Science and Mathematics Education Centre

IMPLEMENTING EFFECTIVE INFORMATION TECHNOLOGY IN EDUCATION: AN EXAMINATION OF THE LEADERSHIP AND MANAGEMENT NEEDS OF SCHOOLS

STUART SELWOOD

This thesis is presented as part of the requirements for
the award of the Degree of Doctor of Philosophy of
Curtin University of Technology

October 2000

ABSTRACT

This study focuses on the need for more attention to be given to the leadership and management issues associated with the increased adoption of Information Technology tools by schools. The genesis of the study began with the development of the Advanced Diploma of Information Technology in Education (ADITE) as a qualification designed for people who were or who aspired to become the leaders of IT in their schools. Apart from the work associated with the development and delivery of this programme, research activity also included in-depth interviews with school principals and Chief Information Officers (CIOs). A survey of school IT leaders was also conducted and the results of this were compared with the results of a similar survey conducted in North America among CIOs. Further detailed data were obtained over a period of two and a half years when the author took up a position as the Head of Department - Information Technology at a prominent New Zealand secondary school. A major intention of the project was to make comparisons between the management and administration of Information Technology in business with that in education.

There are at least two significant aspects to this study. It is one of the few so far undertaken that focuses on area of the leadership and management of IT in schools and it is perhaps unique in its endeavour to draw from both business and educational experiences. The study concludes that there is much to be gained by schools adopting a more professional approach to the management and administration of their IT equipment and infrastructure, and emphasises the importance of the leadership role that the people charged with these sorts of responsibilities must adopt.

ACKNOWLEDGEMENTS

The work undertaken for this study has continued over a long period and this has inevitably had consequences for family life. I am especially grateful therefore to my wife Sally who not only believed in my capacity to undertake this work but who has been consistently supportive, encouraging and helpful from the time the project was started. In addition to this I have been fortunate that my two sons James and John have always been tolerant and understanding despite the inevitable stress that the project has at times generated.

No project like this can be completed without the cooperation of a lot of people and I am indebted to all those people who so generously gave up their time to allow me to interview them and who subsequently also reviewed transcripts.

My thanks too go to my colleagues at the Central Institute of Technology and Chilton Saint James School for supporting me through various phases of the project. Jean Watson, the inter-loans librarian at the CIT Bateman Library warrants a special mention for her cheerful help and response to a long series of requests for inter-loan material.

I also appreciate the support, interest and encouragement of many friends and in particular the Dr Mike Lacy for his special interest in the project and his editorial advice.

Inevitably in producing a thesis there are those long periods of solitude that are needed to pull all the ideas together and to do the necessary writing. This process was made much easier for me because my sister Janet Selwood and brother-in-law Mark Unsworth were gracious enough to allow me the use of their Waikanae holiday home. Without this help the production of this thesis would have been a much longer and more tortuous process.

Finally I wish to express my gratitude to my supervisor Darrell Fisher who has been a consistent source of encouragement, support, and helpful advice from the time the project was first mooted.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

GLOSSARY OF NEW ZEALAND TERMS

Accreditation The accreditation process checks that an establishment is capable of operating its own quality management system and meeting its obligations to NZQA and relevant industry groups e.g. meeting moderation requirements. NQF accreditation checks whether an establishment, through its systems for the management of quality, has the capability to assess against unit standards within specified fields.

ADITE *Advanced Diploma of Information Technology in Education. (AdvDipITEd)* A qualification offered by the Central Institute of Technology (CIT) for teachers holding or aspiring to hold leadership positions in IT in schools.

Aotearoa Maori word for New Zealand.

APNZ The *Association of Polytechnics in New Zealand* (APNZ) is the organisation that acts as the collective voice for the 23 polytechnics and institutes of technology in New Zealand. It represents a partnership of both the chief executives and the councils of these institutions. It does not exercise any control or authority over them, but acts as the mouthpiece for promotional and political campaigns that benefit the sector as a whole. APNZ develops, confirms and promulgates policy on behalf of its members; ensures effective advocacy and academic quality; provides an effective communication framework and support service for its members; and helps establish and maintain relations with tertiary organisations and institutions from overseas.

Area School (see Composite School).

ASTE The *Association of Staff in Tertiary Education* (ASTE Te Hau Takitini o Aotearoa) is a professional and industrial association, which represents employees in all spheres of the

	tertiary education sector throughout New Zealand.
Boards of Trustees (BoT)	Locally elected boards that govern state and state integrated schools. Boards establish a charter, which sets out the aims and objectives of the school.
CIT	*Central Institute of Technology.* One of New Zealand's Polytechnics which has its main campus at Heretaunga in the Hutt River valley north of Wellington.
Colleges of Education	Main providers of teacher training.
Composite Schools	Offer education to students at both the primary and secondary levels (Years 1-15).
Contributing Schools	Offer education to students up to the intermediate level of schooling (Years 1 - 6).
DP	Short for ***Deputy Principal*** and pronounced as separate letters. A position of responsibility in New Zealand schools. Typically this position is the next most senior after the Principal.
Education Review Office (ERO)	Government agency responsible for reviewing and reporting regularly on the performance of NZ schools and early childhood centres.
EFT	Short for ***Equivalent Full Time*** and pronounced as separate letters. Abbreviation normally used as a means of measuring the funding entitlement of New Zealand tertiary education institutions that is based on the notion of an equivalent full time student.
Equivalent Full-time Students (EFTS)	An EFTS is a method of counting tertiary student numbers. The basis of the EFTS system is that a student taking a normal year's full-time study equals 1.0 EFTS unit and the courses taken by part-time students are fractions of one

courses taken by part-time students are fractions of one EFTS unit.

Full Primary Schools Offer education to children up to Year 8 (see Year of Schooling).

GDITE *Graduate Diploma of Information Technology in Education* a qualification offered by The Waikato Polytechnic. Details about the programme leading to this qualification can be obtained from: http://www.twp.ac.nz/progregs/GDipITE.htm

HoD Short for *Head of Department* and pronounced as separate letters. A position of responsibility in New Zealand schools, especially secondary schools. Usually an HoD has responsibility for a team of teachers who deliver a particular area of the curriculum e.g. English or Science.

Intermediate A particular type of primary school in New Zealand that offers education to Year 7 and 8 students only.

ITAG *Information Technology Advisory Group*. Pronounced "*eye-tag*". Group of people appointed by the Minister for Information Technology to provide the Minister with advice on Information Technology matters.

ITANZ ITANZ pronounced "*eye-tanz*" is the Information Technology Association of New Zealand. It is the New Zealand national association of organisations involved in the development, production, marketing and support of goods and services related to the processing of information. ITANZ works to improve the business climate in the interests of all suppliers through its role, vision and mission. It's members are drawn from the following main groups:

- suppliers of equipment in computing and

telecommunications;

- software developers and suppliers;
- providers of professional and educational IT services;
- network operators and suppliers of value added services

The Association's mission is:

To promote the New Zealand IT industry to encourage:

- the widest possible participation from New Zealanders in the use of IT;
- the provision of essential productivity and efficiency tools, on which all industries depend;
- the generation of innovation, investment and employment; the promotion of growth in exports of IT products and services through the use and integration of IT;
- the adoption of international standards and quality management practices; and to represent and focus on the interests of its members in the ongoing development of the industry.

Kindergarten An early childhood institution which provides sessional programmes for mainly three and four-year-old children.

Ministry of Economic Development On 29 February 2000, the Ministry of Economic Development came into being. The Ministry plays an active role with government in fostering business and lifting the New Zealand economy. They will be aided in this by Industry New Zealand, a Crown Entity to deliver Industry and Regional Development Policy. A private sector board will manage Industry New Zealand, which is currently being

established.

The Ministry of Economic Development facilitates, leads and implements the Coalition Government vision for economic development.

Ministry of Education

The New Zealand Ministry of Education was established by Act of Parliament in 1989 and replaced the former Department of Education. Also known as MoE.

NACCQ

National Advisory Committee on Computing Qualifications. The Computing and Information Technology subject forum of the Association of Polytechnics in New Zealand Its objects include:

- To offer support and advice to APNZ and the polytechnic sector in relation to the field of Computing and Information Technology.
- To negotiate with the appropriate Government agencies on issues relating to the field of Computing and Information Technology.
- To co-ordinate information relating to the field of Computing and Information Technology.
- To promote the teaching, learning, research and development in the field of Computing and Information Technology
- To coordinate the partnership of industry and Polytechnics in the field of Computing and Information Technology.
- To take over the assets of the existing committee known as the National Advisory Committee on Computing Qualifications
- To maintain a high quality of Polytechnic graduates for

industry in the field of Computing and Information Technology.

- To contribute (on behalf of Polytechnics/APNZ) to the development of prescriptions for vocational computing and information technology courses in New Zealand.
- To contribute (on behalf of Polytechnics) to the maintenance of the relevance of developed prescriptions to meet the changing requirements of the New Zealand Computer and Information Technology industry by suggesting timely changes to programme prescriptions in response to industry developments. A full review of such programmes to be carried out at least every two years, utilising appropriate external expertise to maintain the quality of programmes.
- To provide a central support for training providers offering these programmes.
- To liaise with the New Zealand Qualifications (NZQA) and other relevant national bodies (for example the New Zealand Computer Society) over national issues relating to these courses (for example course approval, accreditation, moderation, assessment, professional registration etc), in conjunction with APNZ.
- To support the availability of a full range of vertically integrated vocational computing qualifications for New Zealand.
- To ensure co-operation and effective communication between industry and training providers is achieved.
- To offer guidance and advice on programme management.
- To co-ordinate the development of teaching resources for

the use of academic staff.

- To encourage national and international recognition of the qualifications.

NZ — New Zealand.

NZ Curriculum Framework — The foundation policy statement covering teaching, learning, and assessment for all students in NZ schools.

NZCS — *New Zealand Computer Society.* The New Zealand Computer Society (NZCS) is the professional society for people working in the information technology industry. The vision of the Society is "Inspiring Computer People to Professional Excellence" and their aim is to support IT professionals and their organisations in their quest for success in the information technology industry.

NZEAS — *New Zealand Educational Administration Society.* NZEAS is a professional body that provides support and professional development for educational leaders across all sectors. It is a national organisation with branches covering most parts of New Zealand and links with kindred organisations throughout the world.

NZEI — *New Zealand Educational Institute* Te Riu Roa (NZEI) is a professional and industrial education union representing some 34 000 staff employed in primary, secondary and area schools, early childhood centres, Specialist Education Services and colleges of education.

NZPF *The New Zealand Principals' Federation Incorporated.* An association open to all New Zealand school principals but which is supported more by primary school principals. The objects of NZPF are to:

- Uphold the status of the Principal as the School Manager
- Examine the developing needs of its members individually and collectively, and respond appropriately
- Promote the development of its members professional leadership and management skills
- Ensure recognition as a professional organisation actively representing the
- special interests of its members
- Maintain a liaison with the kindred organisations
- Respect and recognise the Principles of the Treaty of Waitangi in the context of the objects of the Federation

NZPPC *New Zealand Polytechnics Programmes Committee* (NZPPC), although part of APNZ operates independently of APNZ and has its own secretariat. NZPPC provides accreditation and programme approval services to polytechnics and institutes of technology. The accreditation process is administered by the New Zealand Qualifications Authority and its agents. Agents for the Qualifications Authority include the New Zealand Polytechnic Programmes Committee (NZPPC) who are responsible for accreditation in polytechnics. The Colleges of Education have their own accreditation body, the Colleges of Education Accreditation Committee (CEAC).

NZQA *New Zealand Qualifications Authority.* The New Zealand Qualifications Authority is an independent body that co-ordinates qualifications in secondary schools and in post-school education and training, maintains national standards,

ensures recognition of overseas qualifications and administers national secondary and tertiary examinations. The New Zealand Qualifications Authority is a Crown Entity established under the Education Act 1989. The Authority is appointed by the Minister of Education, and is accountable through the Minister to Parliament.

Playcentre An early childhood institution that is collectively supervised and managed by parents for children aged between 0 and 5 years

Polytechnic Provider of tertiary training in vocational and academic subjects leading to certificates, diplomas and degrees

Socio-Economic Decile Band All schools are given a Targeted Funding Educational Achievement (TFEA) decile number, depending on the socio-economic status of the area they serve. Schools with lower decile numbers are allocated higher funds to help children from low socio-economic areas to achieve better..

SPANZ *Secondary Principals' Association of New Zealand Inc.* SPANZ is an autonomous national association for secondary school principals, that wishes to advance education through professional leadership, support and advocacy.

The goals of the Association are:

To promote the development of competent, well-informed and confident secondary principals by:

- Providing a range of educational conferences, seminars and other forums for professional exchange
- Developing a comprehensive information-sharing network
- Promoting the development of skills and qualifications for principals and prospective

principals

- Maintaining links with international principals' groups

To support the professional and personal well-being of members by

- Advocating remuneration and conditions of service appropriate to the responsibilities that principals carry
- Promoting effective Principal/Board working relationships
- Providing professional and legal advice to members
- Fostering a collegial support network for members
- To initiate and participate in educational debate and policy development by
- Consulting effectively with members
- Representing principals in educational and public forums
- Maintaining wide, regular contact with education groups and agencies
- Building linkages with relevant groups

TEF

Telecom Education Foundation. Telecom (New Zealand) set up the Telecom Education Foundation in 1993 in an endeavour to make sure that children learn how to use the new technologies to prepare them for life and work in the online age. Telecom regards the money it spends through TEF as part of its commitment to helping schools provide quality education through the use of Information Technology. Each year, the Telecom Education Foundation offers teachers a framework for classroom activities using technologies such as the Internet, e-mail, faxing and audioconferencing.

TUANZ

TUANZ – Pronounced *"two-anz"*. *The Telecommunications Users Association of New Zealand Incorporated* - is a non profit incorporated society which was formed in 1986 with over 450 members including major NZ corporations, small to large businesses, government departments, educational institutions and interested individuals

The Association's purpose is to lead informed, sophisticated usage of technology-based communications by business

Their mission is to realise this purpose by:

- Providing quality written information to business users Giving them opportunities for informal communication
- Being a strong, effective advocate to government and industry for them.
- Encouraging and supporting the activities of special interest groups.

The Association's vision focuses on ensuring that:

- The user has real choice and receives real.
- The New Zealand telecommunications environment is a source of competitive advantage to New Zealand business.
- Social obligations are met, and the industry has a purpose beyond short term profit.

University

A tertiary institute awarding academic degrees and undertaking research and postgraduate training.

Wananga

Wananga provide programmes at the post-secondary level especially for Maori with an emphasis on the application of knowledge regarding *ahuatanga Maori* (Maori tradition) according to *tikanga Maori* (Maori custom).

Year of Schooling	Measures the number of years of schooling a student has received and provides the Ministry of Education with a method of counting students for funding and staffing purposes. There are 15 years of schooling in New Zealand. Years 1-8 represent primary schooling and Years 9-15 represent secondary schooling.

CHAPTER 1

INTRODUCTION

Over the last 15 to 20 years Information and Communication Technologies have played an increasingly significant role in the operation of schools. During this time much has been said and written about the importance, particularly of computers, to education. There are many examples of educational and political leaders extolling the potential contribution of these forms of technology to the improvement of the quality of education. Characteristically the rhetoric makes reference to concepts such as the "knowledge economy" and the "information age".

> Education is about investing in our future; and it is in the marriage of education and technology that the future lies for Britain. Young people now in school will emerge into a world dominated by information and communication technology.
>
> (Rt Hon Tony Blair MP, 1996, n. pag.)

> On the threshold of the twenty first century we are entering a period of change as far reaching as any we have seen. Since the industrial revolution people have had to locate themselves in large centres where they could work with others, but now new technologies are rendering distance unimportant. The skills that are needed in tomorrow's society will be those associated with information and knowledge rather than the industrial skills of the nineteenth and twentieth centuries. Changing technology will affect almost every aspect of our lives: how we do our jobs; how we educate our children; how we communicate with each other and how we are entertained.
>
> (Hon Maurice Williamson MP, ITAG, 1996, n. pag.)

Of course, the discourse though has not been limited to mere rhetoric. Huge amounts of research and related scholarly activity also have been devoted to examining the role and benefits of information technology in education. However, the focus of this work has tended to be in certain main areas including the pedagogical and epistemological role of computers, the identification of requisite skills, the professional development needs of teachers, the preparation of curricula as well as aspects of the application of computers to school administration. By comparison, there appears to have been very little work focussing on the management and administration of the resources. This appears to be true both from organisational and

personnel perspectives. Therefore a major goal of this study has been to examine these leadership and management issues, and the needs of schools as they work to implement an effective application of Information and Communication Technologies.

1.1 Background to the Study

The genesis of this study lies in the initiatives by some New Zealand Polytechnics in the period following major changes to the New Zealand education system resulting from the passing of the New Zealand Education Amendment Act 1990. Increasingly during the years after the passing of the Act, Polytechnics sought to extend their traditional range of courses into new areas, for example, the Waikato Polytechnic's Diploma in Computer Education (DICE). This programme very likely received further impetus from other initiatives and policy developments including the *Report of the Consultative Committee on Information Technology in the School Curriculum,* which recommended:

> That the Government make a commitment to a major upgrading of teacher professional development and support and advice for school communities and Boards of Trustees in the use of information technology across the curriculum.
>
> (New Zealand Ministry of Education, 1990, p. 4)

A report was presented to the New Zealand National Advisory Committee on Computing Qualifications (NACCQ) at their 1994 annual conference. This report outlined how this programme (DICE – Diploma in Computer Education) was being offered to both primary and secondary teachers throughout the Waikato region. There appeared to be potential for such a programme to be offered by other Polytechnics in other parts of New Zealand and the representatives from several Polytechnics followed up on this initial idea. In particular the Central Institute of Technology's (CIT) Department of Information Technology resolved that the concept was worth pursuing. After a preliminary discussion with the Wellington District Adviser in Educational Computing, a survey (Selwood, 1994) was conducted in November 1994 of all schools in the greater Hutt Valley area to ascertain the

extent of any need for such a programme. Responses were received from 92 teachers (a sample representing about 18% of the population) representing 35 (45%) of the schools in the region. The results obtained from this survey showed a very high level of support (97%) for a qualification in the uses of Information Technology in Education. This finding was further reinforced with a comparably high level of dissatisfaction (78%) with the current arrangements for training and upskilling of teachers in Information Technology.

While there was an opportunity for CIT to offer the DICE programme under the auspices of NACCQ they chose not to do so as much of the DICE programme (NACCQ, 1994) at that time drew quite heavily from modules of the National Certificate in Business Computing (NCBC). Examples of such modules included CE120 Operating Systems Software, CE138 Database Management Systems, CE140 Information Technology and its Impact on Society, CE150 Programming, CE260 Computer Architecture, and CE500 Local Area Networks. This meant that there was a significant orientation to the acquisition of technical knowledge and skills. Because of this, and despite Waikato Polytechnic's experience with the DICE programme, CIT chose to develop their own separate programme, the Advanced Diploma of Information Technology in Education (ADITE). Given the DICE orientation to the more technical areas and CIT's determination that teachers' needs were predominantly in other areas, CIT proceeded to develop a programme that they considered would be more directly relevant to the needs of teachers. This decision was based on three main factors. First, the experience of the staff of the Department of Information Technology in teaching the NCBC programme led them to the view that it had little to contribute to a programme specialising in Information Technology in education. Second, the District Adviser in Educational Computing had advised the department that there were aspects of the DICE programme that he considered unsuitable.

> A major part of his concern was his perception that it contained an undue focus on the technical aspects of computing that he felt had only minimal relevance to practising classroom teachers. He also commented on the need for a much more integrated approach in the programme. The District Adviser suggested that such a programme should be constructed around three main sequential developments. The first concerned developing skill and confidence with personal productivity tools like word-processors, spreadsheet and databases... The second would focus on the development of a sound theoretical framework. The final phase would bring the first two parts together.
>
> (Albertson & Selwood, 1995, p. 10)

These factors were further reinforced by a third factor, the uses of computers in which teachers reported they were most interested (Selwood, 1994). High scoring uses included Word-processing (74%), Desktop Publishing (71%), Databases (52%), Spreadsheets (50%), Graphics (50%), Email and the Internet (47%). By contrast, low scoring uses included Authoring Tools (8%), Operating Systems (8%), Robotics (8%), Programming (11%), and Hardware (10%). These figures showed a marked preference for personal productivity tools rather than the more technically oriented aspects of computing.

Apart from the interest of some Polytechnics, other tertiary educational institutions also offered courses of relevance to computers in education. Most of the Universities offered at least one paper like *Computers in Education* (Auckland, Massey and Otago Universities). The Colleges of Education offered a range of papers including *Information Technology in the Curriculum* (Palmerston North College of Education), *Thinking and Learning with Computers* (Christchurch College of Education), and *Computers in Classrooms* (Waikato School of Education). The International Society for Technology in Education (ISTE) also offered distance education courses for educators including *Computers in Math Education, Introduction to Logo for Educators*, and *Planning for Technology in Schools*. (Albertson & Selwood, 1995). While these courses reflected a strong orientation to a direct application of the technology to education, none of them was a coherent stand-alone programme leading to a specialised qualification.

Early in the development of the ADITE programme it became apparent that there were two significantly different groups of teachers for whom this type of programme might be relevant. The first group comprised those teachers who had little or no previous experience in the use of Information Technology but who wished to acquire the relevant skills and have those skills and knowledge recognised by a suitable qualification. The other group comprised teachers who already had skill and experience in the area but who wanted to build upon this experience and further extend their skills. This group also saw merit in a qualification that provided recognition of their abilities and knowledge. A strategic decision was eventually made by the Department of Information Technology to target the second group as it was considered that there were plenty of providers catering for the needs of the first group, albeit usually without any accompanying recognition in the form of a qualification. A consequence of this was that the ADITE could then concentrate on the delivery of a higher level academic programme.

To help fulfil the perceived needs of teachers and to provide a discernible marketing difference, the Principal Learning Outcomes of the ADITE were determined to produce graduates who:

> ... will provide effective leadership in Information Technology within their institutions; and will be informed, imaginative, and possess a demonstrable commitment to improving the practice of education.
>
> (Albertson & Selwood, 1995)

These are in contrast to the objectives of the DICE programme which were to produce graduates who would have:

> Acquired knowledge and skills in computers in education and computer applications; and acquired knowledge and skills in selected areas of Information Technology appropriate for the educational environment
>
> (NACCQ, 1994, p. 3)

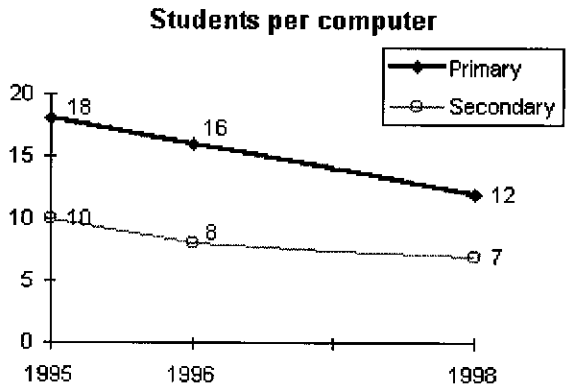
The DICE programme then had an orientation towards the development of practical and technical computing skills suitable for an educational environment while the

ADITE programme had a much stronger focus on developing effective leadership skills for teachers with responsibilities for Information Technology.

1.2 Rationale for the Study

Along with the rhetoric advocating the importance of Information Technology to the future of society in general and to education, in particular, so community expectations have risen and accordingly schools have invested very heavily in hardware and infrastructure (Owens, 1996). The New Zealand Ministry of Education has also been a force promoting a greater adoption of the technology.

Figure 1.1. Students per computer



Ratio calculated = Total number of computers in this survey (Q21) / school roll as of July 1997 provided by Ministry of Education.

(ITAG 1998, p. 8)

As shown in Figure 1.1 the ratio of students to computers in New Zealand schools is on a downward trend. Corresponding to this is the upward trend in the number of computers in schools. The results portrayed in this 1998 survey imply a total of around 75,000 computers in use in schools. Assuming a replacement value of $1500 this represents an investment of approximately $112 500 000. While this level of investment is substantial it reveals only a part of the over all picture because as Table 1 illustrates, schools have also acquired or plan to acquire a range of other forms of Information Technology tools as well.

Table 1.1

Recent and Intended IT Equipment Acquisitions

Unweighted base	Primary *n=169*		Secondary *n=110*	
	A. Have purchased or acquired the technology	B. Intend to purchase or acquire the technology	A. Have purchased or acquired the technology	B. Intend to purchase or acquire the technology
	%	%	%	%
Facsimile machine	28	8	41	15
Speaker phone for audioconferencing	18	13	16	8
Audioconferencing equipment (e.g., Polycom)	5	3	10	6
Audiographics for distance learning	6	5	8	3
Modem, router, ISDN or other device for accessing Internet ...	44	14	60	30

Note: Total may exceed 100% because of multiple responses.

(ITAG, 1998, p. 13)

The incidence of networking with its associated cabling and specialised hardware requirements is also demonstrably increasing.

> More than 70 per cent of Wellington's primary and intermediate schools are networked to the Cat.5 Cable standard, compared to 24 per cent of primary schools nationwide at the end of 1998.
>
> (Wells, 1999a)

In its 1994 report, *Education for the 21st Century,* the Ministry expressed the view that by 2001 the ratio of computers to students should be 1:5. While the motivation for this kind of activity and rhetoric may be sound, there are some disquieting, almost evangelical, overtones.

