________________________________________________________
_________________________________________________________________

Thank you for your assistance in completing this Post Evaluation Check.

Appendices
Correspondence A
Letter from Professor Roger Scott,
Director-General of Education
Department of Education, Queensland
22 December 1992

Mr G Finger
Queensland Sunrise Centre Research
Coombabah State School
Oxley Drive
PARADISE POINT  Q  4216

Dear Mr Finger

I acknowledge the receipt of your letter of 14 December 1992 concerning the report 'Integrating Learning Technology in Queensland State Schools: A Program Evaluation of the Queensland Sunrise Centre'.

I have noted the contents of your letter and have asked Officers of this Department to provide me with advice.

When this advice is received, a detailed response will be forwarded to you.

Yours sincerely

[Signature]

PROFESSOR ROGER SCOTT
Director-General of Education

Ref: 005887
Correspondence B
Letter from Mr Brian Rout,
A/Director, Studies Directorate
Department of Education, Queensland
16 FEB 1993

Mr Glenn Finger
Deputy Principal
Coombabah State School
Oxley Drive
PARADISE POINT Q 4216

Dear Mr Finger,

Professor Roger Scott, Director General of Education, has asked me to respond to your letter of 16 December 1992 regarding the report Integrating Learning Technology in Queensland State Schools: A Program Evaluation of the Queensland Sunrise Centre.

The department would like to congratulate you on your efforts in producing the report. The findings from this study will provide valuable knowledge for curriculum writers, school personnel and others. It is likely that many of the findings will inform the present revision of the Department's policy on use of computers in schools.

Copies of your report will be distributed to regions through Assistant Executive Directors (Studies) and other key learning technology personnel for their information and comment.

The Department of Education appreciates your contribution to the enhancement of effective learning and teaching practices through the use of learning technology for the students of Coombabah State School and wishes you continued success.

Yours sincerely,

BRIAN ROUT
A/Director
Studies Directorate

Ref: 005887
Correspondence C
Letter from Mr Rod Burchill,
Executive Director, South Coast Region
Department of Education, Queensland
15 January 1993

Mr G Finger
Deputy Principal
Coombabah State High School

Dear Glen

I have had an opportunity over the school vacation to peruse the draft copy of *Integrating Learning Technology In Queensland State Schools*.

I focused specifically on the executive summary and chapter conclusions. I found the chapter conclusions sent me delving back into the chapters for more details.

The document is informative and provides a great range of insights for the reader. It has great integrity as it offers the perceptions of all those most intimately connected. It provides significant challenges for education administrators who are seeking to maximise the educational outcomes for students through the use of advanced technology. Obviously there are no easy answers.

I found the document easy to read and its contents easy to access. Congratulations not only on the generation of this significant document but also for your commitment to The Queensland Sunrise Centre above and beyond the demands of this organisation, over the past years.

Yours sincerely

R A Burchill
Executive Director
South Coast Region