> Minister of Multimedia Maurice Williamson attended the launch of Telecom NetDay in Wellington last week and bemoaned his workmates' lack of IT fervour.
>
> "I felt like a voice in the wilderness with some of my Cabinet colleagues."
>
> But he didn't remain isolated for long -- Education Minister Nick Smith "became one of the disciples in that evangelical cause".
>
> (InfoTech Bytes, 1999)

Apart from encouraging the acquisition of additional hardware and software and supporting infrastructure, there has also been a wide range of training initiatives from a diverse group of providers. The thrust of the training has generally been to raise teachers' skill levels in computer applications and to assist teachers to make more effective use of Information Technology tools by integrating their use across all areas of the curriculum. A recent Ministry initiative has been the national series of workshops called *Principals First* which are designed to develop the ability of Principals to plan for and manage the implementation of Information and Communication Technologies in their schools. Additionally, more emphasis is now placed on the importance of planning and the Ministry now has available *Learning Technologies Planning Guides* for a wide variety of school types and sizes. Notwithstanding the more recent Ministry initiatives, the focus has been on training teachers in specific skills while comparatively little attention has been paid to the management and leadership qualities needed to ensure effective implementation of the substantial and growing investment in IT resources and skills. Even the *Principals First* workshop series is only a limited move in this direction. The workshops are short and targeted at a relatively low level of knowledge such as identifying items of equipment and their functions.

Apart from government agencies, there are many other groups actively promoting the adoption of Information Technology by schools. The government appears to be in something of a quandary over its role in answering the question: "Where do we want our schools, our students, our teachers to be?".

> Government has come in for some criticism for not providing an answer to this question. On the other hand, Government is somewhat reluctant to prescribe these goals for fear of setting unreal expectations. Many schools are of the view that if the Government sets a goal then they can rightly expect Government to provide all the resources necessary to meet that goal. When it comes to computer and communication equipment the amount of resources required (hundreds of millions of dollars) has been rather scary, even for the most adventurous politician. Furthermore when studies in the commercial world suggest that the total cost of ownership of Information Technologies is many times the capital cost of the hardware, there is even greater reluctance to set some goals.
>
> (Information and Communications Technology (ICT) Summit, 1998)

Perhaps as a consequence of this situation a kind of vacuum has been created that is rapidly being filled by quasi-governmental and community based agencies.

In an environment characterised by a chronic funding mismatch between what is increasingly expected of schools and their financial capacity to deliver, it is understandable that there should be substantial recourse to voluntary or sponsored assistance. The 2020 Communications Trust was established in 1996 to fulfil a variety of projects and obligations begun under the Wellington City Council InfoCity project (http://www.wcc.govt.nz/wcc/infocity/default.htm).

The Objects of the Trust include:

> To raise the awareness and understanding of people in New Zealand (but particularly the people of Wellington) of the effect on the local and global community of the convergence of publishing, broadcasting, communications, information collection & dissemination.
>
> To participate and co-operate with other parties in the establishment of publicly available electronic multimedia centres integrating the use of multimedia and interactive computer networking in the development of a knowledge based society with particular emphasis on business, education, the arts, communication and technology.
>
> (http://www.2020.org.nz/trust/deed/trust_deed2.html#objects 24 January 2000)

The Trust also has as one of its Objectives and Guiding Principles:

> To promote the Internet and interactive networking communications as a cost-effective means to enable the public to have easy access to public information and to more effectively participate in the decision-making process at all levels of government.
>
> (http://www.2020.org.nz/trust/princip.htm , 24 January 2000)

A major project of the Trust has been NetDay, a concept initially pioneered in the USA. It is a grass-roots volunteer effort to network schools' computers. Volunteers provide the labour with discounted materials, expertise and sponsorship coming from local bodies, community groups and businesses. The intention is to produce a network that:

> ...is professionally tested and certified to show it meets the same internationally accepted standards you would expect from a cable installation company.
>
> (Introduction to NetDay http://www.netday.net.nz/introduction.html, 24 January 2000)

In this project, the Trust has been helped by other sponsors including Telecom New Zealand Ltd, Wellington City Council, The Ministry of Education, Ericsson Communications Ltd, New Zealand AMP, Internet Society of New Zealand, Sun Microsystems (NZ) Ltd, ASB Bank, Datacom, Renaissance Limited, and Unisys New Zealand Ltd. They also have the support of: Maurice Williamson, Minister for Information Technology, Mark Blumsky, Mayor of Wellington, Information Technology Association of New Zealand (ITANZ, Information Technology Advisory Group (ITAG), NZ Principals' Federation (NZPF), School Trustees Association (STA), Proprietors of Independent Schools, Technology Education NZ (TENZ), The Knowledge Centre Palmerston North, Ministry of Commerce, UNIFORUM NZ (Unix user group) and Principals Today newspaper. This is an impressive and powerful group who, though no doubt well intentioned, may have an effect of driving technology faster than the capacity of many schools to deal with and support the change. Certainly the NetDay activity appears to have had an effect on the rate at which schools in the Wellington area are setting up Local Area Networks.

There is an implicit assumption, in all this activity and rhetoric, that schools have the skills, time, and other resources to lead and manage the change clearly expected of

them and to produce tangible benefits in an effective manner. However, educational institutions do not exist in a vacuum. They are influenced by a myriad of societal events constantly occurring around them. Now perhaps more than ever the education system and schools, in particular, are expected to make dramatic change on a whole host of fronts. The arguments may be sound but consideration needs to be given to the resources that schools have at their disposal to cope effectively with these sorts of pressures. Teachers continue to face a range of general change pressures that relate to, among other things: school administration, curriculum development, educational choice, an increasingly competitive environment, funding and economic arrangements, and pedagogical development. In addition, the whole role of Information Technology itself poses an enormous challenge, because its successful adoption demands considerable shifts in the pre-existing knowledge, skills, attitudes, and behaviours of teachers. Many scholars have asserted the potential impact of computers on the teaching-learning process (Brown, 1994; Carey, 1993; Chandler, 1990; Collis, 1988; Sheingold & Hadley, 1990; Vockell & Sweeney, 1994). The question of who is to lead and manage the environment to facilitate the necessary change and development process has been given much less attention.

The assumption appears to be that the responsibility should lie with the school principal. Ultimately, of course, the overall responsibility clearly does lie with the principal but whether it is reasonable to expect that principals can deal directly with all the demands made on them seems doubtful. The role of the principal has grown in complexity. Apart from the increasingly CEO style role they have to fulfil, they are also expected to be instructional leaders for a curriculum that has not only grown substantially in extent and complexity, but which continues to evolve at a quite rapid rate. Just as principals expect to be supported by deputies and associates, so too it seems reasonable for them to be able to draw on the assistance of people with the requisite range of skills in Information and Communication Technologies. IT no longer resides merely in the domain of ancillary or support services, it is now, just as in the business world, a critical and strategically vital part of a school's operation. Its importance and value is now too great for its effective implementation to be left merely to chance of the largely serendipitous outcomes of sponsorship and voluntary assistance. Moreover, the process of implementing successful change in this area requires more than just a technologist, it requires skills and understandings of the

culture of schools and how they operate, and the value-laden nature of technology itself. Schools are also expected, within the limits of their discretion (since they are not free to act however they wish), to attempt to implement an optimal solution, the one that yields the most *bang for the buck* (refer to the Glossary for explanation of this term and its origins).

> This expectation, too, derives from the assumption that schools, since they are purpose-built machines, will pursue the rational, deductive means-ends approach that characterizes rational pursuits. Following this, it is also expected that schools will embrace, indeed will clamor for, any technology that would help them increase their productivity, to perform more efficiently and effectively. It seems natural that they should employ the same tools that have led the world outside the classroom to become a much more information-dense environment, tools like film, television, and computers. Certainly many educational technologists reflexively expect such a response, and are both miffed and baffled when it is not immediately or abundantly forthcoming.
>
> (Hodas, 1993, p. 4)

1.3 Aim and Research Questions

Over the years there have been numerous instances of technological innovation in education. The success and general effectiveness of these innovations in improving the quality of education has varied considerably. Often they have been associated with initial high expectations that rather too often have not been fulfilled.

> First, each of the machine technologies went through a cycle of expectations, rhetoric, policies and limited use. The cycle began with extravagant claims for the revolutionary power of the machine to transform teacher practice and student learning. Predictions that radios would replace teachers, or that motion pictures would make textbooks unnecessary, were common. Reformers, ranging from public officials, foundation executives, school administrators, and wholesalers, fastened on to the innovation and promoted it as a solution for school problems. School boards and superintendents adopted policies and allocated dollars to secure the hardware. Not too long after the machines appeared in schools, academic studies established that the new technology was as effective as a teacher using conventional practices. Shortly afterwards, scattered complaints arose from teachers about the logistics of use, accessibility, and the compatibility with the existing programme, marring the mantle of scientific credibility that had begun to settle over the innovation. Later, surveys documented infrequent teacher use of the machines. Such results triggered criticism of both administrators and teachers. Once limited use had been confirmed,

> a series of analyses blamed teachers for blocking the advancement of technology and classroom improvement. As a convenient shorthand, I called this the exhilaration – scientific credibility – disappointment – blame cycle.
>
> (Cuban, 1989, p. 218)

While innovations in the area of IT may not necessarily become immersed in this kind of cycle, for Cuban has not argued that innovations always follow such a pattern, there is nevertheless always that risk. Therefore it is important, to seek methods and plans that might minimise this kind of risk. It was this kind of thinking that shaped the aim of this study that is to focus on determining ways in which the implementation of IT in schools, especially issues relating to the management of IT, could be made more effective. This aim has resulted in a series of primary research questions.

The emergence of the DICE programme around 1994 raised a question about training and qualifications in the area of computers in education. Emerging from this examination were concerns about the purpose of such programmes, the target market for them and how they might contribute to the implementation not only of computers, but ICT generally, in schools. This provided the impetus and environment for the first research question.

Research Question 1

What form of qualification and training is most appropriate for teachers with responsibilities for IT in schools?

Apart from the general need to manage resources, there are some qualities about Information Technology that distinguish it from other aspects of an organisation's operation. Unlike finance, marketing or sales for example, IT is much more volatile for it is more likely to change quite rapidly in new and relatively unanticipated ways. This raises some interesting issues for management generally and leadership in particular. What model of leadership is required for such a scenario? Two of the more important traditional tools of management, prediction, and control are particularly difficult to apply under these sorts of circumstances (Wheatley, 1999). Nor should it be assumed that management and leadership are synonymous. While related there are important differences that are clearly identifiable.

> Management is efficiency in climbing the ladder of success; leadership determines whether the ladder is against the right wall. Efficient management without effective leadership is like straightening the deck chairs on the Titanic.
>
> (Cornesky, 1992, p. 1)

Consequently, any questions relating to effectiveness must be cognisant of the roles and relationship between management and leadership. The second research question then focuses on needs in these areas.

Research Question 2

What are the leadership and management needs of schools in the area of Information and Communications Technology?

While there is often an understandable reluctance by educators to adopt business models for application to the operation of schools, there can however, still be attributes of business practices that may have benefits in an educational setting.

The boundaries that have in the past permitted a clear differentiation of IT from other areas of an organisation's operation are becoming increasingly blurred. Telephony systems and reproduction and printing technologies are no longer as easily distinguished from the computing world as used to be the case. Gone too are many of the boundaries that distinguished many of the operational areas. IT no longer merely plays a support role but is increasingly not only a core part of all aspects of an organisation's operation but also provides the primary mechanism for exchanging information and for facilitating great increases in functional integration.

> In the past 10 years, companies have learned that information has the power to drive their businesses. This has caused tremendous change to such fundamentals as strategy, organizational structure and market reach.
>
> (Davenport, 1997, p. 1)

Just as occurs in the business community so too the quality of IT leadership in education has the capacity to allow much of IT's value to go unrealised. It is this core strategic role and its power to not only assist in the acquisition of a competitive advantage but to improve organisational effectiveness that gives rise to the next research question:

Research Question 3

What sort of management culture might be most appropriate for schools to adopt so that they can optimise the effectiveness of their IT investment?

Increasingly, quite explicit expectations of the implementation of IT by schools are being prepared. The *Goals for 2001* released late in 1998 under the auspices of the New Zealand Ministry of Education identifies among 32 specific goals the following outcomes:

> All students have quality access to core Information and Communication Technologies
>
> An ICT culture exists in all schools.
>
> Students are all able to apply skills within the learning context
>
> Students are using ICT tools appropriately for each learning area
>
> Students display confidence in the use of ICT
>
> All teachers must have access to core ICT tools at school and at home
>
> Teachers incorporate ICT in learning contexts.
>
> There is a shared responsibility for effective and efficient use of ICT across the curriculum.
>
> School management leads by example, articulates a shared vision for ICT and knows where to get appropriate advice and guidance.
>
> Principals accept responsibility for ensuring that ICT is high on their school's agenda
>
> ERO (Education Review Office) reviews integration of ICT into the curriculum as part of their normal school reviews.

(Information and Communications Technology Summit, 1998, pp. 15-33)

These sorts of statements are indicative of the sorts of pressures that principals are under. They are not only expected to be experts in an ever-increasing range of areas but they are also expected to deal with them in greater depth. If principals are to have a realistic chance to meet these sorts of expectations they need the assistance of suitably qualified and experienced people to whom they can delegate appropriate levels of responsibility. Relationships of this kind have been long established between the Principal, Deputy Principal and Associate Principal. The nature of the relationship between the principal and the person with primary responsibility for the management of a school's Information and Communications Technology resources is

not only not well established, but its importance has probably not yet been fully appreciated. Leadership in this area is still widely regarded as mainly emanating from either the Principal or the Board of Trustees:

> At the School Level, leadership to come from:
> Principals
> Boards of Trustees
> (Information and Communications Technology Summit, 1998, p. 45)

It is to gain a better understanding of the perceptions of principals about this relationship and the qualities that might be needed that provide the basis for the next research question.

Research Question 4

> What are the perceptions of principals about the qualities needed in the people with IT management responsibilities in schools?

When it comes to IT management in general and Information Systems (IS) management in particular, life is not as simple as it once was in the business world. While perhaps this impact has not yet been quite so marked in the educational environment, it is a question of time before it emerges as an increasing issue for schools as well.

> When it comes to IS management, life isn't as simple as it once was. In recent years, as IT use has grown more widespread and ingrained, permeating almost every aspect of every enterprise, the CIO's job has become increasingly sophisticated and complex. Add to that the ever more critical role IS plays in setting corporate strategy and keeping an eye on emerging technologies, and you've got a job that in many cases has grown far too large for a lone executive.
>
> (Stuart, 1995, p. 1)

Certainly, the business world has given the issue of IT management and leadership a great deal of attention and there is a strongly developed body of literature and opinion about the needs and trends in this area. Consequently, it is appropriate to ascertain what is happening in the business environment and seek to make some comparisons with comparable situations in schools.

Research Question 5

What are the perceptions of CIOs about the qualities needed in the people with IT management responsibilities in business and how does the management of IT in business compare with the way it is managed in schools?

1.4 Overview of the Thesis

The purpose of this study has been described in this chapter and background information was provided in order to set the scene and context of the study. The initial four chapters do not seek to answer directly the research questions. They are designed to draw substantially from the literature and provide a backdrop to the argument and evidence presented in Chapters Five, Seven, Eight, and Nine that draw more from research and experience to address more specifically those questions. The second chapter focuses on the need for more attention to be paid to the leadership and management of Information Technology in New Zealand schools. It establishes the importance of this area of schools' operations. The place of IT, in terms of the direct level of investment it represents, is an important factor. Even more significantly it also examines its potential to contribute to the quality of education and the preparation of New Zealanders for the kinds of skills, knowledge, and attitudes that they will need as the impact of this technology grows and influences the well-being of the country. It follows, that to make more effective use of resources, some change is likely to be necessary. Chapter Three deals with the need for change, highlights how innovation in the past has not always been too successful, provides some possible explanations for this and generally attempts to outline how change might be handled to make it more effective. It is argued that as part of the change process there is a need to consider the balance required between leadership and management skills. Chapter Four concentrates on this and also links the relevance of these sorts of attributes to ensuring the continuing effectiveness of IT in schools. Drawing on the author's experience in developing and implementing a qualification designed to cater for the needs of people with IT leadership responsibilities in schools, Chapter Five discusses the characteristics of such programmes and some of the issues that are associated with their development and delivery. In particular Chapter Five addresses issues arising from Research Questions 1 and 2 and gives particular consideration to where the emphasis in this

sort of training ought to be placed. Special attention is given to issues relating to leadership, management, technical skills, and knowledge. In Chapter Six the focus swings to deal more specifically with the management of IT in schools and how schools might improve their performance in that area. It makes the point that apart from looking at leadership and management qualities, consideration must also be given to the role and nature of an organisation's culture.

Chapter Seven looks at aspects of the way people who are already working as leaders and managers of IT in schools are operating. It also presents the findings of a survey of these people and compares their views with the results obtained from a similar survey of CIOs (CIO.com, 1999) that was conducted in North America. The perspective of School Principals is the focus of Chapter Eight which draws on information obtained from a series of interviews with Principals and seeks to determine their views on the leadership and management of IT in schools. This provides further material to add to the picture that begins to emerge from Chapter Seven and which in turn is further rounded out in Chapter Nine. Chapter Nine parallels Chapter Eight but does so from the perspective of people in business with responsibility for leading and managing IT. The material from this chapter draws on a series of interviews with Chief Information Officers (CIOs) and along with the two preceding chapters addresses more specifically Research Questions 3, 4, and 5. Chapter Ten is the final one and it is designed to bring all the material together and summarise the views and argument. A list of references and a set of appendices follow Chapter 10.

CHAPTER 2

THE CASE FOR LEADERSHIP AND MANAGEMENT OF INFORMATION TECHNOLOGY IN NEW ZEALAND EDUCATION

> *A good principal can lead by example, can motivate teachers and students, and has a clear understanding of the relationship between people, curriculum and the physical spaces of a school. We assume that an effective school leader could walk into almost any classroom and muddle through any lesson, performing at least a serviceable job. The major exception to this assumption is educational technology. No principal would ever declare I don't know much about math", or "I was never too much for reading", yet commonly many make this declaration about computers and the role of technology in the classroom. As a result, technology tends to exist in schools outside of the core curriculum, used as an end in itself, rather than as a means to support the central mission of the school. Despite spending considerable amounts of money for hardware, networking connections and software, technology in schools tends to be, what happens in the computer lab, or a disjointed, haphazard portion of school life, seldom connected to or supporting instructional objectives in a meaningful way.*
>
> (Roden, 1997, p. 5)

2.1 Introduction

This chapter advances a case for greater attention to be given to the leadership and management of Information Technology in New Zealand schools. Like most of the other chapters it is intended to add another piece to the overall picture that examines the way IT is handled in schools. It is not intended to answer any of the research questions directly but more to establish a rationale and lay the groundwork on which other chapters can build.

Virtually all schools in New Zealand have made a serious commitment to substantial and increasing administrative and instructional use of Information Technology. Because of the dynamic nature of Information Technology it is difficult to obtain reliable and up-to-date statistics on either the number or nature of this type of equipment in schools or its dollar value. The problem is even worse for attempts to establish an inventory of software and the related support materials.

2.2 *The Size of the Investment*

The Ministry of Education's survey of computer use in New Zealand schools in 1996, which covered 2,673 of the country's schools (97.7%), found that these schools had a total of 51,920 computers (Owens, 1996). The New Zealand Ministry of Economic Development, extrapolating from the results of a subsequent survey, indicates that by 1998 there were about 75,000 computers in New Zealand schools (March, 2000). These figures demonstrate a remarkable 44% increase in the number of computers in just two years and indicate the enormous size of the investment in this kind of technology, especially as very little money is provided centrally, specifically for this purpose. The picture becomes more interesting when these results are compared with figures obtained from an earlier survey. Figures from the International Association for the Evaluation of Educational Achievement Computers in Schools (1991) study when compared with the 1996 figures show that the number of computers available per 100 students has increased dramatically since 1989, but is still well below the Ministry of Education's target for 2001. (See Table 2.1 and Figure 2.1)

Table 2.1

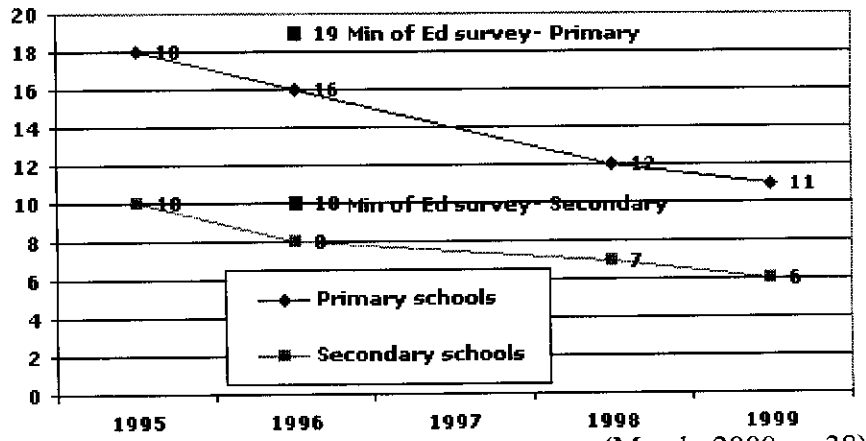
Mean Number of Computers per 100 Students in New Zealand Schools (1989 compared with 1996)

	Primary		Secondary	
School Size	1989	1996	1989	1996
Large	1.1	5.3	2.2	10.0
Medium	2.1	6.9	3.1	11.8
Small	4.5	12.8	5.4	16.5

(Owens, 1996, p. 9)

Figure 2.1.

Students per computer



(March, 2000, p. 38)

2.3 Pressure for Change

Although the 1989 figures were obtained from a sample of 613 schools they do, when compared with the Ministry's 1996 figure, suggest a trend for schools to increase the number of computers available to students and staff. It follows that the number of computers in schools is likely to continue to increase for some time. Indeed there are clearly identifiable forces at work that will encourage such a trend. The pressure generated by these forces, although not necessarily recent in origin is growing and may come from several directions:

> School systems, teachers, parents and children talk about computers as they never talked about programmed learning, educational television, open education or raising the school leaving age, for that matter. Schools must have computers.
>
> (Olson, 1988, p. 1)

First the features of computer hardware and software are developing at such a rate that the machines become dated very rapidly. As a result many schools feel obliged to regularly update their equipment to take advantage of the increases in computing power available from the latest technology.

The general commercial sector also plays a significant role advocating for greater attention to the place of IT in schools.

> Probing more deeply, the statistics reveal that the education sector is lagging behind others in its use of computers and the Internet. In 72 per cent of our secondary schools, less than a quarter of the teaching staff have access to the Internet, while 56 per cent of school principals use email once a week or less.
>
> (Information Technology Advisory Group, 1998)

> These statistics show that there is a low penetration of computers and networking connectivity in schools in New Zealand.
>
> (Frederick and McIlroy, 1999, p. 20)

At an official level too, there are pressures for the New Zealand Ministry of Education has decreed that Information Technology must be a part of the curriculum of every New Zealand student (Ministry of Education, 1994). As part of the process schools will follow to achieve this goal, the Ministry expects that schools will spend more than $500 million on computers by the year 2001 (Ministry of Education, 1994). The increasing level of investment this represents is demonstrated by a comparison of that figure with the 1990 estimate, that schools at that time, had more than $45 million worth of computer hardware and software (Sallis, 1990). In its 1994 report, the Ministry also contends that it is desirable to increase the number of computers from the 1994 level of approximately one computer per 17 students, to one computer per five students by the year 2001. The Ministry's 1996 survey reveals that small secondary schools (schools with less than 501 students) are reasonably close to that target of 20 computers per 100 students with a ratio of 16.5 computers per 100 students. This situation contrasts however with the ratios for all the other types of schools that in 1996 were still well short of the Ministry's goal. By way of illustration, once the Ministry of Education's target of one computer to every five students is met, then an average size primary school (200 students) will have 40 computers and an average size secondary school (700 students) will have 140 computers. On current equivalent full-time enrolment figures (Ministry of Education, 1996) this would mean that there will be in excess of 130,000 computers (an anticipated increase of approximately 73% from the numbers in 1998) in New Zealand schools if this target is achieved.

The issue is not of course limited merely to the number of computers or other information technology devices. It also encompasses, the role of the equipment in the teaching-learning process, the perceived skill base society requires and the professional development needs of teachers. While the matter has been taken up in

numerous forums, the New Zealand. Consultative Committee on Information Technology in the School Curriculum Committee captured the notion of the skill requirements of the *information technology society* with its statement:

> That all students, through access to appropriate information technologies at all levels of education, will leave school with the necessary skills to take their place in an information technology society.
>
> (New Zealand. Consultative Committee on Information Technology in the School Curriculum, 1990, p. 3)

The New Zealand Ministry of Education more recently, has echoed such sentiments.

> The widespread application of information technology has changed the lifestyle of New Zealanders. It has changed the way New Zealand firms and their overseas competitors do business. Information Technology must be part of the curriculum of every New Zealand school.
>
> (New Zealand Ministry of Education, 1994, p. 43)

In June 1995, the then New Zealand Minister of Education, Dr Lockwood Smith, drew attention to the connection with the teaching-learning process. In that speech he asserted "there are few greater issues in education than the impact of technology on teaching." (Chamberlain, 1995, p.6).

There can be little doubt too that there are other sorts of forces at work as well. Although networking computers can be successfully implemented in educational settings, there are data that its increasing popularity may be related to another trend, one that has plagued educational computing since its inception. This trend may be referred to as the *Everest Syndrome* (refer to the Glossary for an explanation and origin of the term) in educational computing. Schools that have succumbed to this syndrome have been lulled into believing that computers should be brought into educational settings simply because they are there. This may be further compounded by the beliefs: any exposure to computers will necessarily be beneficial to students; computers ought to be used for any and all tasks for which software is available or indeed imaginable; and if schools can obtain a sufficient quantity of hardware and software, quality will tend to take care of itself.

A result of the *Everest Syndrome* may therefore be an improper emphasis on computer hardware and associated infrastructure, and a consequent under emphasis on other, frequently more powerful, variables affecting the quality of the teaching

learning process. In some instances, this may result in computer implementations that over-emphasise what hardware can be made to do, rather than what children using computers can be empowered to do.

The New Zealand Computer Society also has expressed a view on the importance of the matter.

> It doesn't take genius-level intelligence to divine that Computers and IT are key to the prosperous future of any country. ...I am very concerned that New Zealanders should by then be fully computer literate and able to parlay our traditional improvisatory genius with number eight wire and tanalised four-by-two into world-beating information systems.... It can't have escaped anyone's attention that IT in Education is flavour of the month – actually, read flavour of the decade....our young people need to be as IT-literate as possible so that they can take full advantage of the Information Age.
>
> (Mason, 1998, http://www.nzcs.org.nz/magazine/masneduc.htm)

2.4 Vision vs Reality

Such intentions and ideas are therefore clearly advocating greater levels of access and a more effective use of technology. But how can this rhetoric become the reality? Common sense cannot be relied on for it does not automatically translate to common practice. Unfortunately, there is, all too often, a vast gulf between the goals of knowing what needs to be done and their implementation. Clemmer and McNeil (1989, p. 26)., citing Drucker state "the reason firms have excellent ideas and yet perform poorly is that the people who have the ideas can't get them implemented" They further contend that many brilliant plans and strategies have often stalled in organisations that have the technology, management systems, and a high degree of motivation and understanding of what is needed to be done. While some were able to achieve a successful implementation, many efforts initially spurted only to later dry up. In many cases, the intentions were the right ones, but the follow-through, the implementation, was wrong. The most common and consistent course of this "implementation problem" as identified by Clemmer and McNeil is a lack of effective leadership skills throughout the organisation. The risk then seems clear that a similar situation might exist with regard to information technology, its adoption, implementation and use by schools. There is then a danger that a vision may exist

that in addition to not being effectively implemented may also consume vast amounts of precious resource.

To some extent recognition has also been given to the needs of teachers who ultimately have the responsibility to translate the grand visions into reality. The New Zealand Employers Federation has stressed the importance of the information technology training needs of teachers.

> Without ensuring basic and on going information technology competence in all teachers, New Zealand will remain by international standards technologically illiterate and innumerate.
> (New Zealand. Consultative Committee on Information Technology in the School Curriculum, 1990, p. 6)

Once again, however, the focus is more to do with goals rather than implementation. It is also perhaps useful to make a distinction between the general needs of teachers and the more specific needs associated with the processes involved with the adoption and implementation of the technology.

2.5 The Scope of Information Technology

The investment and development is not of course restricted merely to computers and their associated support requirements. Information Technology, though often perhaps focused on computers, is much more extensive.

> Information is knowledge obtained from the interpretation of data. The acquisition, storage, processing, transmission, reception, analysis, application, presentation and protection of information constitute the arena of information technology.
> The engineering aspects of information technology utilise the disciplines of communication and software development. However, information technology is also concerned with the development of skills and support services required to produce and maintain the flow of information.
> (Albertson & Selwood, 1995)

> Information Technology is now acknowledged to be broader than the traditional computing and data processing industry and is taken here to include telecommunications and broadcasting
> (March, 2000, p. 1)

It is therefore worth making explicit that the level of expansion is not restricted merely to computers but extends into the realms of tele-computing and electronic communications systems ranging from telephony to video-conferencing. Schools are

investing in a wide range of information technologies including faxes, photocopiers, audio, video and desktop conferencing equipment, local area networks, additional telephone lines and links to the Internet. Networking, cabling and other associated items of infrastructure also represent areas of increasing investment for schools. By 1998, 83% of secondary and 37% of primary schools had networked classrooms (ITAG, 1998). Notwithstanding this level of investment there is an on-going pressure to extend it.

> Considerable work remains in cabling all schools to permit resource sharing and distributed access to student records and Internet resources. The Ministry of Education now recognises cabling projects as part of their Financial Assistance Scheme. The NetDay initiative is an excellent way for Boards to obtain financial assistance in preparing a cabling plan and getting started in wiring their schools.
>
> (ITAG, 1998, p. 11)

The Internet is another factor propelling schools to a greater adoption of the technology. Table 2.2 shows the number and percentage of primary, composite, and secondary schools with different types of connections to the Internet.

Table 2.2

E-Mail and WWW Use in New Zealand Schools

	e-mail only		e -mail & WWW		neither	
School Type	Number	%	Number	%	Number	%
Primary	148	6.6	437	19.4	1597	73.2
Composite	3	3.4	44	50.6	39	45.3
Secondary	22	6.6	205	61.6	99	30.4
Total	173	6.5	686	25.7	1735	64.9

(Owens, 1996, p. 7)

Owens' (1996) figures also showed that 86% of New Zealand schools were already connected, or were intending by 1998, to connect to the Internet. Such is the intensity of the interest that it is difficult to pick up any periodical, popular or professional, that does not refer, often in a feature article, to the *Information*

Superhighway. Clearly there is then a very high level of interest in the Internet. Indeed its potential as an administrative tool and information resource has been recognised by the Ministry of Education. All offices of the Ministry of Education are served by a comprehensive communications network that includes providing e-mail addresses for each employee. Since 1991, the Systems Technology Division of the Ministry has been piloting a client server for schools that provides e-mail and Internet access for over 3,600 registered users (Owens, 1996). In 1999, the New Zealand Ministry of Education established a new website (www.tki.org.nz), separate from the Ministry's own web-site to promulgate ICT information to schools. As Crossman observed:

> The Internet is already larger than the largest library and permits the sharing of files as easily with a colleague in Australia as one down the hall. The prospect of downloading complete text files from a computer 17,000 miles away whets the appetite of any educator who remembers the weeks of waiting for a book from library loan.
>
> (Crossman, 1995, p. 263)

Despite this level of enthusiasm, however, all may not be quite as it may seem. Certainly, the hardware and infrastructure appears to be in place. As a 1999/2000 survey shows, although Internet usage had increased from its 1998 level it was still quite low with about 50% of schools reporting that only 25% of teaching staff were regularly using email (March, 2000).

The level of schools commitment to electronic communications systems is also illustrated by the increasing pervasiveness of local area networks and computer laboratories with all the associated infrastructure of ducting, cabling, servers, networking software, furniture and the like. This trend is not only recognised but also encouraged by the Minister of Information Technology's Information Technology Advisory Group (ITAG) who espouse an objective for all New Zealand schools to use wide area and local area IT networks in learning and administration (ITAG, 1998, p. 3).

Williamson, the New Zealand Minister for Information Technology (1996) wrote in the foreword to *ImpacT 2001: How Information Technology Will Change New Zealand*:

> Louis Pasteur, whose discoveries underpin so much of modern medicine, said 'Chance favours the prepared mind'. By understanding the changes that are occurring now we can prepare ourselves and New Zealand to the maximum advantage.
>
> (Williamson, 1996, p. 2)

2.6 The Need for Management and Leadership

It is obvious therefore, that not only have New Zealand schools invested heavily in information technology and associated support services and materials, but there are also strong and persistent forces to increase the level of their commitment. From time to time, attention focuses on the desirability and effectiveness of this trend, yet only negligible consideration is given to any need to train people or create suitable positions of responsibility so they can provide the leadership or management that such a significant investment demands.

Certainly much has been written about the technology, what it is, how it will develop, and its capacity to influence the way we live. The rhetoric too is also strong about the role of education and the need to train teachers. Organisational change is also advocated not only as being necessary but also as requiring direction and fostering to secure suitable outcomes. Less attention has been given to the means of guaranteeing that this happens in a timely and effective manner. The human and physical resources involved are enormous, but the management and administration of the processes in schools is left largely to people with little or no formal training for the task. The exhortation is for all teachers to be trained in using IT to raise the quality of teaching (ImpacT 2001). If these sorts of goals are to be achieved there is a need for schools to have the staff who can lead IT development, provide useful relevant advice and effectively guide the development and decision-making processes.

There is also a clear need, to avoid much of the *ad-hocery* that has been so influential in the decisions made in schools about aspects of information technology. Boards of Trustees should be able to employ staff with the sorts of skills to provide them with sound advice and information they often either do not have themselves or can not really afford to purchase from already over-stretched school financial resources. As Butler and Zwimpfer point out:

> The lack of IT expertise in schools, in particular the smaller schools, when coupled with rapidly changing technologies, makes it impossible for most schools to prepare effective IT plans or make fully informed choices about IT purchases or to provide the necessary ongoing technical support.
>
> (Butler and Zwimpfer, 1998, p. 40)

Decisions about IT are likely to consume not only significant portions of schools' discretionary funding, but also substantial amounts of their already often stretched and limited budgets. Such decisions also have the potential to impact in critical ways on the teaching-learning processes and methodologies employed by schools. For these reasons, such decisions and developments must be made on soundly based knowledge and advice. Each school needs to have available the human resources to ensure that this is done in a sound businesslike fashion. This is particularly important in the "absence of a co-ordinated approach to the wider use of IT in schools" (ITAG, 1998, p. 2).

Various groups and agencies have recognised this problem. Most notably, and rather ironically, the Minister of Information Technology's Information Technology Advisory Group, has sought to assist schools. The dilemma for such groups is that New Zealand schools, though still mainly centrally funded, are all locally managed. The prevailing ideology favours increasing local control and minimising central involvement. With the continuation of this scenario, it is highly unlikely that a centralised approach will gain much favourable consideration at government level or that a central agency will be able exert much influence. Clearly then the objective has to be to ensure the availability of suitable expertise at school level.

2.7 Early Developments

There are also useful lessons to be learned from the early roots of Information Technology in schools. With the advent of the desktop computer, there was an increase in the force with which computers impacted on the school environment. The significant thrust for this trend is attributable to a cadre of teachers who essentially were computer hobbyists. This occurred in the 1980s with much effort being given to devise ways to use computers to enhance instruction. Accompanying this innovation was a desperate scramble, more particularly in secondary schools, to find a place for the *new technology* in an already overcrowded curriculum. One

consequence was the emergence of a new subject *Computer Literacy*. The teachers who often took on the teaching of this subject were often well intentioned, but predominantly self-taught computer hobbyists[1]. All too soon the computer moved from its former role as a medium for instruction to become the main focus of the instruction. In effect the medium became the message. The claims in support of this change were to the effect that teaching children to be computer literate would prepare them for a future that was certain to be dominated by technology. While there are still undeniable vestiges adhering to views of this sort, the 1990s have tended to bring a further refinement. Computer technology is not now regarded necessarily as an end in itself, but increasingly as a medium for improving the teaching-learning process.

While the genesis of computers in education may have been delivered in large part by well-intentioned hobbyist technophiles such a situation is no longer sustainable. The role of computers and Information Technology, in education, is now too important (Davis, 1992; Mason, 1998; Olsen, 1988; New Zealand. Consultative Committee on Information Technology in the School Curriculum, 1990; New Zealand Ministry of Education, 1994; Scottish Office Education Department, 1991), too complex (McDougall & Squires, 1997), and the potential consequences too dire for this kind of dilettantish approach to continue. There are grave dangers in allowing such a valuable resource that has great potential to enhance the education process in the hands of amateur, though well-intentioned people.

Further innovations are required, both in technology and the associated approaches to teaching and learning, but they need to be based on a school-focused approach (McDougall & Squires, 1997) and should involve teachers in the planning and development process (Guskey, 1986). Certainly, studies have shown that staff development activities undertaken in isolation from teachers' ongoing classroom responsibilities seldom have much impact on teaching practices or student learning (Doyle & Ponder, 1977; Zirgami, Betz, & Jensen, 1977). The propagation of such developments must draw to a much greater extent on teachers teaching teachers, rather than a reliance on outside experts coming in to do the teaching and give all the advice (Bruder, 1990). Furthermore, the involvement of teachers in this manner

[1] The author has used this term based on personal knowledge of the people working in this area of the teaching profession

would help ensure the authenticity of the professional development programme, especially the issue of integration or permeation of Information Technology across the curriculum (Robertson, 1997), and be consistent with the need for teachers to validate their knowledge of teaching in a very pragmatic way (Guskey, 1986). Such an approach would certainly be consistent with strategies for reaching late adopters and reluctant technology users and to make explicit the connection between the work of teachers and Information Technology tools (McKenzie, 1999). It also would help alleviate issues relating to an undue focus on software and hardware rather than educational objectives (Bleach, 1986; Malatratt, 1990). Alternatives to this form of school-based approach such as requiring teachers to attend workshops given by outside experts suggests that the years of practical experience the teachers have gained is under-valued (Lieberman, 1995). Such outsourced forms of professional development also may serve to encourage a view among teachers of teaching as technical, learning as packaged, and teachers as passive recipients of objective research (Riel & Becker, 2000). Certainly the rather ad hoc and laissez-faire orientation of the past will no longer suffice.

2.8 The Training and Professional Development Role

Given the size of the investment, its cost to schools, and the lessons that can be learned from previous experience with technology in education, there is an exigency to maximise opportunities for it to be used effectively. An important component in meeting this requirement is to ensure that there is a growing supply of suitably qualified and experienced professionals to lead the way for the effective and innovative use of information technologies at all educational levels. An argument based on the sheer amount of hardware and software in schools could cogently advance a case for such a qualified person in every school. However, it is not equipment quantity alone that determines this need. A far more important factor is the nature and use of this equipment (McKenzie, 1999).

Virtually all teachers will eventually need to have at least some involvement with computers and other forms of information technology. As a result they all have a degree of responsibility to ensure that it is used effectively. This is a central issue, for although we know how to mass-produce advanced reliable hardware, and can mass-distribute software, we do not know how to mass-produce or mass-distribute

teachers who are well qualified in Information Technology. It seems reasonable to assume that most teachers are capable of learning to use and manage the technology if they are given sufficient time and a sufficiently supportive environment (Hodas, 1997; McKenzie, 1994). The computer in particular is an agent of rapid change, one that transcends subject boundaries. Such a swift rate of change is not readily accommodated by most education systems for they have not generally demonstrated an ability to cope easily with change at all (Cuban, 1986; Fullan, 1993; McKenzie, 1999; Cuban, 2000). Any notion that there is little need for in-service teacher education should be well and truly dispelled by the challenge of the rapid and far-reaching changes effected by computers. Considerable skill and knowledge is required for teachers to make effective use of computers in disciplines as diverse as science, geography, business studies, technology or the arts. While a few teachers have been able to learn on the job, the majority of teachers have neither the time nor the surplus energy to acquire adequate levels of knowledge and skill while still coping with all the demands of their teaching responsibilities. Providing teacher release for the widespread in-service education necessary to address these deficiencies would be very expensive, time consuming and probably not particularly cost effective. A more appropriate approach would be the provision of school-based staff development programmes that facilitate the effective use of information technologies in schools. Such programmes would include providing one-on-one in-service training that is individualised to a teacher's own specific needs. There is a need for a suitably qualified person to design and implement such staff development activities as well as the development and management of the supporting facilities.

In this regard, it is perhaps useful to distinguish different categories of educators and their relationships with information technology. There is the classroom teacher who may, like most primary teachers, teach a range of subjects, or like a typical secondary teacher teach only one or a limited number of subjects. Characteristically these teachers have to integrate Information Technology into their classroom programmes and teaching practice. Because most of these teachers did not grow up in an Information Technology rich environment, nor did they attend schools that provided such an environment, many are likely to be ill-prepared to deal with such technology at either a personal or pedagogical level.

There is also the type of teacher who is concerned either exclusively or mainly with teaching computer applications, computer literacy, computer programming or computer science. These teachers are much fewer in number and are typically self-trained. Few have been trained specifically for this area and only a small proportion will have formal academic qualifications in the relevant disciplines.

2.9 The Role of the Principal

There may be some justification in the argument that school principals should take the responsibility for the management of their schools' Information Technology resources. Certainly in the capacity as chief executive a principal does have the overall responsibility for this area. That they have this overall responsibility is perhaps the critical factor. The introduction, enhancement and maintenance of Information Technology as an integral part of a school's instructional programme requires a high level of active hands-on involvement. Participation at this level is not a viable proposition for a principal who already has a vast plethora of other duties and responsibilities. It is worth observing that Casey (1993) citing a survey conducted by California's Computer-using Group noted that less than 40% of the teachers surveyed considered that their administrators were showing active leadership in bringing technology into the classroom. A response to this might be to encourage principals to become much more actively involved. While there may be some room for this to happen it is likely that such a demand would fly in the face of the reality of life for the principal of a modern school especially the average to large secondary school (700 students or more). Clearly principals have the capacity to be influential, but in accordance with the principles of good management practice and the reality of modern school management they must delegate and be able to do so to at least one person suitably experienced and qualified to reliably undertake the necessary responsibilities.

2.10 Conclusion

Thus a strong case exists for not only having designated responsibilities for Information Technology in schools, but also providing suitable training to equip these people for the demands and challenges of such a role, an issue that will be addressed in Chapter 5. Associated with this need is an important corollary; it is providing, along with the training, the relevant qualifications to equip these people

with the credentials that acknowledge their abilities and competencies. While having such designated responsibility is necessary, it is not of itself sufficient. There needs also to be a culture that is conducive to the effective management and leadership of IT and people with the appropriate personal qualities and skills to undertake the responsibility. More details of these qualities and attributes are examined in Chapters 8, 9 and 10 while the next chapter focuses on the change issues that may be necessary to allow these kinds of development to take place.

CHAPTER 3

MAKING CHANGE EFFECTIVE

> *When the objective is to make children composers, performers, and appreciators of music, it is not enough merely to place a piano in every classroom and provide each teacher with a one-day course on how a piano works.*
>
> (New Zealand Consultative Committee on Information Technology in the School Curriculum, 1990, n. pag.)

3.1 Introduction

Much of the argument that is developed as part of this thesis is concerned with some form of change and unless that can be done in an effective manner then other developments may be jeopardised or their impact diminished. Therefore, this chapter focuses on making change effective. Furthermore, there is a litany of innovation especially in educational technology where the initial expectations have never been fully realised. It is possible that some lessons may be learned not only from the mistakes of the past but from the experience gained in other fields of endeavour.

It has been said in the past that educational innovations have all too often been blunted on the classroom door. Years of experience all too clearly document that the mere existence of educational innovations does not guarantee their use. This repeated failure of all too many educational innovations to achieve widespread adoption clearly poses problems that must be addressed.

For a long time now, many people have been trying to introduce technologies into school classrooms, with remarkably consistent results. After initially proclaiming the potential of the new tools to rescue the classroom from the dark ages and usher in an age of efficiency and enlightenment, technologists have found to their dismay that teachers can often be persuaded to use the new tools only slightly, if it all (Cuban, 1993). They further find that, even when the tools are used, classroom practice remains fundamentally unchanged. Indeed, despite the appearance of change, it could be argued that the last technologies to have a lasting impact on the organisation and practice of schooling were the textbook and blackboard.

As Cuban (1986, 1993) has repeatedly observed, the history of education is littered with descriptions of technological innovations that have not really lived up to initial expectations. Change and the tendency to embrace or resist it seem always to be part of the human condition. Change leads to consternation for some, indignation for others, shock for others, and for a few, hope. Because of this inherent potential for trauma, defining concepts and developing measurement procedures for assessing what was actually accomplished by change is difficult and challenging work. All too frequently, the affective dimension of change draws a veil that obscures what the innovation users are actually doing. It needs to be remembered too, that change or innovation adoption is not accomplished in fact just because a decision-maker has announced it. Instead, the various members of the user system, such as teachers, demonstrate a wide variation in the type and degree of their adoption of an innovation.

3.2 Innovation as a Process

One of the reasons for this variation is a commonly overlooked fact that innovation adoption is a process rather than a decision point; a process that each innovation user experiences individually (Bailey & Palsha 1992; Hall, et al. 1975; Hall, et al. 1973; Hall & Hord 1987; Heck & Goldstein 1980). The levels of innovation adoption that comprise this process need to be accepted as legitimate steps in growth leading toward sophisticated use. Subsequently, strategies must be developed that deal with the user's present level and facilitate growth, for adopting an innovation is a developmental phenomenon that each user experiences individually. Consequently, some individuals will at times, be at less efficient levels than others.

Complementing this, the research on educational change strongly supports the notion that innovations will not be implemented in schools just because they appear to make sense and may meet specified needs. (Fullan, 1991). Apart from the innovations themselves there is also a need for other forms of change as well. New knowledge and attitudes are often necessary. While important, these aspects are not necessarily sufficient. Changes to attitudes and knowledge are possible but without accompanying behavioural change the effectiveness of the innovation may be minimal or even lost. (Fullan, 1991; McClelland, 1968). Consistent with Cuban, Fullan describes "a huge legacy of failed reform" (p. 354) and argues that a complex

web of factors must be present to support successful innovations. While Fullan's contentions are not exclusively directed at technology-based innovations they too, despite the claims of their power and potential, have often conformed to the negative legacy of previous reform efforts. Among the impediments that limit the effectiveness of technology use in schools are: inadequate resources, lack of teacher preparation, lack of staff development, lack of time, and inadequate on-site support. (Braun, 1990; Sheingold & Hadley, 1990).

3.3 The Problem of Innovation

Before picking up on the impediments identified by Braun, Sheingold and Hadley, it is necessary to consider the general environment, for although there are specific obstacles there are also some more general issues that may need to be resolved first. One such possible difficulty is that the people within the organisation may not really care about innovation. This sort of attitude may be dismissed as merely reflecting the attitudes of people more concerned with receiving a pay cheque than wanting to contribute to the advancement of the organisation for which they work; the classic Theory X perspective (McGregor, 1960). When viewed in this way the solution to this problem appears to lie in hiring different people; the right people for the job. A solution that involves finding more capable people, while perhaps having an occasional place, can perhaps be little more than a cop-out, a convenient excuse and refuge for avoiding some fundamental leadership responsibilities. The need is not just for people with the requisite skills and knowledge, but for people who have appropriate interests and attitudes.

If the alternative perspective is taken, the one that acknowledges that people often do truly desire to make a difference, the Theory Y perspective (McGregor, 1960), then difficulties with innovation become an even bigger puzzle. The explanation cannot be attributed merely to not having the right people it must lie in another direction.

Most organisations and indeed many schools have mission statements, goals and objectives, official visions, and organisational values that are carefully articulated and published. Too often however, there has grown an understandable cynicism around the mismatch between the lofty ideals and the realities of organisational life. The rhetoric does not match the reality. Too often the nice ideas presented in such statements have meaning only to a few but communicate little to the organisation's

members as a whole. Very few organisations have a culture in which a management decision could be challenged on the grounds that it did not serve the mission. The majority of organisations serve those who are in power rather than a mission (Senge, 1998). Associated with this is the difficulty so many organisations have in creating an environment of openness; one in which people feel free to speak up and identify faults. Building this kind of culture, one in which people can express their views without fear of any form of reprisal is often in reality a major challenge for most organisations. Therefore the general obstacle may not be a specific one but one to do with the prevailing climate within the organisation. Thus, the challenge to permit effective innovation may be to create an organisational ecology that fosters and supports the sort of interaction that is conducive to genuine change.

The point is that while the specific impediments already identified are important they must be addressed against the backdrop of the organisation's culture and not in isolation.

3.4 The Place of Staff Development

To return now to the specific impediments that limit the effectiveness of technology use in schools there are, notwithstanding such arguments, grounds for optimism. There is evidence that teachers in a co-ordinating role can perform a variety of functions that help schools overcome many of the existing obstacles to effective use of technology (Bruder, 1990; Strudler, 1991). If this contention is accepted then the number of teachers undertaking such roles should increase with a consequent greater demand for relevant professional development opportunities. Studies that have focussed on computer co-ordinators (Strudler, 1991; Strudler & Gall, 1988) as well other people involved in staff development (Miles, Saxl, & Lieberman, 1988) provide support for such a notion. In addition, they suggest that suitable professional development opportunities should be made available for teacher leaders with responsibilities for facilitating change.

Any such staff development programme focussing on technological change has to be viewed as a long-term change effort and as such it must incorporate and build on a range of strategies that are compatible and supportive of that view. For this to have a reasonable chance of success, the objectives must be long-term and the locus of the programme school-based. Out-sourced development activities have a place, but they

are not the only, nor necessarily the best, solution. The major thrust and responsibility must lie largely within each school because of financial constraints (costs include hiring specialists and employing relief teachers), the need for on-going support, the need for training to be relevant to the situation and the provision of suitable modelling. Consequently, there needs to be someone with primary responsibility for leading and managing this process. It is increasingly no longer feasible for the principal to shoulder the total responsibility. In keeping with the ever-increasing pressures of the position and the principles of good management, much of the responsibility for the management and implementation of IT in schools should be delegated. The people to whom these responsibilities are delegated need, however, to have the personal qualities and skills to allow them to be effective in all the aspects of their job. It is a complex task that does not merely entail the planning for and purchase of hardware and associated support infrastructures. These people need a range of skills in other more diverse areas including, in particular the arenas of adult learning and staff development, aspects that receive further attention in Chapter 5.

There are several key principles that ought to characterise any staff development program. There is an affective, or personal, side to change. Too often, change facilitators and teacher educators become involved in the technology of the innovation and neglect to attend to the people who are involved. Such personal concerns are a very real part of the change process and must be acknowledged and recognised as legitimate. It is the responsibility of the staff development co-ordinator to attend to these early concerns, or the staff involved may be apt not to be able to resolve, use and move on to more important concerns.

Because change is a process, entailing developmental growth and learning, it will take time. Managers of the change process and other designers of staff development activities need to acknowledge and anticipate that change is a process and, consequently they need to adjust their training activities accordingly (Ritchie & Wiburg, 1993; Strudler, 1993). One-shot workshops do not necessarily produce effective results; long-term follow-up is normally required. Policy and decision-makers must also become aware of this fact, and, in response, stop assuming that their decrees and mandates will result in instantaneous cures out in the field. Staff

developers need to design and deliver their activities so that the concerns of all the teachers are addressed.

Once people buy into the idea of concerns, a new dilemma appears. As with any group, individuals within the group are never at the same place at the same time. Rather, individuals with different kinds of concerns will be present. Therefore, the traditional, cost-effective format of providing common staff development activities for all teachers is no longer acceptable. The problem becomes: how to individualise and personalise staff development in such a way that each teacher's concerns are addressed, while attending to the fact that staff development budgets and staff time have limits. Using small homogeneous groups, designing options within a staff development session, and providing school-based programs will have potential for solving this dilemma.

Since schools are complex organisations, not all the component members or constituencies will have identical interests at all times. The technology that is favoured by one faction at a given moment may be resisted by another, which might favour it for different reasons, and under different circumstances. Also technologies are not necessarily value free nor constituted simply by machine processes themselves. Rather, they offer uses for machines and often support highly normative, value-laden institutional and social systems. These are all very important factors that must be taken into consideration when staff development is being planned or developed.

3.5 Strategies for Enhancing Teacher Leadership in ICT

A primary goal of staff development must be to help teachers acquire knowledge, skills and perspectives that will improve instructional effectiveness. This staff development in turn, should also seek to assist teachers to increase productivity through the use of more sophisticated instructional delivery systems. In order for this to occur, training programmes must acknowledge the reality that they usually only deal with a tiny proportion of the teaching population. Any programme designed to assist with teacher professional development should therefore incorporate a range of strategies that are aimed at helping teachers to become change agents. It is only through the adoption of such a strategy that other teachers and the educational environment itself can themselves be changed. No one programme or

course can realistically hope to affect directly many more teachers than those actually involved in the programme. A major goal has to be to produce teachers capable of influencing, adapting, innovating and altering the environment in which they practise.

3.6 Action Research

One such strategy is action research that characteristically focuses on site-based problems of immediate concern (Glesne, 1991; Kemmis & McTaggart, 1982; Noffke, 1992). Skill in action research has the particular advantage of identifying problems, developing solutions, and then initiating and refining them in a continuing spiral of professional development. Additionally, it is geared toward finding solutions to practical problems and to linking theory with practice. As a consequence, when teachers are doing action research they usually select problems for study that are directly related to their practice, thus aiding them to develop an informed framework for making decisions, and establishing a basis for making effective changes in practice (Strudler & Powell, 1993). While these sorts of developments are clearly desirable, there is a need not just to make changes to the practice itself but also to the environment in which the practice takes place. To do this requires a different skill that involves leadership and a capacity to effect change.

3.7 Facilitating Changes in Staff Performance

Apart from the requirement to learn new skills, explore alternative approaches, analyse new situations and acquire and transfer problem-solving abilities from one context to another, a programme seeking to promote professional growth must also challenge teachers too. They need to be stimulated to reconsider personal attitudes and beliefs about their roles and scrutinise their vision of technology's place in society, schools and their own lives. Any such changes in teachers' thinking and behaviour, especially if they are to be of an on-going nature, necessitate an involvement in a process of self-actualisation. Maslow (1968, 1970) identifies five categories of needs in a hierarchy of ascending importance in which lower order needs generally take precedence over high-order needs. Maslow asserts that only when the lowest four needs in the hierarchy are met can the individual become motivated by self-actualisation. In light of Maslow's theory, there are strong

implications for any staff development programme seeking technological change. Research (Bennet, 1991) indicates that teachers' awareness and/or concern about their physical comfort within a staff development setting is foremost in their minds. Considerations that are basic to any staff development programme include increasing physical comfort levels by the inclusion of frequent breaks, snacks and drinks, comfortable chairs, adequate heat and light, materials that are easy to read and a varied pace of learning activities. There may be an assumption that the second level of Maslow's hierarchy *Safety and Security* has little relevance to most staff development activities because they typically occur in settings where participants will feel safe from physical harm. However, there are relevant considerations for teachers do need to feel psychologically safe when exploring the use of new technology (Herrman, 1988). The feelings of apprehension that are often associated with ventures into learning the use of new technology can interfere with learning, as well as teachers' abilities to integrate technology into classroom practice (Hunt & Bohlin, 1992).

Teachers must be able to maintain a positive self-image and status while they are assisted to acquire the knowledge and skills required to learn how to use new technology. Teachers are no exception to the fear, also felt by other professionals, at the prospect of having to acknowledge they know little or nothing about technological tools. Certainly, no one likes to feel stupid or incompetent in front of peers or superiors. For many teachers, this may be a double-edged problem. Not only do they need to acquire personal skills and knowledge in the use of the technology but they also have to learn to incorporate new technology into classroom practice. In these circumstances, they may move from feeling highly competent within their current teaching context to feeling less competent as they realise that there may be deficiencies in the range of skills they need to be successful teachers in the future. For female teachers, particularly those who have been in the service for some time, these concerns may be quite strong as typically they will have had little cultural preparation for intimate interaction with mechanical and technological devices (Spertus, 1991).

3.8 Cognitive Development

Just like Maslow's hierarchy of developmental needs, Bloom's (1956) taxonomy of the cognitive domain reflects an ascending structure of classes that range from facts oriented reproductive thinking (knowledge) through to the much more sophisticated high-level productive and critical thinking (evaluation). Also Bloom's paradigm shares a further similarity with that of Maslow in that each level of both taxonomies makes use of and builds upon the preceding classification level. This also has implications for staff development programmes. Bennett (1993) identifies two faulty assumptions about how teachers learn to integrate technology into classroom practice. The first of these is that the learning involves the mastery of only one knowledge base or set of skills. The process of learning to use a computer is in fact much more complex involving the development, understanding, application and integration of many knowledge bases and sets of skills. Mastery of this knowledge and skills must be acquired on a personal level before teachers are ready to learn how to incorporate the new technology into their teaching repertoires and in turn to teach their students how to use it to aid in their own learning. The second faulty assumption is that once a knowledge or skill base is developed teachers will automatically be able to transfer that set of skills to a new setting without modelling, guided practice, feedback and follow-up assistance. Teachers need support and guidance in applying new skills.

Bennett (1993) also contends that there is a strong interdependence between the cognitive and affective realms of professional growth such that educators involved in the staff development process will feel motivated to engage in higher-order learning activities only after basic affective needs are satisfied. It follows, therefore, that staff development contexts, processes and activities which facilitate the fulfilment of these needs will result in more energy being expended by teachers to learn new skills and information. If, from a teacher's point of view, self-actualisation means becoming the best teacher possible through the proper use of a variety of teaching methods within the context of teaching and learning, then there is a clear pointer to a strategy for a staff development programme. A staff development programme for technological change must enhance teachers' quests for self-actualisation as part of its delivery. Such a programme must also acknowledge the complexity of the

process of successful transfer and integration of new technological knowledge and skills into practice and view its outcomes as part of a long-term perspective.

3.9 Political and Ideological Considerations

Typically, teacher courses dealing with computers in education have focused on the mechanics of the technology or how to use the technology to teach. Characteristically, teachers engaged in such programmes are required do a range of things. They may include learning to: make confident use of software packages and information technology devices; critically review the relevance of software and hardware to their classroom practice; develop and incorporate into their teaching programme, schemes of work that make appropriate use of Information Technology; and evaluate the ways in which the use of Information Technology may change the nature of teaching and learning. To a large extent, many of these are oriented to comparatively low level cognitive processing and are essentially the products of training rather than education. Valuable though this sort of knowledge and skill may be, education courses and programmes should do more and assist teachers to move beyond mere functional competence. Not only is the computer a powerful tool but it is also a potent symbol in our society. Teachers need to appreciate that the demands and pressures on them to use computers in schools raise issues that are not just pedagogic. While clearly teachers need a range of skills to use technology, they also need a wide cultural and political perspective that allows them to see clearly and critically the value-laden nature of the technology. They should also be able to unveil the motives of the proponents of the use of technology and examine the consequences of the ways in which they and their students use and think about the technology. Among the more readily identifiable forces influential in mediating the experience of information technology are industry and the government.

A commonly articulated motive for technology's role in education concerns vocational need (Frederick & McIlroy, 1999). The rhetoric refers to students needing to be prepared for their future roles as producers, consumers and citizens in a competitive, technological society.

> The Information Age is upon us. The cycle of technology development and implementation is accelerating.... More than 50 per cent of Gross Domestic Product (GDP) in the major OECD economies is now based on the production and distribution of

> knowledge. We are leaving the Industrial Age behind and moving into the Information Age....
>
> ...But New Zealand's economy is still too dependent on producing commodities for export. While efforts over the last fifteen years to diversify markets may have been successful, we still need to expand our limited range of products. We must take the next important step and transform New Zealand from a pastoral economy into a knowledge-driven economy. ....
>
> We are weak in these key areas:
>
> The place of information and communication technologies (ICT) in education, the low number of graduates we produce in technical disciplines, and more widely, ensuring that all teachers and students are ICT-literate.
>
> (Frederick & McIlroy, 1999, pp. 1-2)

Preston (1992) found that schools had responded to this imperative by using technology overwhelmingly in a vocational way. However, teachers need to scrutinise carefully the extent to which schools can or should fulfil a vocational function in modern technology. While these sorts of functions may be of value caution must be exercised in developing an assumption that the primary purpose of education is to train students to fit uncritically into the workforce. If education is essentially concerned with preparation for later life then it ought to be preparation for a full life, and not merely for employment.

It may be all too easy for teachers to become uncritically acceptant of technology and particularly computers with their seductive presentation as beneficial, economically competitive, efficient, fast, of growing importance, and essential for national economic advancement. Positive associations of computers with abstractions such as rationality, efficiency and progress enhance such allure. Less obvious, however, are other competing but still legitimate views that may: see technology having a role as a form of cultural imperialism; conceive of economies other than the market economy; regard some other aspects of life and experience as more important; perceive some applications of computers as possible but not necessarily socially desirable; and have concerns for the way the advance in technology serves to widen the gap between groups and nations who have ready access to technology and those with less technology.

Even more appealing to teachers is the potential of computers to have beneficial effects on the quality of learning. The rhetoric but not necessarily the action of

politicians may have further reinforced such this appeal. Comparatively little funding has come from the New Zealand government to fund computers although the Telecom New Zealand sponsored Telecom Education Foundation contributed more than $35 million to help schools come to grips with Information and Communications Technology (Harris, 1999). The cost of equipment has however been identified as a major factor reducing the value schools get from their investment in IT (Sullivan et al, 1998). Apart from lobbying and general fund-raising activities teachers and principals can do little to address this problem. Where there is much more scope for barrier reduction within the control of school management is in the other two major areas: *teacher knowledge of equipment and teacher understanding regarding the value of use* that were also identified by principals as greatly influential in reducing the value obtained by schools from the ICT investment (Sullivan et al, 1998).

3.10 Conclusion

As was discussed in Chapter 2, it cannot be assumed that the principal can be relied upon to achieve all the change that may be necessary and especially in the technology area. In addition, this chapter has been arguing that there are changes needed to ensure that the environment and culture within schools is conducive to the type of change that is going to optimise the chances of technological innovation being successful. Too often in the past this kind of change has not delivered in accordance with its initial promise. Although there is probably no real danger that computers will be thrown on the educational technology scrapheap, it is at least prudent to explore directions that will maximise the chances of them realising their promise. A major factor in determining the level of success of innovation is the people who lead and manage it. The next chapter explores the characteristics needed in the people who have the responsibility for leading and managing the implementation and adoption of Information Technology in schools.

CHAPTER 4

MANAGER OR LEADER? THE QUALITIES REQUIRED

> *Management is efficiency in climbing the ladder of success; leadership determines whether the ladder is against the right wall. Efficient management without effective leadership is like straightening the deck chairs on the Titanic.*
>
> (Cornesky, 1992)

4.1 Introduction

In Chapter 3, the argument centred on the environment that is needed for innovation to be successful. While not the sole determinant the people with responsibility for leading and managing it are certainly very important factors. This chapter builds on the ideas outlined in Chapter 2 that advanced a case for leadership and management of Information Technology as well as those in Chapter 3 that outlined some of the ways that change can be made more effective. This chapter discusses the balance of leadership and management qualities that will be required and these are then taken up more specifically in Chapters 6, 7, 8 and 9.

An argument has been advanced in this thesis that there are clear problems associated with the successful implementation of innovation in general and IT in particular. Certainly, the British Telecom Report *Heading for the Superhighway* (McCarthy et al., 1999) makes the point that the most crucial factor for ensuring the success of ICT in schools is good management and leadership. Specifically the Report identifies seven crucial areas: planning and target setting; capital investment and maintenance; management and administration; in-service training; supporting the curriculum; monitoring and assessment; and community use of resources. These are all clearly management type functions. At least a part of the solution lies in having suitably skilled and qualified teachers available to undertake appropriate delegated responsibilities in much the same way as happens for senior business management roles. While the direction of the argument so far may be clear, what may be less clear is the kind of qualities these people ought to possess. Ought they be managers or should they be leaders? It is important to make this distinction even though the roles of manager and leader are not mutually exclusive. Management involves the

rational assessment of situations and the systematic selection of goals and purposes, the development of strategies to achieve the goals, the marshalling of the necessary resources, design, organisation, direction and control of the activities to attain those goals. While management has as a primary purpose making the technologies work this is accomplished primarily through systems: financial, production, service, and administration. The focus tends to be on science and systems. There is clearly a place for this kind of approach and the skills associated with it but the nature and pace of change are likely to be such that other qualities are also needed. These qualities are those of a leader. This chapter seeks to determine the characteristics of leaders as distinct from managers and advances the case particularly for the role of leadership qualities. Chapters 7, 8 and 9 will continue to develop this theme by looking specially how the balance of management and leadership skills and qualities applies to Information Technology in Education.

Despite the high level of interest in the subject of leadership it still remains an elusive concept. Yet demonstrably it is extremely important, as its impact on business performance is dramatic.

> ... according to a study by Anderson Consulting's Institute for Strategic Change: the stock price of companies perceived as being well led grew 900% over a 10-year period, compared to just 74 percent growth in companies perceived to lack good leadership..." The truth is that no one factor makes a company admirable," wrote Thomas Stewart, "but if you were forced to pick the one that makes the most difference, you'd pick leadership. In Warren Buffet's phrase, 'People are voting for the artist and not the painting.'"
>
> (Bennis, 1999)

While the study referred to by Bennis relates to leadership in business, it serves to stress the general importance of leadership; an importance likely to be of similar significance in education.

4.2 The 'Common Sense' Approach to Management

There may be a temptation to obviate discussion about management and leadership to one focussing on common sense. Common sense, however, is not only an elusive quality, but it does not automatically become common practice. There can often be a vast gulf between knowing what needs to be done and actually doing it. Indeed having a good idea is one thing, implementing it is quite another. Clemmer and

McNeil (1983) among others have found that one reason why some firms that have excellent ideas yet still perform poorly is that the people who have the ideas cannot get them implemented. It is their contention that many brilliant plans and strategies have stalled for this sort of reason. Often these organisations have the technology such as computers and manufacturing processes, the management system, and a high degree of motivation and understanding of what needs to be done. While some were able to do this well, many efforts spurted and later dried up. The intentions, in many cases, were right, but the follow-through; the implementation, was wrong. Clemmer and McNeil (1989) observed that the most common and consistent course of this "implementation problem" has proved to be a lack of effective leadership skills throughout the organisation. The key to changing the leadership elements or conditions that exist in all organisations lies in the skill levels of all organisational members.

4.3 Distinguishing Between Leadership and Management

The person who successfully marshals human collaboration to achieve particular ends is a leader. Leadership seeks to orchestrate the dynamics of people working with people. Leadership recognises that people might sometimes be irrational, emotional, uncontrollable, and even unpredictable. Leadership develops an inspirational context using vision and values to create a sense of purpose and commitment. Leadership, properly deployed, integrates people as teams. The teams have purposes, and these purposes will in turn bring about new vision. Leadership is reflected in the ability to initiate action and move others to a shared goal. This is persuasion, not position power. While obviously there is likely to be an expectation that IT Managers/Leaders in schools will have an appropriate level of technical competence perhaps less attention may have been given to the importance of the capacity to work with people. (The views of principals and CIOs about the place of technical expertise is explored in Chapters 8 and 9). These are qualities that enable the vision to be realised and although vision is often regarded as among the most important attributes of a leader, it is one that is closely intertwined with the strategic role of leadership.

4.4 The Evolving Needs of IT Leadership in Schoools

Although business is now beginning to accept that the nature of leadership in the IT area is changing, schools may not yet have given the issue the same degree of consideration. Some of the older views of the role of IT now need to change as IT itself changes from an art form inspired by engineers bent on building technology solutions, to a business discipline that is mature, can be audited and is perceived as a capital asset. (Pedersen & Rubenstrunk, 1999). While school leaders and policy makers widely acknowledge the importance of IT in education they have perhaps had an orientation to its role primarily as a support mechanism with potential benefits for administration and pedagogical applications. Rather less attention has been given to its strategic importance. A similar attitude used to prevail in the business world but this situation is rapidly changing. The consultancy company Pricewaterhouse Coopers stated in its November 1998 *Trendsetter Barometer* report that 80 per cent of the Chief Executive Officers of the 436 fastest-growing companies said that the role of Information Technology was not just important **but extremely important** to their company's success. These CEOs posted 72 per cent higher revenue growth, than peers who did not rate IT as highly. This reflects the new business model in which IT plays a central and driving role; a strategic role. While clearly schools are not normally evaluated in terms of their revenue growth there does seem to be a valid comparison between their ability to cope successfully with the innovation that IT demands and the role of IT in business. Just as IT is assuming a more pivotal role in business, it will increasingly assume a similar significance in education. Just as is the case for business, schools need leaders who are able to recognise the need to change and who are capable of effectively managing the related cultural change. Caution must be exercised to avoid acquiring the mistaken view that the emergence of early adopters is a sign that the culture has moved. Errors of this sort may lead to the development of a set of expectations that are based on that vanguard and which as a consequence are out of sync with current cultural reality. A lack of leadership capable of dealing with this kind of situation could be the downfall of modern schools wanting to provide the best possible educational environment for their students.

This need for strategic leadership is not however limited to IT. Increasingly, as has happened in the business world, the people with comparable responsibilities in

schools will find that more and more of their job is becoming focused on managing IT systems (PC Week Magazine, 1997). Their job is in fact becoming more concerned with managing information within the school. This sort of emerging change in function has several important implications. It means that more effort needs to be accorded to pushing information downward and outward to end-users in the most efficient way possible. It means planning and implementing systems that can provide the school with the most effective ways of complying with the increasing demands of government, allow teaching and administrative staff to provide better quality services more readily and in an increasingly competitive environment gain an edge in the *marketplace*. Furthermore, it also entails getting those systems online rapidly enough to capture a meaningful return on investment and also perhaps a competitive advantage. While some of the realities faced by today's CIOs and CEOs may not be felt as fully in schools it appears almost inevitable that these forces will increasingly become the reality for schools and the people within them with relevant managerial responsibilities.

While the links of strategy and vision to leadership are quite clearly established, what receives rather less attention but which must also be an important part of leadership are issues to do with professionalism and ethical behaviour. Certainly, organisations such as the Association for Computing Machinery (ACM) and the New Zealand Computer Society (NZCS) have clearly expressed commitments to ethical professional conduct.

4.5 Leadership and Ethics

Information technologies and in particular the information systems that they operate have in themselves become very powerful change agents. At the macro level, and especially in the commercial sector, this power has led not only to the devastation of some industries but also to the development of entirely new ones. At the micro level they are capable of creating new ways of working, and through the use of office automation systems, greater levels of integration of clerical work. The developments in the associated communications technologies have meant that increasingly geographic distances have become almost irrelevant. The kinds of cultural turbulence that the IT operation and its associated change pressures tend to engender, puts schools as organisations under a great deal of pressure as they struggle to

respond effectively and efficiently to the needs of their various client groups (students, parents, and staff).

The technological, economic, and educational rates of change that are related to IT are still increasing. While this may be acknowledged, it may perhaps not be so readily apparent what the effects of this will be on the organisational structure and operation of schools. Almost inevitably there will have to be some form of restructuring, whether evolutionary or revolutionary that is likely to impact on the ways schools do things. This impact may be on, amongst other things, departmental structures, organisational hierarchy, job content, span of control, methods of communication, and forms of social interaction. In this context the discussion tends to focus on the management and staff level of a school's operation. While this is unquestionably important and in itself provides evidence for the need for an ethical dimension to leadership, there are other factors that are just as compelling.

The impact is not restricted merely to those areas, but extends to the student and parental communities as well. This is particularly significant because although schools have a major responsibility for the well-being of their students, the students typically have only a comparatively limited voice in what happens. This provides a strong imperative for moral conduct by those people who have the power and responsibility not only to influence the pace, nature and extent of change but also the obligation to anticipate and resolve ethical dilemmas. Although the principals have responsibilities in this regard they are not unique as leaders; other professionals have responsibilities in this area as well. All teachers have ethical responsibilities but someone needs to give particular attention to the ethical implications that are associated with the adoption and implementation of IT with its effects not only on the curriculum and professional development, but on pedagogy, and the full range of administrative areas too. Lashway (1996) contends that relatively few administrators have been trained to deal with the sorts of conflicts and dilemmas that can emerge. Beck and Murphy (1994) note further that ethical issues have been given little attention in preparation programmes. Such evidence and views suggest some deficiencies and preparedness in this general area and therefore further reinforce the need for greater attention to be given to ethical leadership in IT.

Moral duties do of course express themselves in the more obvious day-to-day ethical dilemmas, but there is also potential for the seemingly more pedestrian and mundane

policies and structures to have ethical implications as well. As Starratt (1991) observes, every social arrangement benefits some people at the expense of others, and a simple assumption that schools necessarily embody desirable ethical standards is at least naïve and possibly even culpable. Ethical leaders in schools must consequently not only behave responsibly as individuals but strive towards the creation of their schools as ethical institutions.

While clearly there is no elegant solution to the problems associated with the handling of complex ethical dilemmas some guidelines and personal qualities have been suggested as important. Starratt (1991) has argued that leaders should have a strong sense of ethical standards and an associated fully informed consciousness that contains themes of caring, justice and critique. Kidder (1995) identifies the need to examine dilemmas from a range of perspectives including: anticipating the consequences of choice; the application of moral rules; and an emphasis on caring and the application of the Golden Rule: *Do to others as you would have them do to you.* Other abilities involve a capacity to reframe issues in ways that avoid either-or type thinking and construct new paths for solutions and a habit of conscious reflection.

Just as is true for principals IT leaders in schools have responsibilities for maximising the effectiveness of their schools. Effective schools are according to Sergiovanni (1992) those with a shared covenant that clearly articulates the school's core values and provides a standard by which actions can be judged. Apart from formulating such a covenant leaders must also actively support and enforce it. This means that the rhetoric must reflect the reality, for one of the six constants of leadership identified by Gardner (1995) is that leaders must embody the message they advocate.

If IT is accepted as increasingly important in the array of skills and knowledge required of all students then it follows that issues relating to equitable access to schools' IT resources must be of concern to IT leaders. Among the factors that may influence access include gender, ethnic background, and socio-economic status. Each of these factors has the potential to generate ethical dilemmas. The literature on gender issues in computing in particular provides numerous examples of the sorts of issues that have, until very recently at least, contributed to the under-representation of women in this area. (Camp, 1997: Cottrell, 1992; Frenkel, 1990;

Pearl et al, 1990; Selby et al, 1998; Shade, 1993; Spertus, 1991). Among the many explanations put forward to account for the discrepancies include expectations, cultural factors, lack of institutional support, and outright discrimination. Generally people may not be consciously trying to discourage women from participation in IT for it is the subconscious and often stereotypical influences that may be the major determinants of a lack of participation by women. A proactive stance to address this type of issue requires not just leadership, but ethical leadership.

A concern for ethical practice can be found in the wider IT community as well. The Association of Computing machinery (ACM, 1992) expect a commitment to ethical professional conduct of every member. The New Zealand Computer Society (NZCS, 1999) has a Code of Ethics that binds every member of the Society. Many of the moral imperatives that such professional associations identify as important to good practice are equally relevant in an educational setting. In its section headed *General Moral Imperatives* the ACM requires its members to:

> **Contribute to society and human well-being**
>
> This principle concerning the quality of life of all people affirms an obligation to protect fundamental human rights and to respect the diversity of all cultures. An essential aim of computing professionals is to minimise negative consequences of computing systems, including threats to health and safety.
>
> **Avoid harm to others**
>
> "Harm" means injury or negative consequences, such as undesirable loss of information, loss of property, property damage, or unwanted environmental impact. ...Harmful actions include intentional destruction or modification of files and programs leading to serious loss of resources or unnecessary expenditure of human resources such as the time and effort required to purge systems of "computer viruses".
>
> **Be honest and trustworthy**
>
> Honesty is an essential component of trust. Without trust an organisation cannot function effectively. The honest computing professional will not make deliberately false or deceptive claims about a system or system design, but will instead provide full disclosure of all pertinent system limitations and problems.
>
> **Be fair and take action not to discriminate**
>
> The values of equality, tolerance, respect for others, and the principles of equal justice govern this imperative. ...Inequalities between different groups of people may result from the use or misuse of information and technology.

Honor property rights including copyrights and patent.

Give proper credit for intellectual property

Respect the privacy of others

Honor confidentiality

(ACM Code of Ethics and Professional Conduct, General Moral Imperatives, 1992, http://www.acm.org/constitution/code.html#sect1)

Lashway (1996) contends that most schools do not encourage discussion of ethical issues. This is a situation compounded by the fact that educators spend most of the day comparatively isolated from each other and in an environment where time is always at a premium. Just as Rogerson (1995) argues it is totally unacceptable to assume that moral dimensions are properly catered for in business IS/IT so too it is just as unacceptable to assume they will automatically be exposed and dealt with in a school setting. Again the onus in schools is perhaps even stronger. There is still an equally compelling need in schools, just as in business, for the administration and management areas to have a sound ethical base and practice. Over and above this however, schools have an additional responsibility to ensure that students are not only treated in an ethical fashion but are also encouraged to behave in ethically responsible ways. Rogerson, citing Ramon Barquin of the Computer Ethics Institute in the USA describes *The Computing Ten Commandments*. While these were developed with IS/IT professionals in mind they have clear relevance to students, especially with the prevalence of computer networks and the ease of access to the Internet.

- Thou shalt not use a computer to harm other people.
- Thou shalt not interfere with other people's computer work.
- Thou shalt not snoop around other people's computer work.
- Thou shalt not use a computer to steal.
- Thou shalt not use a computer to bear false witness.
- Thou shalt not copy or use proprietary software for which you have not paid.
- Thou shalt not use other people's computer resources without authorisation or proper compensation.

- Thou shalt not appropriate other people's intellectual output.
- Thou shalt think about the social consequences of the program you are writing or the systems you are designing.
- Thou shalt always use a computer in ways that ensure consideration and respect for your fellow humans.

(Rogerson, 1995, n. pag.)

Indeed many schools now have clearly established Acceptable Use Policies (AUPs) that set out the forms of behaviour that are considered acceptable and unacceptable. A problem with this sort of approach is that it is rather rule based and has overtones of a legislative solution. Many people may argue that it is not really possible to legislate for ethical behaviour and therefore education must be relied upon. The responsibility for IT leadership in schools therefore assumes a further dimension. Not only does it encompass the day-to-day operational and administrative needs of the school community, but it extends into the educational arena with concerns for producing students who will play their roles in society as ethical IT users. The issue of ethics emerges again in Chapters 8 and 9 when the views of school principals and CIOs on these and other matters is discussed.

So far this chapter has dealt mainly with qualities and skills that are normally associated with leadership. Although some distinctions can be drawn between leadership and management these are not always clear cut and in any event the role of those attributes and skills that are more readily categorised as management are still important.

4.6 IT Management

While there may be dangers in any analysis of the management function that draws too heavily on trait theory, there is some benefit in examining the qualities of managers who are seen as successful. There is little literature that relates to the management of IT in schools but considerable work has been done in comparable areas in business. Research by Earl (1996) indicated that the most important qualities of a successful CIO at that time were: a vision shared with the company's wider management, so that IT supported strategy; a close relationship with senior executives, especially the CEO; a willingness to pay attention to day-to-day IT performance; and an ability to judge the importance of changes in the business.

While these qualities are still critical, increasingly CIOs are being confronted with new responsibilities (Earl, 1999). There has been a growing perception that CIOs need a good understanding of business processes and this in turn means that their job descriptions are now likely to encompass HR and strategic planning. Like all managers, they have to be able to lead their departments through rapid change but are also often expected to be the *corporate radar* for emerging technologies. In addition, modern CIOs are also expected to manage relationships with an ever-growing range of external suppliers and contractors. Markus (1999) extends the relationships responsibility to cover relationships with people within the organisation as well. As the IT function tends to become more centralised, there is an accompanying risk of friction between IT and the line managers with which IT has to work. These sorts of situations generate a need to handle the political aspects of organisations with a consequent need for those in IT management to have an ability to develop and maintain good quality relationships; to possess and utilise effective *cultural software.* (All of these issues are addressed again in Chapter 7, 8 and 9). This is also immediately applicable to the comparable role in schools. Even the HR issues are becoming a reality in schools as they employ such specialists as network administrators, hardware technicians, trainers, and web-site developers.

The analysis so far has focussed more on the desired qualities and skills of leaders and managers and to some extent on the kind of environment and organisational culture that is conducive to successful leadership and management. Even when these factors are present however there are other issues that can ameliorate or diminish their effectiveness.

4.7 Barriers to IT Leadership

The IT leadership survey (*CIO.com*, 1999) of nearly 360 respondents (the article does not specifically confirm that these people were necessarily all CIOs) identified the following as the biggest barriers to being an effective leader.

Table 4.1

Barriers to IT Leadership

Barriers	Number of Respondents
Too many tactical distractions/not enough time	(229)
Not politically minded	(118)
No role models/mentors	(117)
Not enough credibility with other executives. Not part of the leadership group	(97)
Difficulty communicating effectively with other executives	(87)
Change happens too fast to get in front of it	(74)
Don't know the skills	(44)

(*CIO.com*, 1999)

This list highlights that there are some very real obstacles that impede leaders and managers from being as effective as they might be. Of particular interest is the apparent paradox of a lack of political nous when leadership gurus like Bennis have clearly identified politics as a tool for leaders. These barriers are examined in detail in Chapter 7 where the CIO.com survey results are compared with the results of a similar survey of IT leaders in New Zealand schools.

While it may not be possible always to develop a comprehensive set of skills and strategies for coping with such barriers, there are some tools that can be acquired or cultivated and that will minimise the problem and increase chances of success.

4.8 The Ten Tools an IT Leader Needs to be Successful

Again neither the barriers nor the leadership activities identified in the CIO.com survey relate to technical competence. While this does not suggest that an absence of this sort of ability is desirable it does seem to suggest that other factors may be at least as important. Blodgett (1999) outlines ten tools that every new CIO needs to succeed. They are shown, in the order presented by Blodgett, in Table 4.2.

Table 4.2

The Ten Tools an IT Leader Needs to be Successful

- Study the Corporate Culture
- Understand the Business model
- Build Relationships with Fellow Executives
- Establish Credibility First Through Small Changes
- Build a Personal Board of Directors
- Talk and Listen
- Be Accessible and Responsive to Users
- Set Realistic Goals
- Take Inventory of the Technology
- Assess Your IT Personnel

(Blodget, 1999, pp. 2 – 10)

These guiding principles draw very heavily not from computing expertise but rather from approaches that are more closely allied to anthropology and sociology.

Assessing the corporate culture may not appear to be either relevant to IT or particularly to schools. While it is perhaps mostly an intuitively based activity, its significance becomes more apparent when what it involves is examined. Study of the corporate or school's culture includes seeking rather subtle clues such as the way people communicate, how they dress, and the importance of socialising. Blodgett stresses the importance of fitting in to the broader environment beyond the manager's own department. There may be a temptation for some teachers to treat this sort of advice rather dismissively yet if it is a tool that assists CIOs then it should also have a role to play in the success of the IT operation in schools.

Secondly, allied to studying the culture is understanding the business model. For *business* the word *management* can be substituted to make the relevance to schools more obvious. The message here is to avoid coming into unnecessary conflict with the management or administrative model employed by the school. If the decision-making process is for example highly centralised, then it is important to avoid the

frustration of fighting it. On the other hand, if there is an expectation that the model needs changing then there needs to be the flexibility to provide suitable input into the transformation.

Thirdly, there is a need to build relationships with other senior staff and Heads of Departments, indeed all the key decision-makers in the school. This has the potential to engender a two-fold effect. It allows the IT leader to learn what others want and expect from IT and ultimately it can provide an effective channel for the profile of IT to be raised and for input from the IT area.

The fourth point is to gain credibility. For new appointees in particular this is very important. To do this involves acting promptly to avoid becoming a part of the problem. The changes, while needing to be obvious, can be quite small but should address areas of pain. It is not for example necessary to embark on a major new project initiative when taking care of relatively simple problems can achieve the desired impact. This has the dual effect of increasing credibility whilst simultaneously reducing the noise and creating a space that can be used for longer-term activities like strategic planning. By paying special attention to the immediate frustrations and needs of senior staff a cadre of supporters can gradually be built. (Business CIOs in particular identified this as a very important skill and their views are examined in detail in Chapter 9.)

Associated with the idea of a team of supporters is Blodgett's fifth method for assisting a leader to be successful. It is the need to cultivate a group of confidantes who will help answer gnawing questions or merely lend a sympathetic ear. The honest and constructive opinions that such people may provide on both personal and professional performance can provide valuable feedback for the improvement of the quality and effectiveness of the IT service.

The sixth principle enumerated by Blodgett is to focus initially on building empathy through talking, listening and building up goodwill, then to gradually figure out what needs to be done. This is consistent with avoiding treating the office as a bunker and getting out and talking to people.

Having an *open door* policy, the seventh tool, allows for feedback on the issues and attitudes people have towards IT and thus facilitate the IT leader to gauge the extent of the challenges that may be faced.

Building a reputation for responsiveness, is Blodgett's eighth tool. As part of the process for doing this, formal surveys on what people expect from IT can be conducted. It is also really important to set realistic goals, do the appropriate amount of homework, and avoid undue confidence. The lesson of always under-promising and over-delivering, especially during the first year is one reinforced strongly by the views of CIOs in Chapter 9.

The last two principles Blodgett identifies include conducting an inventory of the technology to assess whether internal and external customers are well served by the current systems. Just as it is important for a CIO to consider how well the technology is serving the needs of the business so too is it equally important for the ICT leader to consider how well it meets the needs of the school. This notion of an inventory can be extended to include software, licences, guarantees and service agreements, as well as keeping up-to-date with educational scholarship and developments in the technology. While the scale of most IT projects in schools may be quite small in comparison to those typical for many businesses, there is a similar need to apply good project management practices.

The final principle is to get to know the IT staff and their strengths and weaknesses. This should allow for capitalisation of the strengths and permit attention to be focussed on the need to remediate weaknesses.

While Boldgett's advice is designed for *rookie CIOs* it is important and relevant to the IT leaders in schools for at least two reasons. First, there is no evidence to indicate that this sort of advice stops being relevant as people become more experienced. Second, it demonstrates very clearly that technical computing expertise is not a primary concern and focuses instead on principles and practices that have not yet very widely been associated with the management of IT in schools. The discussion in Chapters 8 and 9 on the views of school principal and business CIOs examines the place of technical expertise and supports the argument that other qualities and skills are more important.

4.9 CEOs Look at the IT Function

While there appears to be little information about the views of school principals on the desirable qualities of the people responsible for IT leadership, work has been done on CEOs' views of senior IT managers. DeLisi (1998), director of the

Information Technology Executive Program at Santa Clara University, in a study on CEOs' perceptions of CIOs found that CEOs believe that senior IS executives often get so excited about the technology that they lose sight of the point of employing it. He further found that while CEOs agreed that IT is important, they think that few IT Managers are able to let go of their technical expertise enough to become true corporate executives. As will emerge in Chapter 9, CIOs argue this highlights what is perhaps one of the key differences between an IT Manager and a genuine CIO. A CIO is able to make the transition and is not preoccupied with technical matters. DeLisi's study also found that CIOs are perceived as the worst communicators of all senior managers, even though many are light years ahead of their IS predecessors. As Chapter 9 demonstrates, New Zealand CIOs have a strong concern about communication skills, which they identify as among the most important skill a CIO should possess. Building on his findings DeLisi recommends a series of strategies for CIOs who wish to function in a manner more in keeping with how CEOs would like them to operate. These recommendations may be equally applicable to the IT leaders in schools.

According to DeLisi, CIOs are in a unique position to understand the business from an enterprise-wide perspective, yet most do not capitalise on that vantagepoint as much as they should. They have in effect the opportunity to understand everyone's role, but fail to make the most of it. While CIOs may often be perceived as technical specialists they should operate as general business managers who employ technology to reduce complexity, cut costs, and enable better collaboration and communication. The IT leaders in schools may also be similarly placed and as a result may suffer from the same problems. CIOs who learn to think strategically and take the time to enlarge their view of the world will be better able to live up to the CEOs' expectations. Comparable changes in behaviour by school IT leaders might allow them too to function more in accord with the expectations of principals. Indeed as Chapter 8 reveals in more detail principals have quite clear views about the value of vision and strategic thinking as a desirable quality in their IT leaders.

DeLisi (1998), stressing the importance of interpersonal skills, cites one CEO from his survey who observes, "[CIOs] can produce some great results, but if they can't explain it to you, you can't value what they've done". A school principal might just as easily make a similar observation about a school IT Director. The study suggests

that IT executives should develop the requisite skills CEOs want them to have by working on general management, interpersonal, and strategic business skills.

The third recommended strategy from DeLisi's study is to raise awareness of the value of IT. DeLisi argues that CIOs should concentrate on reducing the gap between the value that IT provides and the value that is perceived by senior management. To do this IT executives need to condition their CEOs or principals to see things differently by reporting the value and results of an IT project rather than swamping them with technical details. The emphasis needs to be on explaining the value that a particular project brings to the business or school.

Finally, in a recommendation that parallels the CIOs' own perceptions of barriers to success DeLisi advocates establishing relationships, especially with the people who really count and increasing visibility to senior management. To do this he suggests three specific strategies. First, CIOs should be obsessive about contributing to the success of their business colleagues. Second, they must spend more time in front of the senior management team. Finally, the CIO should not simply react to problems when addressing senior managers but seek to proactively control the agenda for at least 20 percent of the time spent with the CEO. In all these cases 'CEO' could validly be replaced by 'Principal' and 'CIO' by 'IT Director'.

4.10 Conclusion

Kanter (1999) contends that organisational change has become a way of life as a result of three main forces: globalisation, information technology, and industry consolidation. Regardless of whether globalisation and industry consolidation have much if any impact on the way schools operate there can be little question that Information Technology has and continues to have a major impact. Schools just like any other organisation need to manage complex information flows, grasp new ideas quickly, and spread those ideas throughout their communities.

> What counts is not whether everybody uses email but whether people quickly absorb the impact of information and respond to opportunity.
>
> (Kanter, 1999, p. 2)

In order for this potential to be realised, schools must have the requisite management and leadership skills and expertise that will enhance the school environment so that it

can be realised. Technical competence though perhaps still necessary is no longer sufficient to cater for the current IT environment let alone the future. Schools, just as businesses have found, need more than efficient management they need effective IT leadership. This chapter has sought to advance a general case supporting this contention. The next chapter, Chapter 5, addresses Research Question 1: *What form of qualification and training is most appropriate for teachers with responsibilities for ICT in schools?* that examines the training and possible qualification needs of school IT leaders.

CHAPTER 5

IT PROFESSIONAL DEVELOPMENT FOR TEACHERS: WHERE TO PUT THE EMPHASIS?

> *Due to the unprecedented presence and prevalence of technology in society, it is no longer sufficient, or perhaps even appropriate, to talk about "technology training" as a goal in education. Educators need much more than intermittent sessions on how to operate computer equipment and software. Teachers, like all professionals, need and deserve ongoing exposure to technology so it becomes a seamless component of instruction that leads to real results for students. They need professional development. Professional development for teachers is an ongoing, long-term commitment that begins with the decision to pursue a career in education and continues, through a combination of formal and informal learning opportunities, for the duration of a career*
>
> (Crane & Spoon, 1999, p. 8)

5.1 Introduction

So far the discussion has been concerned with establishing the importance of the management and leadership of IT in schools. It has also examined the sorts of skills and qualities that these people need to be successful and the kind of environment and culture that is needed for IT to flourish and realise its potential. This chapter is based on experiences gained from developing an instructional programme and a qualification for school IT leaders and seeks to determine what such a course should cover and where particular emphases should be placed.

The place of IT in teacher certification and the importance of IT in both pre-service training and in-service training for teachers in general are quite readily acknowledged. Comparatively, the debate about the IT requirements for those people, other than principals, who have the responsibility for managing and leading the introduction and implementation of Information Technology in schools has perhaps been rather muted.

5.2 Background

Since computers in particular started to make a serious impact on education there have been a number of related developments in teacher training and associated certification. At a national level, the British Department for Education and

Employment (1999) has identified ICT standards for Initial Teacher Training (ITT). With its recently announced £230 million National Opportunities Fund initiative, the DFEE plans to upskill serving teachers and school librarians to these standards. In New Zealand, there have been numerous initiatives at the national level with the current *Principals First* programme being among the most recent.

Apart from such national schemes, various tertiary education organisations have also developed their own approaches to teacher training in the IT area. *Computers in Education* or similarly titled courses have featured at Universities, and Colleges of Education. Massey University's *Computers in Education* course is amongst those at the forefront of this development. These courses have had two main characteristics. They have all been offered as part of some other programme, usually as an option, and they have tended to focus either on the general pedagogical and epistemological implications of the use of computers or their relevance in specific aspects or areas of the curriculum. Some examples of these include *Language and Computers* (Auckland College of Education), *Music Computer Technology* (Wellington College of Education), and *Thinking and Learning With Computers* (Christchurch College of Education).

A more recent development has been the emergence of entire programmes related to computers in education. Among the more notable of these was the Waikato Polytechnic's *Diploma in Computer Education* programme (formerly known as DICE but now evolved to the Graduate Diploma of Information Technology in Education, GDITE). Other institutions too moved in a similar direction with UNITEC Institute of Technology offering both the *Certificate in Education Technology* and the *Diploma in Education Technology*. It is interesting that these programmes were being offered not by the traditional institutions, the universities and colleges of education, but by polytechnics. That this shift in direction should occur is probably attributable to the dramatic changes that occurred in tertiary education and the readiness of many of the polytechnics to identify and seize new opportunities to extend their range of programmes and qualifications. In the case of Waikato Polytechnic at least, there are other fascinating links.

5.3 Links to Business Computing

The Waikato Polytechnic like most of the country's Polytechnics has a strong business computing department that offer programmes such as the *Certificate in Business Computing* (CBC) and the *Advanced Certificate in Business Computing* (ACBC). These programmes have very strong associations with the business IT community and were overseen at a national level by the National Advisory Committee on Computing Qualifications (NACCQ). The overall aim of NACCQ is: "To foster computing education in New Zealand". At a more specific level NACCQ's objectives are:

> To promote the teaching, learning, research and development in the field of Computing and Information Technology
>
> To maintain a high quality of Polytechnic graduates for industry in the field of Computing and Information Technology
>
> To offer support and advice to APNZ, the polytechnic sector in relation to the field of Computing and Information Technology
>
> (NACCQ Regulations v 2.1, 1998, p. 4).

Clearly elements at The Waikato Polytechnic and NACCQ saw a degree of synergy as well as a market opportunity in offering a computing programme for teachers for the DICE programme. Though offered virtually exclusively at Waikato Polytechnic, this programme had the approval of NACCQ. The DICE programme differed significantly from other courses on offer at the time. It was a programme in its own right, and although it incorporated modules dealing with pedagogical topics many of them were much more technically oriented and had strong similarities to some of the modules offered as part of the National Certificate in Business Computing. The DICE programme clearly had considerable appeal to teachers as The Waikato Polytechic were able to offer it not only from its Hamilton campus but also from several other centres in the greater Waikato area as well. While the DICE programme had a significant technical component it was in other respects very similar to other initiatives and programmes in that it tended to focus on the particular needs of general classroom teachers.

5.4 The Emergence of ADITE

Partly as a result of the NACCQ association with the DICE programme and partly because of the potential benefits accruable from adding another programme to their existing range, the Central Institute of Technology began investigating the feasibility of offering a similar programme. A survey of all the primary, intermediate, and secondary schools in the greater Hutt Valley was conducted late in 1994 (Albertson & Selwood, 1995) to determine the likely demand for such a qualification. Responses were received from 92 teachers of whom 89 (97%) indicated that they considered there was a place for a qualification in the uses of Information Technology in Education. In addition 67 (72%) teachers responded that they were either moderately or very interested in enrolling in a programme that would lead to a qualification in the uses of Information Technology in Education. On the basis of this evidence, CIT determined that the concept was worth pursuing further and as part of this initial investigation discussed the idea with the then District Adviser on Educational Computing.

A major outcome of these discussions was the decision that the DICE programme could be improved in several ways. The main area of concern was the apparently undue focus on technical aspects of computing that were perceived as likely to be of only minimal relevance to the majority of practising classroom teachers. It was also felt that the programme would benefit from a much more integrated approach, and a construction that drew on three main sequential developments. The first was to develop teachers' skills and confidence levels with personal productivity tools like word processors, spreadsheets and databases. The second was help teachers establish a sound theoretical framework for the implementation of IT in schools, and the final stage was to bring the first two parts together. In addition to the need to develop a different programme to DICE, a strategic decision was taken that the programme needed to be pitched to provide a qualification at a graduate or higher level. This decision meant that there was little room in such a programme for practical skill development. While this was still seen as an important need for many teachers, a separate programme was regarded as the best way to meet such a need. The target market for this qualification was then identified quite specifically as those teachers who already had well developed basic applications type skills, but who wished to extend their professional expertise to a higher and more specialised level. While

earlier courses and programmes had tended to focus on the role of computers in education as their primary focus, the CIT programme was to adopt a wider orientation that replaced *computers* with the more generic term, *Information Technology*. The rationale for this was based on two main premises.

First was the perception of what constituted Information and Information Technology. CIT adopted a definition of information as "the knowledge obtained from the interpretation of data". Additionally Information Technology was defined as "comprising the acquisition, storage, processing, transmission, reception, analysis, application, presentation and protection of information" (Albertson & Selwood, 1995 p. 9). Such a view acknowledged too that Information Technology was also concerned with the development of skills and support services that are required to produce and maintain the flow of information. On this basis, it was not the computers that were important but the processes that were associated with the use of them and related equipment.

The second premise was that although computers unquestionably had great potential as an educational resource there were other related forms of technology whose capacity to contribute to education ought to be acknowledged and therefore incorporated into the programme. In particular, this notion meant that communications technologies were also included within the ambit of the programme.

At a philosophical and strategic level, consideration was given to how this programme might be designed to maximise the effectiveness of its impact on the education system. While it was clear from the 1994 survey and other both formally documented and anecdotal evidence that teachers in general had widespread needs in this area, it was equally obvious that it would be very difficult to address them directly. It was seen that a more effective approach would be to assist schools to acquire key staff who would have the necessary leadership and other related attributes to facilitate the appropriate developments directly within schools. The new CIT programme, the Advanced Diploma of Information Technology in Education (ADITE), was then designed with two principal goals. They were to produce graduates who:

> would provide effective leadership in Information Technology within their schools

> would also be informed, imaginative and possessing a demonstrable commitment to improving the practice of education.
>
> (Albertson & Selwood, 1995, p. 47)

5.5 Important Characteristics of the programme: The Role of Leadership

This programme then had established goals that expressed a clear vision of the leadership role for its graduates and the importance of this as a component in its learning outcomes. At a more specific level the ADITE programme had fifteen objectives (Refer Appendix F) which were designed to give a clear indication of the kind of graduates this programme was designed to produce.

5.6 Important Characteristics of the programme: The Place of Adult Learning

The ADITE programme also acknowledged that to optimise its chances of being successful in these objectives it would need to model and assist participating teachers to develop their knowledge and skill in the principles of adult learning. This was seen as important for at least two main reasons. First, was to ensure that the delivery of the programme was based on sound teaching and learning principles that would be conducive to an effective delivery of its curriculum. Second, to provide the participating teachers with the knowledge and skills that would equip them to work effectively as trainers of their colleagues. Everyone of course expects teachers to be well acquainted with general pedagogical theory. Despite this most teachers are unlikely to be similarly well-versed in the principles of adult learning, yet the ultimate success of this programme was seen to hinge to a significant extent on ADITE graduates being able to work effectively with both young people and adults.

As a consequence, the programme was designed around a collaborative mode of delivery as this was seen as the most effective and appropriate style for teaching adults (Brookfield, 1986; Daloz, 1987; Lindeman, 1962). The programme then was designed to draw heavily on this body of literature that asserts that the key for working successfully is participation; ideally participation in a learning activity that is a co-operative endeavour. An additional factor in this aspect of the programme was its expectation that participants, both in terms of the academic level of the ADITE programme and their needs as adult professionals, would have to focus on the higher order cognitive skills of analysis, synthesis, and evaluation. Such an

active involvement of the learner in the learning process was identified as the only viable process by which the achievement of these higher order skills could occur. This has meant a strong orientation to engage participants by drawing on their own experience. It is an entirely realistic expectation given that as practising educators the people involved in the programme have a rich variety of experiences that are intense in scope and with the potential to provide valuable material for evaluating new situations, relationships, and content.

5.7 The ADITE Programme

The ADITE programme was approved by the CIT Academic Board in 1995 and has been running since 1996. The New Zealand Polytechnics Programmes Committee (NZPPC) approved the ADITE programme and accredited CIT to offer it. The Ministry of Education has also recognised the qualification for salary purposes. In its initial form the programme was structured with three main components. They were a compulsory core of ten modules, a dissertation (research paper) and four elective modules chosen from a range.

The core modules were:

- Information Technology and Personal Development
- Hypermedia in the Classroom
- The Internet as an Educational Resource
- Information Technology and the Learning Process
- Information Technology Across the Curriculum
- Information Technology Applications in Professional Development
- Ethical Legal and Social Responsibility
- Hardware and Software Maintenance and Management
- Educational Research Methods
- Information Technology Planning

(Albertson & Selwood 1995, pp. 18 - 19)

5.8 Programme Evaluation and General Issues

Students evaluated each paper at the end of the module and the analysis of these responses for the 1996-98 period showed high levels of student satisfaction. (Lacy,

1998 p. 2). On a four-point Likert Scale (1 = very positive and 4 = negative) the average response on a range of issues was 1.7 or between positive and very positive. Reinforcing one of the key characteristics of the programme students put a high value on the collegial atmosphere and the opportunities for sharing and building on others experiences.

However during the first few years of operation some issues were also discovered. Many of the students and prospective students, while acknowledging the value of this sort of programme, felt that they lacked the pre-requisite IT skills required for the ADITE programme. There was a strong demand for participation in the programme from outside the area immediately contiguous to CIT that the prevailing delivery mode was unable to fulfil. The number of papers offered made the programme appear daunting for some people and also reduced the coherence of the programme. The attempt to offer the programme in a timeframe that fitted the four-term school year meant that the delivery time of about eight weeks was too tight to fit everything in. Contrary to expectations developed during the planning stages of the programme many of the participating teachers experienced considerable difficulty with the "workshop" approach that was customarily adopted for many of the teaching sessions. Initially at least, many felt, rather ironically given their background as teachers, that a more didactic lecture style approach would better equip them with the requisite skills and knowledge. There appeared to be an inherent prejudice that unless the teaching sessions closely resembled those traditionally associated with university style lectures the content and level was not appropriate.

5.9 Programme Review

During the middle of 1998 the ADITE Programme Team initiated a major review of the ADITE programme. After the Team had drafted out a revised programme they sent a survey to all the people who had been involved in or expressed interest in the programme. The responses (32% response rate) gave some very clear indications about the proposed developments to the ADITE programme. The first five questions in the survey were designed to capture the view of the respondents to the various aspects of the proposed changes. Responses were ranked on a 1 – 3 scale with 1 indicating a positive response and 3 a negative response. The results are summarised in Table 5.1.

Table 5.1

1998 ADITE Review Results

Item	Response (1 = Positive 2 = Neutral 3 = Negative)
Reduction from 16 papers to 6 modules	1.1
A fixed sequence for the presentation of modules	1.5
Enrolment only in February of year of study	1.9
Minimum study time of 20 months	1.4
Distance delivery of the programme	1.3

(Albertson, Lacy, & Selwood, 1998, p. 25)

Overwhelming the majority of respondents endorsed the two major aspects of the proposed changes, to reduce the number of modules and to change the delivery mode. Rather surprisingly the suggestion to restrict the enrolment to the beginning of the year produced a basically neutral response. Predictably the further a respondent's home address was from the Heretaunga campus the more positive was their response to distance delivery. While a section of the questionnaire provided for freeform response this was only completed by a small number of people and their comments overall echoed the outcomes from the fixed-response items. Among the comments were:

> The ADITE fills a gap in teacher training and meets a need within schools
>
> On the right track for the more mature professional up-skilling themselves
>
> (Albertson, Lacy, & Selwood, 1998, p.26)

Such observations reinforced the original intention of the programme.

5.10 The Revised Programme

By 1998, the team involved in the delivery of the ADITE programme had the evidence to support their view that changes were necessary and put forward a set of proposals to the ADITE Programme Advisory Committee for their approval. The

revised programme is the equivalent of one year of full-time post-graduate study and can be completed by part-time study in a minimum of two years, but is more likely to take three years with a normal maximum of six years. The structure consists of six compulsory modules each of 20 credits. The four stage one modules must be completed in any order but must all be completed before the stage two modules are attempted. In stage two, the Educational Research Methods module must be completed before the Research Topic module can be studied. The revised structure is shown in Table 5.2.

Table 5.2

Revised ADITE Structure

	Module Name
Stage 1	Personal and Professional Development for IT in Education Teaching, Learning and IT Management of IT Resources Policy and Planning
Stage 2	Educational Research Methods Research Topic

(Albertson, Lacy, & Selwood, 1998, p. 1)

All the modules were designed to be the equivalent of 200 hours of student learning time although the Research Topic would normally take up to two semesters to complete.

5.11 Conclusion

The ADITE programme does not address either the issues of IT in pre-service training or teacher certification. It is however a serious attempt to provide training and a relevant qualification for group of people whose needs and abilities to contribute significantly to the effectiveness of IT in schools are all too often overlooked. It is this target group who with the appropriate skills and knowledge can have an important and cost effective influence on the attitudes and skills of their

teaching colleagues. With the assistance of professionals of this calibre, schools should be able to obtain the best possible returns from the increasing and substantial investment they are all making in Information Technology. Perhaps much more emphasis should be put on this form of teacher training with its focus on leadership and management. Such an orientation would do much to ensure that schools are equipped with the requisite human resources to assist them to translate the desired administrative and pedagogical IT outcomes into a working reality. It would also of course help ensure that IT is increasingly appreciated as a core strategic activity for schools and not a mere adjunct foisted on education by capricious commercial development.

As has already been pointed out the ADITE programme was never designed for basic skills and competency development. It was designed to target the higher level skills to do with management, administration and leadership. It could be argued that this major objective was rather premature as schools and teachers may not yet be at a stage of development or readiness to appreciate the value of this sort of training.

The extent to which this sort of programme is needed and can contribute to the advancement of IT in education is taken up in various ways in the next four chapters. Chapter 8 in particular looks at the need for such a qualification from a principal's point of view. Regardless of the merits of a formal recognised qualification the issues relating to the management and leadership of IT in schools must still be addressed.

CHAPTER 6

THE MANAGEMENT OF IT IN SCHOOLS: HOW TO DO IT BETTER

> *Even though we have been trying to change schools for a very long time, many of the leaders of the recent drive to network classrooms appear unaware of that history. They show by their actions, their promises and their strategies that they have little understanding of the failures and mishaps that accompanied many earlier school change efforts. They appear unaware of educational research that outlines the elements of successful innovations. They seem headed for shallow waters as they emphasize the purchase and installation of equipment while underfunding organizational development and ignoring the lessons of the past.*
>
> (McKenzie, 1999, n. pag.)

6.1 Introduction

In previous chapters the argument has advanced the importance of IT and the need for effective management of it. Attention too has been given to the possible place for specialised in-service training and associated qualifications. Later chapters will pick up related issues that emerge from interviews with principals and CIOs. This Chapter draws on the literature to seek and expose ways in which the whole process of leading and managing IT in schools might be improved. Further evidence supporting these ideas will be presented in Chapters 7, 8 and 9, which present information based on the findings from a survey and a series of interviews with school principals and CIOs.

Maurice Williamson, the New Zealand Minister for Information Technology, wrote:

> Louis Pasteur, whose discoveries underpin so much of modern medicine, said 'Change favours the prepared mind'. By understanding the changes that are occurring now we can prepare ourselves and New Zealand to the maximum advantage.
>
> (Butler, 1996, p. 2)

This is the kind of rhetoric that New Zealand teachers have become accustomed to hearing on a regular basis. Much has been said and written about the important role of technology and the capacity that it has to dramatically influence the way people

live. These arguments typically advocate various forms of change, especially in education. In this sort of discourse, attention has been given to teachers and their training needs, pedagogical issues associated with the place and function of technology in schools along with wide-ranging comment on hardware and software. Acknowledgement is also made of the need for organisational transformation at the school level to ensure that this change heads in the right direction and produces suitable outcomes. Somewhat less attention has been given to the means of making this a practical working reality that can emerge in a timely and effective fashion. The human and other resources involved are enormous, but the management of this process is left largely to people with little or no specialised training for such a task. If the sorts of goals described in publications like *ImpacT 2001* are to have a reasonable chance of success then schools will need to have people who can lead the IT development, provide useful relevant and timely advice, and guide the development and decision-making processes. Considerable, indeed perhaps too much, reliance tends to fall on principals who despite an obvious leadership role have an enormous range of responsibilities that in themselves almost automatically exclude principals from the level of involvement required.

6.2 The Role of the Principal

Principals must, especially in our larger schools, cope with and be effective, in adopting the role of Chief Executive Officer (CEO). Because of the demands of the modern educational environment, principals need to focus on the overall management of their schools, working in conjunction with their various school communities to establish school wide goals, objectives and operating policies and to oversee their effective implementation. As principals commented in the interviews (later included in Chapter 8) their role has changed; they can no longer serve as instructional leaders for their role has developed to an extent where that is no longer normally possible. This sort of responsibility must now be devolved to others who make up the management team. This is the only effective and realistic direction in which they can head, but to be successful they need to have the support of a senior management team which has the capacity to provide advice and support and which can implement the broader vision in practice. The modern principal needs a manager and leader of Information Technology who must be a key member of that senior management team and who can provide the sort of advice, vision and strategic

direction that the principal and the management team needs to make sound decisions about IT. Moreover the team also need help to realise that increasingly IT in schools, just as has occurred in most businesses, is now an integral part of the operation and as such can no longer remain an incidental ancillary service. The principal has therefore a major responsibility to provide the structures and environment that will make this possible. Just as business CEOs have appreciated, principals too need their equivalent of the CIO, not merely an IT Manager but an IT Director, a key member of the senior management team.

6.3 Ad-hocery Avoidance

Additionally, there is a clear imperative to avoid much of the ad-hocery that has been too influential in so many of the decisions made in schools about aspects of Information and Communications Technology. Decisions about IT are likely to consume significant portions, not only of a school's discretionary funding, but also substantial amounts of its already often stretched and limited overall budget. Such decisions also have the potential to impact in critical ways on the teaching-learning processes and methodologies employed by schools. For these reasons, such decisions and developments must be made on soundly based knowledge and advice. Each school needs to have available the human resources to ensure that this is done in a sound businesslike fashion. This is particularly important given the conspicuous "absence of a co-ordinated approach to the wider use of IT in schools". (ITAG, 1998, p. 2) Various groups and agencies have recognised this problem and have sought to assist schools including rather ironically, the Minister of Information Technology's Information Technology Advisory Group. The dilemma for such groups is that New Zealand schools though still mainly centrally funded are all locally managed. The prevailing ideology is to increase local control and minimise central involvement. With the continuation of this scenario, it is highly unlikely that a central agency will be able to do very much that will impact directly on schools. To help avert an approach that is characterised by predominantly whimsical and ad-hoc decision making, it is necessary to ensure the availability of suitable reliable expertise at a local level.

6.4 The Impact of Computer Hobbyists

With the advent of the desktop computer, there was an accompanying increase in the force with which computers have impacted on the school environment. Among the most significant of the forces at work propelling this trend was a cadre of teachers who were also enthusiastic computer hobbyists[1]. This occurred in the late 1980s with much effort being given to devise ways to use computers to enhance instruction. Accompanying this sort of innovation was a desperate scrabble to find a place for the *new technology* in an already rather overcrowded curriculum. One particular consequence was the emergence of a new subject *Computer Literacy*. The teachers who took on the teaching of this subject were once again often well-intentioned but predominantly self-taught computer hobbyists. All too soon the computer moved from its former role as a medium for instruction to become the main focus of the instruction. In effect, the medium became the message. The claims in support of this change were to the effect that teaching children to be computer literate would prepare them for a future that was certain to be dominated by technology. More recently, these sorts of views have been moderated by a strengthening conception of information and communication technology being not so much an end in itself, but more as a medium for improving the teaching-learning process and an important epistemological tool.

6.5 Computing in the Curriculum

Even so, today there is still an absence of focus on the need for leadership and management skills. Recently a push has emerged for a development that strongly parallels the one that saw the introduction of *Computer Studies* as a senior secondary school subject. This move appears to be part of a legitimating force that seeks to more solidly embed the teaching of "computing" as an academic subject in the senior secondary school. While there are undoubtedly compelling reasons to consider such a move it is still one that is problematic. A strong motivating factor seems to be the view that the current Sixth Form Certificate course will soon be redundant as the practical applications skill levels of students rise. A logical consequence is the need to fill the subsequent curricular vacuum with a related but more academic subject. This argument has some validity and indeed it may advocate an entirely appropriate

[1] The author uses this description on the basis of his observations and knowledge of the teachers working in this area.

development. It seems a pity however that the opportunity such a change may present has not been seized on to address the growing range of issues, especially in secondary schools, that relate to organisational rather than technological matters. Pre-eminent among these must be the management and leadership of information and communication technologies.

> Studies of organisational change regularly show the importance of the 'promoter' or 'champion' who is willing and able to 'own' a new idea or product, to develop it into an operational form, and to get it accepted and embedded in the organisation. Our research into the kind of decisions that need to be taken if IT projects are to be successfully implemented suggests that many of these issues have no obvious or powerful 'owner'....
>
> (Boddy, 1998, p. 337)

Rather paradoxically this heightened awareness of the value of technology as a pedagogical and epistemological tool has not necessarily been accompanied by a commensurate development of the leadership and management role, or the associated skills required by these people with responsibility for providing and maintaining these resources. There are lessons to be learned from this early genesis that was delivered in large part by well-intentioned hobbyist technophiles. The complexity of the educational technology environment, the level of investment and its strategic importance to schools means that a different range of skills is required. Just as the role of the technology in the teaching-learning process has become more sophisticated, so too the management of the resource must also develop and mature. The situation is now too advanced and the consequences of mistakes too dire for these issues to be ignored any longer.

6.6 The Business Model

There is merit in considering the developments that have been taking place in the commercial Information Technology world. Many large modern schools have comparable IT demands to medium to large businesses. The number of computers in schools has grown enormously and this has been accompanied by the acquisition of increasing large and complex networks often with sophisticated telecommunications links. The range of software used and supported is very extensive and the number of users is also usually very high. Arguably, the role the computer users in schools play is a much more complex one than that commonly found in most business

environments. Typically, few of the users regard a particular computer as *theirs* and individuals, both staff and students, may use several different computers each week. This poses some logistic and management issues not encountered to the same degree in the commercial sector.

Many business have now moved to a Chief Information Officer (CIO) model of management. Michael Earl's (1996) research on the qualities of successful CIOs indicates that the most important include:

- a vision shared with the company's wider management, so that IT supports strategy
- a close relationship with senior executives, especially the CEO
- a willingness to pay attention to day-to-day IT performance
- an ability to judge the importance of changes in the business

All these qualities are immediately and readily applicable to the environment in many schools. Earl's work however goes further by observing that IT and all the things connected with it change quickly with a consequence that CIOs are being confronted with an increasing range of new responsibilities. CIOs now also must have a good understanding of business processes, which means in turn that they are now likely to encompass Human Resource and Strategic Planning. Just like any other manager they need to lead their departments through rapid change, but they have in addition to act as the *corporate radar* for new technologies. On top of all this, today's CIO needs to manage relationships with an ever-growing range of external suppliers and contractors. The parallels with the IT management requirements in schools are obvious, clear and strong.

6.7 The Lessons for Schools

Just as businesses appreciate that information and associated technologies are among their most important assets so too must schools move past mere mantra to a more applied and practical acknowledgement of this reality. Much more attention must be given to the adoption of a more business-like approach to IT management. Luftman (1996) contends that a firm must co-ordinate four main elements, business strategy, the strategy of its information systems, its organisational infrastructure, and its information technology infrastructure. Schools too need to adopt a similar approach.

While clearly there are many significant differences between businesses and schools these differences should not be used either to obscure the significant similarities or to minimise the increasingly vital role that IT plays in educational organisations. Consequently, schools too must seek to identify and align these same four elements. A failure to move in such a direction may well jeopardise the benefits that ought to be increasingly accruing from the growing investment in information technology.

6.8 Leadership or Management

While this argument advocates a greater management orientation to the acquisitions, deployment, and implementation of IT in schools, this does not mean it should be done at the expense of leadership. The strategic activity concerned with the posing and resolving of *how questions*, continues to be important. The focus must however quickly move beyond this to address issues more concerned with the *what* and *why* questions that must be examined as part of a process that both precedes and enables strategy development. This must also be accompanied by the provision of an environment in which a sense of purpose and confidence is engendered in all members of the school community. There is a greater likelihood of this occurring where there is the sort of personal action that is at the heart of leadership. As has already been observed this is not merely the responsibility of the principal. The issues involved in the management of schools are too important and too diverse for one person to handle them all adequately, especially given the priorities and the competing demands faced by today's principals.

Schools, like any organisation, unquestionably need leadership but this is more than a requirement for one or two key senior people (Ogawa & Bossert, 1995). Leadership should be associated with roles throughout an organisation, including of course those concerned with the management of IT. There is a clear need for people in positions of responsibility with regards to IT in schools who can shape rather than surrender to the volatile nature of these technologies. It is too much to expect the principal alone to assume this kind of responsibility. In any event what matters now is *collaborative advantage* and the assembling of powerful teams. (Bennis & Biederman, 1998) There is a strong imperative for careful consideration of how the administration of education, both at macro and micro levels, can encourage or stifle

potential leaders. Certainly the issue is not merely one of increased management for there is an ever-present risk of schools becoming over-managed and under-led.

6.9 The Place of Technical Know-how

Apart from the issues of management and leadership there is the additional dimension of technical knowledge and expertise. For many years, there has been a general call for computer literacy, but how much technical computer knowledge is really required? Luftman (1996) presents a cogent, but apparently heretical argument that what the leaders and managers of IT need is more ***computer illiteracy***. He believes that computers and indeed information too are secondary and not primary elements of IT. His assertions add up to an approach to handling IT as a business resource, using business language and not technical IT language. This message is equally applicable to schools. IT in education is also a secondary element; an educational resource that must be handled and presented using a language that permits clear communication with all interested parties. For IT to be effectively developed, implemented and maintained in schools, the related discourse must avoid the kind of complex details that are likely to draw an opaque veil over the subject. A reliance on a technically-oriented methodology to communicate with the school community is not only not necessary, but is likely to mystify matters and consequently be counter-productive. In the interviews discussed in Chapters 8 and 9, both principals and CIOs expressed very clear views about the prime importance of communication and in particular the need to do so in a language that avoids jargon but which clearly conveys the continuing strategic importance of IT. This does not deny however the existence of valid, vital and highly complex technical issues, but these are not necessarily the ones with which the IT leader needs to be intimately concerned.

This view has undoubtedly been pertinent for some time, but its relevance and application to the needs of modern school communities will be driven to greater prominence by the force of telecommunications. Already the advent of the ubiquitous Internet has begun to have a major impact on the way schools operate. As some of the traditional barriers of time, cost and distance diminish or even disappear, so too many of the longstanding beliefs and practices of schools will become destabilised and possibly redundant. Technical IT knowledge and skill do not rank

as high priorities on the list of attributes needed for leading and coping in such a changing environment. The concept of IT and computers in particular as complex, fragile and expensive devices that are off-limits to most people and to be handled and discussed by technical experts is an anachronism in a world of decentralised PCs with their convenient and increasingly intuitive graphical user interfaces. While there may be elements of power and control to be gained from working within a mysterious shroud of technical jargon that is comprehensible only to an IT priesthood, the only, if any gain, will be a short-term personal one for the members of this elite group. The educational CIO must be free of any such trappings that ultimately only serve to obscure and impede the effective operation of IT. This person must be a powerful communicator and advocate who can clearly and simply articulate the ICT needs of the school community. Certainly, fluency in decision-making and the application of the technology in an educational setting are far more empowering and necessary than literacy in technology.

There is then a need for a careful blend of management and leadership. The IT area has a particular requirement for skill in activities such as problem solving (Leithwood & Steinbach, 1995), formulating and communicating a strategy based on a vision for an improved future, as well as a capacity to inspire others to strive to turn the vision into a reality (Fidler, 1997). These are qualities usually associated with leadership but they need to be accompanied by planning and the adoption of a set of systematic procedures to help provide an environment in which the vision has a realistic chance of attaining reality. These complementary characteristics are not mutually exclusive but they do have to be synchronised. This balance is necessary to avoid the loss of spirit and purpose that emerges from either over-managed and under-led organisations or those that experience a temporary soar followed by a quick crash which is so often associated with strong charismatic leadership accompanied by poor management (Bolman & Deal, 1991). Such a challenge is of course comparable to that faced by the modern school principal, but it must not be treated as one exclusive to that role.

6.10 The Place of Principals

The New Zealand Ministry of Education through its *Principals First* training series and the accompanying *Learning Technologies Planning Guide for Schools* is

targeting principals to assist them to gain a general understanding of learning technologies and its management (New Zealand Ministry of Education, 1999). The motivation for this kind of targeting appears to be based on a succession of reasonable premises. The Principal is the person with the budgetary discretion to make decisions concerning the introduction of technology into classrooms and also should have both the leadership position and the accompanying power to be a successful innovator. As Casey (1993) contends, for the successful integration of IT into the learning and teaching process of a school, the principal needs to have the following skills and qualities: fluency in the use of computing for educational purposes; cognisance of the instructional uses, pedagogical implications, and curricular effects of using the technology in the classroom; as well as a thorough grounding in the research on educational technology and innovation. Such a view, although thoroughly laudable, is not particularly realistic especially in a medium to large secondary school environment where there may be too many other competing demands on a principal. It might be argued however that much of this, at least at a general level, should be a necessary prerequisite for the job. The real need would seem to be for people in schools who are well trained, experienced and qualified to support and advise the principal and assume a set of responsibilities similar to those of the business CIO.

The concept of technology as an integral part of the instructional programme is comparatively new. We can neither assume therefore that information about the role and efficacy of technology in education will automatically filter through to principals nor that they will have an up-to-date grounding in instructional practice. We must however similarly be careful not to assume that they necessarily have the capacity to deal with all the issues themselves. The days, as Bennis(1998) observes, of the empowered individual are over and a principal, just as a business CEO, must be part of a powerful team in which each member must play an important role in ensuring the overall success of the organisation.

It is not enough to allow schools to continue to focus on the acquisition of more computers, communications and associated peripheral equipment. Just as the new technologies make new demands on teachers, it also makes new demands on the management of the resource. In addition to the technology, schools have to have the human resources to manage IT in such a way that it can achieve its potential. The

British Telecom (1999) report identified the most crucial factor for ensuring the success of IT in schools as good management and leadership. In particular, the report identified seven specific areas as particularly important. These areas are:

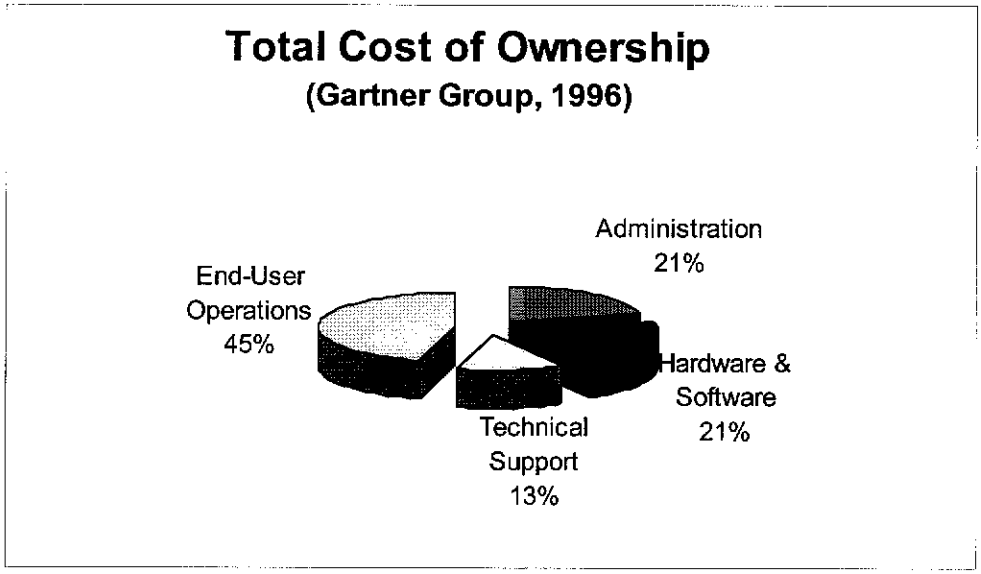
- planning and target setting
- capital investment and maintenance
- management and administration
- in-service training
- supporting the curriculum
- monitoring and assessment
- community use of resources

6.11 Barriers to Obtaining Value from IT in Schools

Sullivan et al. (1998), reporting on a survey of New Zealand School Principals identified a number of barriers to getting value from IT in schools. These included: cost of equipment, cost of technical support, other usage costs, teacher knowledge of equipment, teacher understanding of the value of the use of equipment, Board of Trustees understanding of the value of the use of equipment, availability of equipment, backup support, and the availability of resource kits and learning activities. Perhaps because of the chronic long-term under-funding of ICT in schools the principals tended to focus on immediate cost and availability issues. There appears to be much less attention given to the longer term issues including, the total cost of ownership of the equipment, what is the best way to address the problems, and how much of the responsibility for minimising risk and maximising effectiveness can most productively be delegated. Unfortunately, this is likely to be attributable to the inclination to focus on the immediate problems with less consideration being given to longer-term solutions and an administrative paradigm that is unduly influenced by a more traditional way of doing things.

6.12 Total Cost of Ownership

Figure 6.1 Total cost of ownership



(Gartner Group, 1996, n. pag.)

An example of how thinking about these issues has developed is demonstrated by the emergence a few years ago in business IT circles of the concept referred to *as Total Cost of Ownership* (TCO). Discussion of TCO now permeates the consciousness of IT and financial managers, staff, and CEOs in the business world yet seems largely ignored in education. This impetus for this level of interest is attributable to the Gartner Group Consulting Services Report (1996). While there is a plethora of TCO theories, approaches and remedies it is nonetheless still an important concept in the management of IT in business. Experts in this area find it difficult to agree on the actual costs associated with TCO but they are unanimous about one thing; the initial purchase price is a relatively small percentage of the total cost of owning a PC. A commonly accepted TCO model (refer to Figure 6.1) identifies the four main constituent parts of the total costs as: end user operations (44 – 55 %), support (17-27%), administration (12 - 14%), and hardware and software costs (14 – 20%).

While principals appear to focus more attention on the cost of hardware and software (Sullivan, 1998), the largest piece of the cost pie is that incurred by end-users. There may be a temptation to dismiss this as only relevant to business as the major end users in schools are students who are not employed and therefore do not incur costs

in the same way as business employees. Clearly, there are differences between the ways schools and businesses operate but there are still important lessons to be learned from this kind of analysis. Teaching and administrative staff members are very important users of computers and teachers' time in particular is especially valuable. Students, while not employees, still merit consideration in this regard. The time students spend in unproductive activity detracts from other work, increases frustration for both staff and students and is likely to run counter to many of the educational objectives the equipment is meant to serve. Students have therefore just as much right to expect consistent and reliable performance from the computers they use, as would any business user.

An analysis of some examples of the non-job related tasks that often consume end users time may be helpful to explain its importance. Problems relating to the inefficient data backup or lack of data backup, which means that there is no reliable process in place to ensure the preservation of documents in the event of computer-system crash. Huge amounts of time can be spent on the annoying and time-consuming task of trying to recreate data that is lost. Education has a long history of self-support out of fiscal necessity. If users doing their own troubleshooting, repairs, upgrades, software installation, training and backup management is a problem within business then inevitably it will be even more of an issue in schools where a *do-it-yourself* mentality is almost traditional. (Principals and CIOs have more to say about this in Chapters 8 and 9). There are real, although hidden costs of teachers maintaining computers for, as a consequence, they will not only not be able to be as effectively productive in the specialised work they are trained and employed to do but they may not necessarily be as effective as a trained computer technician. Collaboration and co-operation are clearly desirable attributes in an educational environment but the kind of informal assistance that teaching colleagues and students may give each other to resolve technical problems also has a cost. The advice may be wrong or misleading and this sort of situation is conducive to drawing even more people into the discussion so multiplying the number distracted from their main activity. There are also a whole range of time-wasting activities that typically occur probably with similar regularity and impact, in both business and education. They have been collectively referred to as the *Futz* Factor (refer to the Glossary for a detailed explanation). While there is no agreed-upon definition of this term, it

mostly concerns the time spent on playing games, doing personal work, rearranging file locations, altering set-ups and configurations, playing around with screen savers and the like. Downtime, whether it is of the planned or unplanned variety, causes interruption, delay and frustration. The non-availability of its computer network, even for short periods, can have a major impact on the administration of the school and those classes dependent on having access. Among other things, the typically minuscule professional development budgets customary in education means that schools will find them quite inadequate to meet the costs of professional IT training. Out of necessity, as a consequence, self-training then often replaces traditional formal training. This may not only pose particular difficulties in making effective use of hardware and software but may make tasks longer and more complex than they need to be. These issues while clearly identified and quantified in the business world are just as important in schools where arguably they may too often be neglected or not accorded the attention they deserve. Problems of this type will not merely disappear or resolve themselves. The solution is for schools to be better equipped with the people with the skills, resources and time to do the job of managing the ICT environment.

6.13 Conclusion

Despite the baffling minefield of conflicting approaches to remedying these kinds of problems they still need to be considered and dealt with and more effective management will provide substantial assistance. Most principals acting alone cannot assume the kind of responsibility for competently handling all the IT management tasks such as setting relevant goals, devising and implementing suitable tactics, implementing tighter management tools, increasing control and evaluating the comparative merits of leasing rather than purchasing. The overwhelming conclusion must be that they should be able to call and rely on the presence of a professional colleague who is competent to accept the appropriate range of delegated responsibilities. This person, though not necessarily highly technically knowledgeable, must have excellent communication skills, have sound management and leadership capabilities, and a thorough grounding in the theory and practice of education generally and Information Technology in Education in particular. A major priority must be to ensure that schools have access to suitable people to undertake

these sorts of responsibilities or much of the investment that has gone into IT will yield returns that are disappointing, debilitating, and destabilising. Undoubtedly, it can be done better and a planned and cohesive approach to the management of IT in schools is an especially important means to that end.

The arguments advanced in this chapter are based primarily on supporting ideas and evidence from the literature. The next three chapters add to this case but with evidence based on research conducted with school IT leaders, school principals and business CIOs.

CHAPTER 7

SCHOOL AND BUSINESS IT LEADERS IN ACTION

> *If I have learned anything from my research, it is this: The factor that empowers the work force and ultimately determines which organizations succeed or fail is the leadership of those organizations. When strategies, processes or cultures change, the key to improvement remains leadership.*
>
> (Bennis, 1994, p. 76)

7.1 Introduction

In Chapter 4, the qualities required of leaders and managers are examined and a case for more emphasis on the importance of these qualities in the adoption and implementation of Information Technology (IT) in schools is advanced. This chapter builds on these ideas and provides some evidence to further advance the case for giving greater acknowledgement of the place these qualities should have in IT in schools and to identify specific areas where there is scope for change or development. It also provides information useful to answer to Research Questions 2, 3 and 5.

In 1999, the *CIO Leadership Research Center* conducted a *Self-Assessment Survey* (US CIO Survey) in which respondents were asked to rate the relative importance of 18 leadership activities. In addition to providing a rating for these activities, respondents were also asked to rate how much time they spent on each so that the perceived importance of each activity could be balanced against the amount of time spent on it. This survey provided useful insights into the views of business CIOs.

Early in 2000 the author developed another survey, designed to parallel the survey conducted among Chief Information Officers (CIOs) by the *CIO Leadership Research Center*, yet independent of it (NZ IT Leaders Survey). It was subsequently emailed to approximately 100 New Zealand people identified as having the primary responsibility in their respective schools for leading and managing IT. (The people identified were selected from those who had participated in email discussions and who clearly had responsibilities for leading and managing IT in their schools. With a very few exceptions these people would not have been principals and the majority

held HoD positions or the equivalent in New Zealand secondary schools. As the intention of the survey was to obtain information from people with responsibilities over the broadest possible IT areas including the management of local area networks such a target group seemed reasonable as primary schools are not yet typically big users of such a range of technology and in addition are normally much smaller than the average secondary school). The intention of this survey was two-fold. First to obtain data that would allow a comparison with the results of the US CIO survey and second to gather data reflecting the views of a comparable group of people from the New Zealand educational community.

Email was selected as the medium for the survey as the subjects of the survey were intended to be heavy computer users with ready access to email facilities. This had the added advantage that the responses provided would already be in electronic format and therefore much easier to collate and tabulate using tools like a spreadsheet or word processing program. Other advantages of this approach include its cost effectiveness and the ease with which the process could be automated. It was also comparatively easy to follow-up on people who did not respond though a limit was of two attempts was set on this. These advantages were typically borne out in practice, but there were some drawbacks. One of these was that some subjects did not have software sophisticated enough to handle the form as it was sent out and occasionally there may have technical problems. Allowance was made for this by resorting to alternative file types and on occasion printing hard copy and transmitting it by fax. The choice of a questionnaire as the method for collecting data was determined by the method used for the original CIO survey and the need to keep the questions as similar as possible.

7.2 The Surveys

While it was important that the surveys be similar, so the results of the two surveys could be compared, it was considered necessary to alter the wording of the NZ IT leaders survey form. (A copy of the NZ IT Leaders survey form is included in Appendix G). Thus, minor adjustments were made to the NZ IT Leaders survey to better reflect the different working environment involved. The order, number of questions, and general layout of the survey remained very much the same. The US CIO survey was published on the website

(www.cio.com/forums/leadership/quiz3form_content.html) and the results published on the website (www.cio.com/forums/leadership/edit/quiz3_content.html). The NZ IT leaders survey was sent by email to people previously identified as having relevant responsibilities. Nearly 360 people responded to the US CIO survey whereas 33 people (20 men, 8 women and 5 who did not reveal their gender) responded to the NZ IT survey. Of these people only one was identified as a principal (small primary school) and the majority were from secondary schools where they held positions that were either equivalent to or at HoD level.

The results are likely to reflect more closely the situation prevailing in secondary schools. Among the reasons for this is that the survey was conducted by email. Secondary schools are more likely to have ready access to email than primary schools. The people were selected from groups in which secondary schools are more strongly represented. The questions asked are likely to be seen as more relevant to secondary schools that typically have a much greater investment in IT equipment and infrastructure.

7.3 The Relative Importance of Leadership Activities

The first section of each of the surveys asked for 18 'leadership' activities each to be rated on a four point scale (*1=Most Important* to *4=Least Important*) and also to be rated according to the amount of time spent on each activity. The time rating was done on a three point scale (*Too Much, Enough, Not Enough*). These leadership activities are described in Table 7.1

The relative importance of the 18 'leadership' activities ranked top to bottom from most important to least important are shown in Tables 7.2, 7.3 and 7.4

Table 7.1

Leadership Activities – Listed in Survey Order

Activity Number	CIO Activities	IT Activities
1	Efficiently implementing IT	Efficiently implementing IT
2	Building a top-notch IT staff	Building a top-notch ***IT*** staff
3	Developing leaders within the IT staff	Developing leaders within the ***IT*** staff
4	Building the IT department's reputation for value and service	Building the ***IT*** department's reputation for value and service
5	Prioritizing the investment portfolio	***Prioritising*** the investment ***in equipment, software, infrastructure…***
6	Aligning IT with business goals	Aligning ***IT*** with ***school/education*** goals
7	Satisfying internal customers' needs	Satisfying internal customers' needs
8	Networking/schmoozing with other executives	Networking/schmoozing with ***other senior staff***
9	Educating officers and business unit heads about IT and its possibilities	Educating ***staff*** about ***IT*** and its possibilities
10	Networking in the industry or CIO community	Networking in the ***educational*** or ***HoD- IT*** community
11	Studying the competition and its use of IT	Studying the competition and its use of ***IT***
12	Developing and implementing a strategic plan	Developing and implementing a strategic plan
13	Identifying new business opportunities made possible by IT	Identifying new opportunities made possible by ***IT***
14	Identifying competitive threats and business disrupters	Identifying competitive threats and disrupters
15	Reacting to change	Reacting to change
16	Influencing and anticipating the moves of the technology vendors	Influencing and anticipating the moves of the technology vendors
17	Building strategic partnerships with IT vendors	Building strategic partnerships with ***IT*** vendors
18	Keeping tight rein on expenses	Keeping tight rein on expenses

(The differences in wording are identified in bold italics. The abbreviation ICT – Information and Communication Technologies was chosen to more closely reflect the prevailing parlance of the New Zealand education system.)

Table 7.2

Rankings of CIO Leadership Activities (US CIO)

(No information was provided on the method employed to determine the ranking order from the CIO survey)

CIO Ranking		
CIO Order of Importance		IT Order of Importance
1	Aligning IT with business goals	4
2	Building a top-notch IT staff	11
3	Building the IT department's reputation for value and service	12
4	Developing leaders within the IT staff	9
5	Satisfying internal customers' needs	5
6	Efficiently implementing IT	1
7	Developing and implementing a strategic plan	3
8	Educating officers and business unit heads about IT and its possibilities	2
9	Identifying new business opportunities made possible by IT	6
10	Reacting to change	10
11	Keeping tight rein on expenses	8
12	Studying the competition and its use of IT	17
13	Identifying competitive threats and business disrupters	16
14	Networking in the industry or CIO community	13
15	Building strategic partnerships with IT vendors	14
16	Networking/schmoozing with other executives	15
17	Influencing and anticipating the moves of the technology vendors	18
18	Prioritizing the investment portfolio	7

Table 7.3

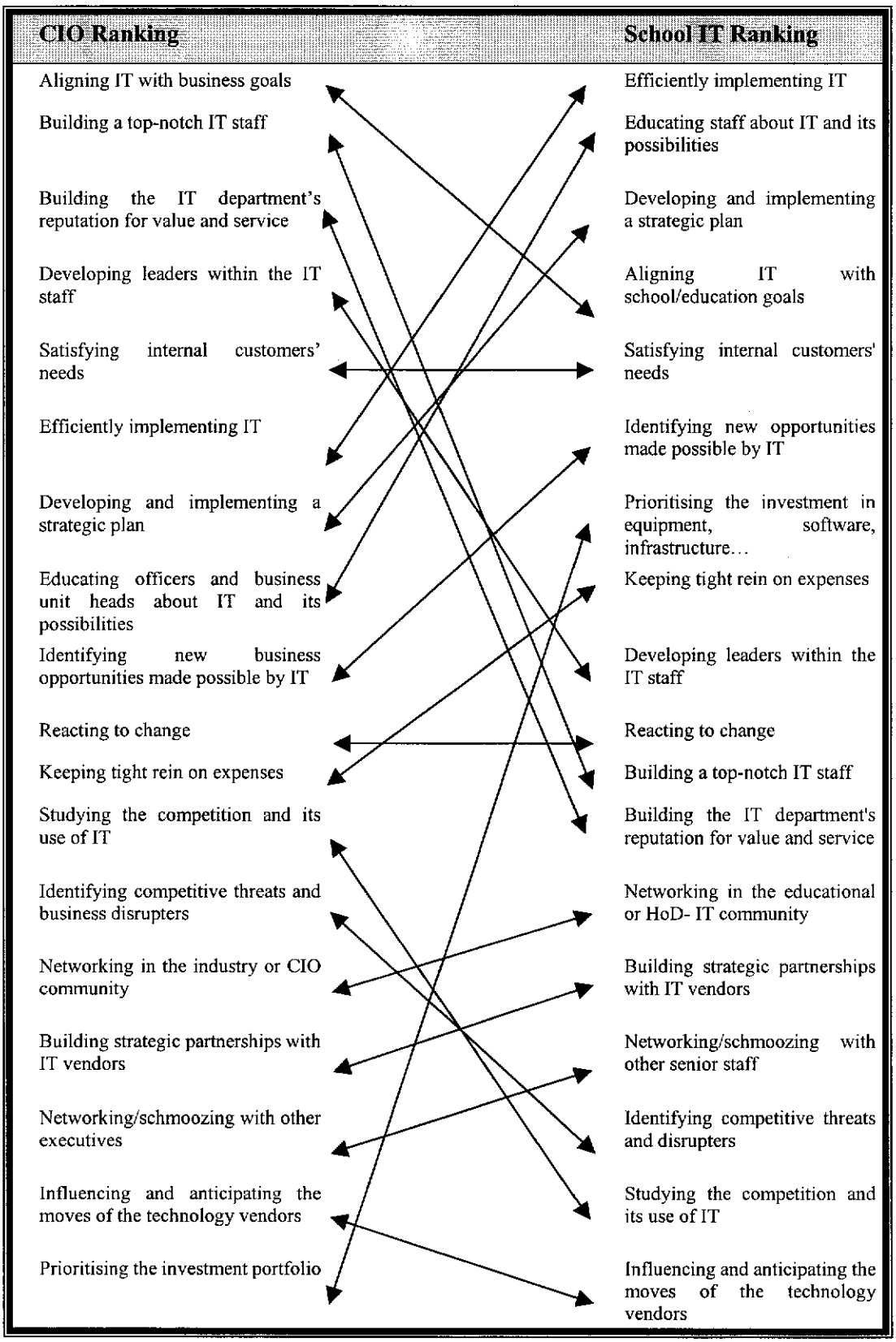
Rankings of School IT Leadership Activities (NZ IT Leaders)

(The method for determining the ranking of the response to the IT Leaders survey is outlined in Appendices A and B)

School IT Ranking		
IT Order of Importance		IO Order
1	Efficiently implementing IT	6
2	Educating staff about IT and its possibilities	8
3	Developing and implementing a strategic plan	7
4	Aligning IT with school/education goals	1
5	Satisfying internal customers' needs	5
6	Identifying new opportunities made possible by IT	9
7	Prioritising the investment in equipment, software, infrastructure…	18
8	Keeping tight rein on expenses	11
9	Developing leaders within the IT staff	4
10	Reacting to change	10
11	Building a top-notch IT staff	2
12	Building the IT department's reputation for value and service	3
13	Networking in the educational or HoD- IT community	14
14	Building strategic partnerships with IT vendors	15
15	Networking/schmoozing with other senior staff	16
16	Identifying competitive threats and disrupters	13
17	Studying the competition and its use of IT	12
18	Influencing and anticipating the moves of the technology vendors	17

Table 7.4

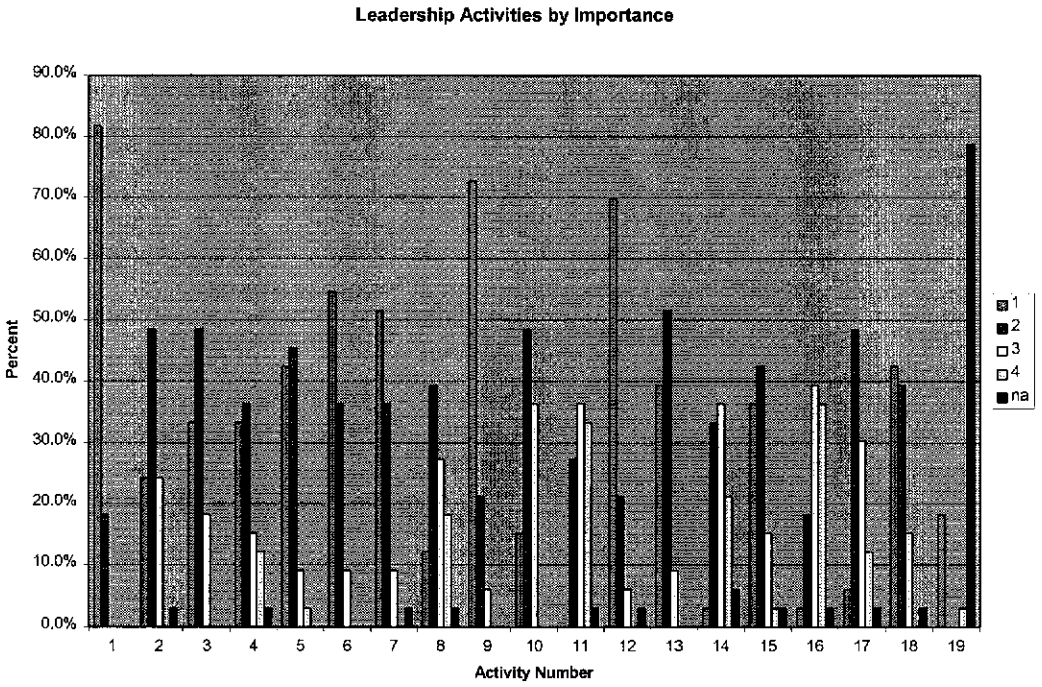
Comparative Rankings of Leadership Activities in Priority Order



The results of this part of the surveys are compared in Figure 7.1.

Figure 7.1. IT Leadership Activities

The extent of any differences between the results of each of these surveys is



summarised in Table 7.3.

7.4 Differences Between the Two Leadership Surveys

The largest difference between the two sets of responses to the section of the survey on *Leadership Activities* occurred with *Prioritising the investment portfolio / Prioritising the investment in equipment, software, infrastructure.* While it ranked as number 7 for the IT people, it rated the lowest scoring for CIOs. This appears to be at odds with the strategic nature of the highest rating activity for *CIOs, Aligning IT with business goals.* It may reflect a possible difference in the cultures of businesses and schools as the business environment is perhaps more likely to be more strongly focussed on business goals. For businesses the prioritising of investment most likely follows in a comparatively routine fashion from the determination of these goals while schools may have a less marked orientation to goals and a greater degree of concern with ensuring an equitable distribution of expenditure over all departments. Furthermore, schools typically operate on much smaller budgets than would be customary in many businesses with a consequent need for schools to attribute greater

importance to prioritising expenditure. As the NZ IT people rated *Efficiently implementing IT* as their most important activity, this would seem to further reinforce the notion that they have a greater level of concern over funding issues than do CIOs. However, both groups gave a comparatively low rating to *Keeping a tight rein on expenses* (CIO –11, IT – 8) so the explanation may not be quite so obvious.

Substantial differences were also apparent between the importance ratings of *Building a top-notch IT staff* (CIO – 2, IT – 11) and *Building the IT department's reputation for value and service* (CIO – 3, IT – 12). Despite the prevalence of outsourcing it seems likely that businesses are more likely to have higher levels of staffing in their IT departments than typically is the case in schools. Concern over the department's reputation for value and service is consistent with the CIO's ranking of *Satisfying internal customers' needs* (5). This does not follow in the case of the IT leaders who rated *Satisfying internal customers' needs* at 5 but *Building the ICT Department's reputation for value and service* at 12. This apparent anomaly may be attributable to the rather artificial nature of the notion of an IT Department in many schools. Often in schools there may be only one person with the responsibilities that would, in other schools, be assigned to an IT Department. In such circumstances, it may be regarded as contrived to try to build the reputation of a department that does not really exist. Alternatively, it may be that many IT leaders do not fully appreciate the importance of their reputation and this would be consistent with their views of the importance of other political type activities. While both groups accorded this activity the same importance rating, the IT group did not see the same degree of alignment of satisfying internal customers needs as did the CIO group. This too may be attributable to the typically low levels of IT staffing in schools, where as a result, there is perhaps a consequential, and possibly inevitably lower set of expectations of the performance of the IT staff. If this is the case, it might follow that the reputation of a school's IT department would not be seen as important as might be the case in the commercial arena.

There was also an appreciable difference between the importance rankings of *Educating officers and business unit heads about IT and its possibilities / Educating staff about IT and its possibilities*. CIOs ranked this 8 whilst the IT people ranked it very highly at 2. This would seem to indicate that schools believe they still have much to do to persuade staff about the possibilities of IT where as CIOs may feel that

much of this has already been achieved. IT has been more accessible and its use and its benefits have been widely understood and accepted for business for longer than is typically the case for most schools. In contrast to this position, there are still schools with only very limited IT facilities and there is debate about the role and comparative merits of the use of computers in education.

Significant differences also emerged from the rankings of *Efficiently implementing IT, Developing leaders within the IT staff* and *Studying the competition and its use of IT.* Concern about efficiency ranked as the most important activity for the IT people while CIOs ranked it at position 6. With schools typically having to work hard to fund even small scale IT projects it is perhaps not too surprising that the leaders from this sector should have such a concern with efficient implementation. It is possible that a distinction may also be made between the significance of the use of *efficiency* and the possible alternative use of *effectiveness.* Maybe the IT people are more likely to have concerns about doing *things right* rather than doing the *right things.* (Drucker, 1964) Perhaps the IT people are more oriented to achieving goals at the lowest possible cost in contrast to adopting a process that critically appraises the appropriateness of the goal. CIOs may not only be more management literate in this sense than the people with comparable responsibilities in schools, but may also have more opportunities to reflect and evaluate the desirability of particular courses of action. The difference in rating for the *developing leaders'* activity is again almost certainly attributable to the differences in staffing levels. With IT staffing in schools in many cases not even running to one full-time equivalent position for non-teaching tasks like IT operational work, this activity becomes one of only marginal importance in a school environment.

While neither the CIOs nor the IT leaders ranked *studying the competition and its use of IT* very highly (IT 17/18, CIO 12/18) there is still an appreciable difference between them. The low ranking by the IT people may reflect the fact that while competition is part of the reality of life in the business world, and although it is relevant in education as well, there is perhaps not a comparable level of orientation to competition in the educational culture. Since the passing of the Education Amendment Act in 1990, schools in New Zealand have had much more independence from central government and it is only since then that schools have become market-oriented to any appreciable extent. Certainly, schools in New

Zealand have a long tradition of co-operation. This is reflected in the extent to which teachers involve themselves and share ideas through a wide range of interest groups. Examples of these associations include the Wellington Association of Computing Teachers (WACT), the Central Districts Computers in Education Society (CDCES) and a whole hosts of other groups that range from specific curriculum areas like language, reading, mathematics and physical education to other areas like literacy and educational administration (NZEAS). Close bonds are no doubt also forged through the activities of the main teacher unions, the NZEI and the PPTA, who have high levels of membership in almost all state schools. Many school principals belong to associations such as the Secondary Principals Association of New Zealand (SPANZ) or the New Zealand Principals Federation (NZPF) which involve principals from both the State and Independent sectors. That CIOs also gave *Studying the competition* quite a low ranking may indicate that while they may see IT as of strategic importance to their organisations they do not see monitoring the competition as important an activity as may be true for their counterparts in Marketing and Sales. This low ranking seems compatible with those given by both the CIO and IT groups to *Identifying competitive threats and business disrupters.* (IT 16/18, CIO 14/18).

7.5 Similarities Between the Two Leadership Surveys

In contrast to the areas of differences, there were several activities about which the CIOs and IT people had similar views. As has already been noted *Satisfying internal customers' needs* attained the same importance rating (5) from both groups. Indeed there were only two activities to be ranked by both the CIOs and the IT leaders in the top five most important activities and there were no activities appearing in the top three for both ranking lists. (Refer to Table 7.3) It would however be presumptuous to ascribe too much significance to this. *Reacting to change* also had the same rating for both groups (10). There were minimal differences in the ratings for *Building strategic partnerships with IT vendors* and *Influencing and anticipating the moves of the technology vendors*. Both groups deemed both of these activities of minimal relative importance. Similarly both groups produced a difference of only one rating point for three other activities: *Networking/schmoozing with other executives, Networking in the industry or CIO community* and *Identifying competitive threats*

and business disrupters. Interestingly with the exception of *Satisfying internal customers needs*, all these activities rated very low on both lists.

Table 7.5

Leadership Activity

Activity Number	Leadership Activity (Listed in descending order of difference)	CIO Ranking	IT Ranking	Difference
5	Prioritizing the investment portfolio	18	7	11
2	Building a top-notch IT staff	2	11	9
4	Building the IT department's reputation for value and service	3	12	9
9	Educating officers and business unit heads about IT and its possibilities	8	2	6
1	Efficiently implementing IT	6	1	5
3	Developing leaders within the IT staff	4	9	5
11	Studying the competition and its use of IT	12	17	5
12	Developing and implementing a strategic plan	7	3	4
6	Aligning IT with business goals	1	4	3
13	Identifying new business opportunities made possible by IT	9	6	3
18	Keeping tight rein on expenses	11	8	3
8	Networking/schmoozing with other executives	16	15	1
10	Networking in the industry or CIO community	14	13	1
14	Identifying competitive threats and business disrupters	15	16	1
16	Influencing and anticipating the moves of the technology vendors	17	18	1
17	Building strategic partnerships with IT vendors	15	14	1
7	Satisfying internal customers' needs	5	5	0
15	Reacting to change	10	10	0
	Average Difference			3.78

This also suggests that both the CIOs and IT people do not have the same perception of the usefulness of politics as a tool for leaders and this ranking is probably consistent with the identification of *not being politically minded* as a major barrier to effective leadership. (Refer to Section 7.9 *Barriers to Effective Leadership*)

An indication of how respondents to both surveys felt about the whether they were spending the right amount of time on each of the leadership activities is given in Tables 7.6 (CIO) and 7.7 (IT).

Table 7.6

CIO Time Allocation Results

Ranking	Activity Description	Time Rating		
		Too Much	Enough	Not Enough
1	Aligning IT with business goals	8%	50%	42%
2	Building a top-notch IT staff	5%	48%	48%
3	Building the IT department's reputation for value and service	6%	41%	53%
4	Developing leaders within the IT staff	2%	39%	58%
5	Satisfying internal customers' needs	19%	55%	26%
6	Efficiently implementing IT	14%	58%	29%
7	Developing and implementing a strategic plan	6%	45%	48%
8	Educating officers and business unit heads about IT and its possibilities	5%	28%	67%
9	Identifying new business opportunities made possible by IT	3%	39%	58%
10	Reacting to change	26%	56%	18%
11	Keeping tight rein on expenses	23%	64%	14%
12	Studying the competition and its use of IT	3%	40%	57%
13	Identifying competitive threats and business disrupters	2%	48%	49%
14	Networking in the industry or CIO community	2%	33%	65%
15	Building strategic partnerships with IT vendors	5%	70%	25%
16	Networking/schmoozing with other executives	11%	39%	49%
17	Influencing and anticipating the moves of the technology vendors	8%	64%	28%
18	Prioritizing the investment portfolio	6%	62%	32%

7.6 Time Allocated to Leadership Activities

Table 7.7

IT Time Allocation Results

Ranking	Activity Description	Time Rating		
		Too Much	Enough	Not Enough
1	Efficiently implementing IT	18%	24%	55%
2	Educating staff about IT and its possibilities	6%	24%	70%
3	Developing and implementing a strategic plan	15%	58%	24%
4	Aligning IT with school/education goals	6%	52%	42%
5	Satisfying internal customers' needs	27%	39%	30%
6	Identifying new opportunities made possible by IT	9%	30%	61%
7	Prioritising the investment in equipment, software, infrastructure…	12%	61%	27%
8	Keeping tight rein on expenses	18%	76%	3%
9	Developing leaders within the IT staff	3%	39%	58%
10	Reacting to change	9%	55%	33%
11	Building a top-notch IT staff	3%	30%	61%
12	Building the IT department's reputation for value and service	21%	42%	30%
13	Networking in the educational or HoD- IT community	0%	52%	45%
14	Building strategic partnerships with IT vendors	3%	64%	30%
15	Networking/schmoozing with other senior staff	9%	61%	30%
16	Identifying competitive threats and disrupters	9%	58%	27%
17	Studying the competition and its use of IT	0%	58%	39%
18	Influencing and anticipating the moves of the technology vendors	0%	67%	30%

(**Note**: There were a few people who did not provide a response to some activities so some of the percentage figures will total less than 100%)

The analysis so far has focussed on the comparative rankings of the 18 leadership activities. As Tables 7.4 and 7.5 reveal there can be some variation between the

perceived level of importance and the amount of time devoted to that activity. Clearly there are many leadership obligations for which there just is not sufficient time available for them to be addressed to the extent regarded as desirable by either group.

7.7 Time Allocation of CIOs

CIOs rated several activities high on the scale of relative importance yet indicated they were possibly not spending enough time on them. Included in this category were *Developing leaders within the IT staff* (fourth - 58% not enough time) and *Developing the IT department's reputation for value and service* (third – 53% not enough time). There were of course those activities that rated lower in importance yet respondents felt that they ought to be spending more time on them. Among these were *Educating officers and business unit heads about IT and its possibilities* (eighth – 67% not enough time), *Networking in the industry or CIO community* (fourteenth – 65% not enough time) and *Studying the competition and its use of IT* (twelveth – 58 % not enough time). The apparent paradox of comparatively important activities being seen as deserving more time is probably attributable to there being too many leadership activities for the time available. Certainly this is consistent with the identification by both CIO and IT groups of *lack of time* as the major impediment to effective leadership.

Table 7.8 *CIO Leadership Activities Getting the Least Amount of Needed Attention*

Ranking	Leadership Activity	% *not enough time*
8	Educating other officers and business unit heads about IT and its possibilities	67%
14	Networking in the industry or CIO community	65%
4	Developing leaders within the IT staff	58%
9	Identifying new business opportunities made possible by IT	58%
12	Studying the competition and its use of IT	57%

The top five leadership activities CIOs rated as getting the least amount of needed attention are shown in Table 7.8.

In contrast, there are those activities on which too much time is spent. None of the activities rated by the CIOs indicated that too much time was devoted to that activity. This is consistent with the identification by both groups of, lack of time, as the major impediment to effective leadership. Three activities in particular were identified as demanding quite high levels of time. These included *Reacting to change* (26%), *Keeping a tight rein on expenses* (23%) and *Satisfying internal customers' needs* (19%). While none of these activities ranked at the top end of the importance scale they were not in the bottom group either. The CIO perceptions of these activities would seem to be that while they are necessary pursuits they do drain time away from even more important and neglected duties.

The top five leadership activities CIOs rated as getting more time than they deserved are shown in Table 7.9.

Table 7.9 *CIO Leadership Activities getting more time than they deserve*

Ranking	Leadership Activity	% *too much time*
10	Reacting to change	26%
11	Keeping tight rein on expenses	23%
5	Satisfying internal customers, needs	19%
6	Efficiently implementing IT	14%
16	Networking/schmoozing with other executives	11%

7.8 Time Allocation of IT Leaders

The IT leaders also rated several activities high on the scale of relative importance yet indicated they were possibly not spending enough time on them (Table 7.10). Included in the category were *Educating staff about IT and its possibilities* (second – 70%) and *Identifying new opportunities made possible by IT* (sixth – 61%). This result reinforces the earlier observation that schools probably still believe they still have much to do to persuade staff about the potential of IT and aid them with the

development of IT skills. In many schools, this would be an especially time consuming activity and rather ironically probably one for which only limited amounts of time are available. Certainly the high ranking of *Educating staff* (2) combined with the clear indication that this activity does not receive enough attention (70%) identify this as an area of considerable concern to IT leaders. It may also suggest that schools ought to allocate more staffing time to fulfil needs in this area. The rating of 70% is also very close to that given to the comparable activity in the CIO survey (67%) further reinforcing the notion that there may be a general need for staff education about IT and its possibilities. Notwithstanding the earlier comments about the size and place of IT staff in schools, two leadership activities relating to staffing, *Building a top-notch IT staff* (61%) and *Developing leaders within the IT staff (58%)*, appear in the top five activities IT leaders identified as needing more attention. This may reflect a perception of IT leaders that they, as the primary if not the only people from their schools who fit into the relevant category, need more opportunities to develop their own skills and knowledge. While CIOs did not place *Building a top-notch IT staff* as high on the list of activities needing more time as did the IT leaders, the *Developing leaders* activity was given the same rating of 58% by both groups. It would appear therefore that there is a perception that more time needs to be given to leadership development in both the educational and business sectors. Also getting similar ratings from both groups was the identification of the new opportunities made possible by IT category (CIO – 58% and IT 61%) although the IT group rated it slightly higher in importance than did the CIOs. It is probably of particular significance that the two activities rated as first and second in importance by the IT leaders were also rated by the majority as in need of more time. This is very likely to be attributable to a general lack of time for IT leaders to carry out their duties, and this in turn is almost certainly allied to low staffing levels in this area of schools' operations. The issue of time is discussed in more detail in a subsequent section of this chapter.

The top five leadership activities IT leaders rated as getting the least amount of needed attention are shown in Table 7.10.

Table 7.10 *IT Leadership Activities getting the least amount of needed attention*

Ranking	Leadership Activity	% *not enough time*
2	Educating staff about IT and its possibilities	70%
11	Building a top-notch IT staff	61%
6	Identifying new opportunities made possible by IT	61%
9	Developing leaders within the IT staff	58%
1	Efficiently implementing IT	55%

In contrast, there are those activities that the IT leaders felt received too much time (refer Table 7.11). Highest on this list was S*atisfying internal customers needs*. This also of course appeared on the comparable list for CIOs (19%) but its significance is possibly ameliorated by the almost equal three-way split in the ratings of the IT leaders (27% - too much time, 39% - enough time, 30% - not enough time). It is difficult to interpret these results, however that it may reflect a feeling that although satisfying internal customers is reasonably important (5/18) much of the effort spent in this area might be better allocated to more productive activities. (The use of this kind of fraction provides a ranking for the activity out of a total of 18 activities). An example of a more productive activity might include staff development and education since an increase in the knowledge and skill of teachers might in turn reduce the demands for help-desk type assistance. Even with its comparatively low rating of 12/18 *Building the IT department's reputation* was still rated by 21% as getting too much time, however, counteracting that, more people thought it did not receive enough time (30%).

The next two activities on this list are particularly interesting. The *Efficient implementation of IT* is in the top five activities receiving insufficient time (55%) while it also appears in the list of the top five activities that do not receive enough time (18%) though the balance of opinion is clearly towards it not getting enough time. Given its ranking at the top of the importance list it is rather surprising that nearly a fifth (18%) of the IT leaders felt it was

receiving too much time. This may yet be another example providing further evidence that there is not enough time to do justice to all the important responsibilities. *Keeping a tight rein on expenses* while seen by 18% as getting too much time, rated much lower on the importance scale (8/18), and so provides an interesting contrast to the views on the amount of time spent on *Efficiently implementing IT.* The fifth activity on the list, *Developing and implementing a strategic plan*, ranked quite high on the importance list (3/18) yet was rated by 15% as receiving too much time, though more people felt it was not receiving enough attention (24%). In recent years, the New Zealand Ministry of Education has focussed on the need for schools to develop IT plans so this has probably heightened awareness and sensitivity to the need for this kind of documentation. The majority of respondents (58%) however felt that *Developing a strategic plan* was receiving enough time. It is important to note that as with the CIOs there was no instance of a majority of the IT leaders indicating that too much time was spent on any activity. Once again this is likely to be an indication that both groups of leaders felt very pressed to find sufficient time to allocate to their duties.

The top five leadership activities IT leaders rated as getting more time than they deserved are shown in Table 7.11.

Table 7.11

IT Leadership Activities getting more time than they deserve

Ranking	Leadership Activity	% *too much time*
5	Satisfying internal customers needs	27%
12	Building the IT department's reputation for value and service	21%
8	Keeping a tight rein on expenses	18%
1	Efficiently implementing IT	18%
3	Developing and implementing a strategic plan	15%

7.9 Barriers to Effective Leadership

Given the previous responses, it is no surprise to find that the vast majority of CIOs and IT leaders cited *Too many distractions/not enough time* as the biggest deterrent to being an effective leader. For both groups, this was by far the biggest hurdle with no other hurdle achieving anything like a similar rating level. The IT leaders, however were significantly more concerned than the CIOs about this as a problem, with 88% of them identifying it as a major obstacle. This is further evidence that there is a strong need for additional staffing in this area of the human resourcing of New Zealand schools. For the IT leaders the next biggest obstacle was *Change happens too fast to get in front of.* This is consistent with their concern about the lack of time and number of distractions. Although the CIOs gave it a lower rating, their concern about the lack of time, albeit high, was not as marked as it was for the IT group. Over a quarter (27%) of the IT leaders felt that not knowing the skills presented a hurdle for them and this further reinforces the point made in Chapter 5 about the need for leadership and management training for these people. While a higher proportion of CIOs saw that not being politically minded was a hurdle than was the case for the IT leaders, it was still identified by a significant number of the IT Leaders. As the *CIO.com* article (www.cio.com/forums/leadership/edit/quiz3_content.html, p. 3) notes, leadership gurus such as Bennis have identified politics as a tool for leaders (refer Chapter 4, Section 4.7).

> *Politics isn't just something you use to defend yourself—it can be the key to leading organizational change*
>
> (Wallingford, 2000, p. 1)

Probably many IT leaders, just like CIOs, may not perceive it in this light, rather regarding it somewhat negatively as an enemy or skill they either do not have or even perhaps wish to have. Both groups rated the networking and schmoozing activities at similarly low levels of importance (see Table 7.5) so perhaps the perceived political hurdle might not be so daunting if these sorts of activities were accorded more importance and given more time. Certainly, Blodgett (1999) in her outline of ten tools that every CIO needs to succeed, included building relationships with other senior staff and all key-decision makers (refer to Chapter 4). It is possible too, that both groups of IT leaders are not as aware of the potential of politics as a tool to assist them in their jobs as they should be and that more education in leadership skills

might help them appreciate the value of these sorts of activities. Table 7.12 shows the weightings given to the various hurdles to effective leadership by both CIOs and IT leaders.

Table 7.12

Hurdles to Becoming an Effective Leader

Hurdle Number	Hurdles to Effective Leadership	CIO % Selection	IT % Selection
5	Too many tactical distractions/not enough time	64%	88%
2	Not politically minded	33%	24%
8	No role models/mentors	33%	18%
3	Not enough credibility with other senior staff	27%	12%
6	Not part of the leadership group	27%	18%
4	Difficulty communicating effectively with other senior staff	24%	12%
9	Change happens too fast to get in front of it	21%	36%
1	Don't know the skills	12%	27%
7	Don't really want the responsibility	unknown	6%

7.10 Gender Deviations

While there was no specific intention in this research project to identify or address specific issues relating to gender it emerged that there were some and that they were of a significance that they merited inclusion. While there was unanimity by gender in both groups over the selection of the first and second most important leadership activities (see Table 7.13) some variation is apparent from the third choice on. The IT leaders' selections are consistent through to their third ranking although the ranking order was different from those chosen by the CIOs. Female CIOs rated the building of their department's reputation as the third most important activity while male CIOs opted for *Efficiently implementing IT.* While this aligns the male CIOs more with the views of the IT leaders, the female CIO choices, with the exception of the first one, have a strong orientation to staff concerns. This pattern is not reflected in the responses of the female IT leaders perhaps indicating that the size of IT departments in schools is such that activities identified in the NZ IT Leaders survey

Table 7.13
IT Leadership Activities by Importance and Gender

Ranking	CIOs		IT Leaders	
	Female	Male	Female	Male
1	Aligning IT with business goals	Aligning IT with business goals	Efficiently implementing IT	Efficiently implementing IT
2	Building a top-notch IT staff	Building a top-notch IT staff	Educating ***staff*** about ***IT*** and its possibilities	Educating ***staff*** about ***IT*** and its possibilities
3	Building the IT department's reputation for value and service	Efficiently implementing IT	Aligning ***IT*** with ***school/education*** goals	Aligning ***IT*** with ***school/education*** goals
4	Educating officers and business unit heads about IT and its possibilities	Building the IT department's reputation for value and service	Identifying new opportunities made possible by ***IT***	***Prioritising*** the investment ***in equipment, software, infrastructure…***
5	Developing leaders within the IT staff Satisfying internal customers' needs	Developing leaders within the IT staff Satisfying internal customers' needs Developing and implementing a strategic plan	Networking in the ***educational*** or ***HoD- IT*** community	Identifying new opportunities made possible by ***IT***
6			Developing leaders within the ***IT*** staff	Developing leaders within the ***IT*** staff
7			***Prioritising*** the investment ***in equipment, software, infrastructure…***	Networking in the ***educational*** or ***HoD- IT*** community
8			Networking/schmoozing with ***other senior staff***	Developing and implementing a strategic plan
9			Developing and implementing a strategic plan	Satisfying internal customers' needs
10			Satisfying internal customers' needs	Keeping tight rein on expenses
11			Building the ***IT*** department's reputation for value and service	Reacting to change
12			Reacting to change	Building the ***IT*** department's reputation for value and service
13			Building a top-notch ***IT*** staff	Building a top-notch ***IT*** staff
14			Keeping tight rein on expenses	Networking/schmoozing with ***other senior staff***
15			Studying the competition and its use of ***IT***	Building strategic partnerships with ***IT*** vendors
16			Influencing and anticipating the moves of the technology vendors	Influencing and anticipating the moves of the technology vendors
17			Building strategic partnerships with ***IT*** vendors	Studying the competition and its use of ***IT***
18			Identifying competitive threats and disrupters	Identifying competitive threats and disrupters

(Data for CIO respondents only available for their first five rankings)

that relate to IT staff have only very limited relevance. This conclusion is also reinforced by the significant difference in ranking *of Building a top-notch IT staff,* ranked at number two by both male and female CIOs, but only appearing at position thirteen for both male and female IT leaders.

Rather surprisingly in view of the hurdles that were identified (see Table 7.12) only the female IT leaders ranked networking in the top five of their important leadership activities and the *schmoozing* activities do not appear in the first five for any of the four groups. This is despite Blodgett's views (see Chapter 4 Section 4.8) on the merits of building empathy through listening and building goodwill; in effect schmoozing type activities. Of all the leadership activities only one, *Aligning IT with business goals* appeared in the top five for each group.

Just as there was unanimity about the choice of the most important leadership activity so there was a similar level of agreement over the identification of the major barrier to leadership. All four groups (see Table 7.16) chose *Too many tactical distractions/not enough time* as the major hurdle. This level of agreement however was not sustained for the other choices. Women CIOs lamented a *Lack of role models and mentors* as their second biggest barrier while their male counterparts gave this rating to *not being politically min*ded. Women's concern over the lack of mentors is consistent with observations made elsewhere (Schneider, 1999). Given that there has been considerable discussion of the need for role models for women this is perhaps not surprising. Rather paradoxically however, female IT leaders did not identify this as a hurdle at all, although a quarter of their male colleagues did see a lack of a suitable role model as a hurdle. (Mentors are critical to males as well as to females, Bennis, 1999). Certainly the majority of IT leaders do not have an identifiable leadership role model or mentor although just under half indicated that they would like help to find one (See Table 7.14)

Table 7.14

Leadership Role Model or Mentor

	Yes	No	No Answer
Do you have a leadership role model or mentor?	33%	61%	6%
Would you like help in finding a leadership mentor?	45%	42%	12%

Perhaps this reflects the fact that there are proportionately more females in teaching than there are females in commercial IT management. Only 10% of CIO positions in the USA, UK, and France are held by women (Schneider, 1999 p. 6). The situation in New Zealand schools may not be as severe for female leaders in this area for the responses to the IT survey (Refer Table 7.15) showed a higher level of participation by women in IT leadership. Teaching as a career in New Zealand is increasingly dominated by women with only 21% of primary teachers being male and most of them being in the older age groups (Roger, 2000, p. 34). It may be that women in teaching in New Zealand may not have the same level of concern about their role as women who work in the IT section of businesses.

Table 7.15

Gender Ratio for IT Leadership

Male	Female	Unknown
Permanent Full-Time Primary Teachers*		
23.38%	76.62%	
Permanent Full-Time Secondary Teachers*		
51.72%	48.28%	
Permanent Full-Time Teachers (Total)*		
34.97%	65.03%	
IT Leaders Responding to the Survey		
58%	25%	16%

* Ministry of Education, 1997

By further contrast, the male IT leaders allocated second place to *Not knowing the skills* where as their female counterparts opted for *Change happens too fast to get in front of it. Don't know the skills* was only chosen by the male IT leaders and as the statement did not make clear what range of skills it refers to there may be some ambiguity in the meaning of this response. Male IT leaders may see their roles being concerned mainly with technical issues and that increasingly significant proportions of these are tending to be outside their area of expertise. Alternatively, male IT leaders may now perceive their responsibilities involve them more in a management

and leadership role, one for which for which they may feel ill equipped. Such a conclusion may be supported by the fact that 61% of IT leaders reported that they have not attended a leadership training programme in the last two years (refer to Table 7.16). It is also supported by the contention advanced in Chapter 6 that many of these people may have moved into these positions because of their technical interests and expertise. (Refer also to Chapter 8 for the principals' views on their IT Leaders skills and attributes).

Table 7.16

Participation in Leadership Training programmes in the Previous Two Years

Have Participated	Have Not Participated	No Answer
33%	61%	6%

Males appear to be much more likely to feel that they are not part of the leadership group, though surprisingly this did not rate as a concern for females who might be expected to have more difficulties in this area. Given the increasingly important strategic role of IT and the size of the investment in it both for education and business, this must be a cause for concern. As cited from Earl (1996) in Chapter 4 both a vision shared with the wider management and a close working relationship with other senior staff are especially important qualities (refer also to Chapter 9 for the views of CIOs on this matter). While the survey did not explicitly gather such data, it seems likely that IT leaders in schools may not yet be routinely regarded as part of the senior executive of schools. Although it is not a view reflected in the comments of principals (refer to Chapter 8) there may still be lingering vestiges of older ways of thinking. It may be that IT leaders, unlike their CIO counterparts, still have to gain recognition for a position that has advanced from one with its beginnings as a repository for "closet geeks", to one that should now be regarded as the place of a key information strategist.

Notwithstanding the common belief that IT technology changes very rapidly, male CIOs did not perceive this as a significant barrier to effective leadership. Female CIOs and both male and female IT leaders did express concern about the obstacles created by the pace of change. The IT people certainly rated this much higher on the scale of barriers than was the case for the CIOs. Once again this may be a reflection

of the range of the responsibilities of the IT people. Many of them have teaching responsibilities in addition to their IT management and leadership role, and as has already been noted, they often have only very limited staffing to cover all the duties they are expected to perform. Spreading their attention in these ways would impede their ability to cope with the pace of change.

Table 7.17

Top 5 Hurdles to Effective Leadership by Gender

(The numbers used in this table indicate a ranking position for the top five barriers on a 1 – 5 scale. The percentage figures indicate the proportion of the sample identifying a particular barrier)

Barriers to Effective Leadership	CIOs				IT Leaders			
	Female		Male		Female		Male	
Don't know the skills						0%	2	(45%)
Not politically minded	4		2		3	(13%)	4	(30%)
Not enough credibility with other senior staff	3		5			0%		10%
Difficulty communicating effectively with other senior staff						0%		20%
Too many tactical distractions/not enough time	1		1		1	(75%)	1	(90%)
Not part of the leadership group			4			0%	5	(25%)
Don't really want the responsibility						0%		10%
No role models/mentors	2	(70%)	3	(63%)		0%		25%
Change happens too fast to get in front of it	5				2	(25%)	3	(35%)

(Other than for "No role models/mentors" percentage figures not available for the CIO survey)

7.11 Leadership Advice

Respondents were asked to identify the extent to which five groups of people could be classified as credible leaders (see Table 7.18). As details of the CIO responses were not given in the *CIO.com* article the analysis is restricted to the results of the IT leaders survey. The most effective advisors on effective leadership for IT leaders come from two similar groups: *Successful veteran School HoD-ITs and Successful "next generation" School HoD-ITs*. These results seem to be consistent with the

male IT leaders who indicated that a lack of models/mentors was a hurdle to effective leadership. It may also reinforce their feelings of inadequacy about their knowledge of skills (see Table 7.19). About half the IT leaders saw academics as having at least some degree of credibility as advisors and this may be taken as an indication for a need for more education in the area of leadership and management of IT and perhaps the need for mentors as well. By contrast however, principals are not generally perceived as particularly credible advisors on effective leadership, yet as the key leadership figure in schools this is a role that they might be expected to have. Certainly the New Zealand Ministry of Education has targeted school principals as key leadership people in schools with its *Principals First* seminars and documentation. Perhaps the Ministry's efforts might have been more effectively oriented to the people with the more direct IT responsibilities in schools and to promoting their value as people with major strategic contributions to make. Other people with major leadership responsibilities, distinguished politicians, fared even worse with a resoundingly high proportion of the IT leaders rating them at the bottom of the credibility scale for advice on effective leadership.

Table 7.18

Credible Advisors on Effective Leadership

Advisors on Effective Leadership	1	2	3	4
	Most credible ⟷ Least credible			
1. Academics specialising in educational leadership	3%	52%	21%	12%
2. Successful veteran School HoD-IT, School IT Manager…	46%	36%	6%	0%
3. Successful "Next generation" School HoD-IT, School IT Manager…	49%	30%	9%	0.0%
4. School Principals	9%	30%	30%	18%
5. Distinguished politicians	3%	3%	18%	61%

(**Note**: *1=Most Credible, 4=Least Credible*)

7.12 Position Description

Unlike business where the term *CIO* now has wide currency, there is no equivalent term that adequately reflects the responsibilities of the IT leaders in schools and which has the same level of acceptance as does *CIO*. While Table 7.19 spreads the

responses out rather thinly it does perhaps provide enough evidence to make some observations. The traditional term of Head of Department (HoD) is still widely used in many New Zealand schools although several alternatives have been adopted. A particular difficulty with this title may be that it has normally been used to describe a teacher with responsibility for the delivery of a particular curriculum area. Though computing topics are taught in schools and there is still a recognised computing subject offered at Year 12 (Sixth Form Computer Studies), IT does not readily conform to this sort of classification. Typically, IT leaders will have responsibilities that are much broader than just subject responsibilities and indeed some may not have any such direct teaching responsibility at all. People working in the financial and general administration areas of schools have not customarily been described as HoDs (Heads of Department) but rather as Managers or Directors. They of course, have not normally had teaching or direct subject responsibilities so the IT area is probably unique in this regard. Further evidence of this confusion of roles can also be found in the connection between IT and Technology. Technology is now officially a part of the New Zealand Curriculum, but the role of IT is less clear. Is for instance, IT a part of Technology or does it stand alone on its own merits? Some schools have clearly opted to include the IT aspect of their operation under the Technology umbrella, while what is probably a larger group regard it as having a separate role. This sort of tension perhaps reflects a slowly growing realisation that IT is increasingly a core part of the business of education and as such it serves a key strategic function. Despite this, there is still no official funding for positions of designated responsibility for example Local Area Network (LAN) Administrator, within the IT operations of schools. Perhaps in response to the difficulty in fitting the new IT role into traditional terminology new descriptions like Manager and Director are beginning to emerge. There was no substantial indication from this survey that there is any trend in education to follow the path taken by business who have recognised that a new role, that of CIO, has emerged and that it is a different one to that undertaken by an IT Manager. A possible exception to this might be the use by one school of the title *Director Library/Information Resources and Services.* This example is the nearest any of the schools came to revealing an understanding that IT as it is now deployed concerns much broader issues than the machines and the programs that utilise them. The associated issue of where responsibilities for areas like Learning Technology, Audio-Visual Technology, Copying Technology,

Document Management, and Telephony lie is not made explicit. With the trends in the changes in technology, these are all areas that will become increasingly difficult

Table 7.19

Position Title

Category	Position Title	% Title	Using	Category Total
HOD	HoDIT	21%		
	HoDIT	9%		
	HOD	3%		
	HoDComputer Studies	6%		
	HoD- Technology Curriculum	3%		
				42.00%
Manager	IT Manager	6%		
	ICT Manager	3%		
	Computer Manager	3%		
				12.00%
Director	Director – Resources	6%		
	Director Administration	3%		
	Director Library/Information Resources and Services	3%		
	Director - IT	3%		
				15.00%
	Principal	6%		
	ICT Specialist	3%		
	TIC Computers	3%		
	Chairperson - ICT Committee	3%		
	ICT Co-ordinator	3%		
	TIC - Technology	3%		
	General IT "Dog's Body"	3%		
				24.00%

(TIC – Teacher In Charge, ICT – Information and Communications Technology)

to distinguish. Perhaps as a consequence, schools should be planning and acting in a manner in which they allocate senior positions of responsibility accordingly. Perhaps titles such as *Director of Information Resources*, *Director of Information Infrastructure*, or *Director of Learning Technologies and Information Services* would more adequately reflect, not only the merited seniority of the position, but also the range and importance of the responsibilities associated with it.

While caution needs to be exercised in ascribing too much significance to the importance of titles, they may nonetheless be symptomatic of underlying tensions and issues. As has already been discussed, many of the people with responsibilities in the area of IT in schools feel pressures that may be directly attributable to the diverse and possibly vague nature of many of their duties. Such difficulties may not be restricted to the IT area as other teachers may have comparable problems. Regardless, it is still important to expose the reality and seek improvements, especially as IT now represents such a substantial investment both in terms of time and money and plays such a pivotal role in the operations of most schools.

7.13 Conclusion

The role of leadership in the operation of any enterprise be it a school or commercial business, is a critical one. As has already been noted in Chapter 4, efficient management without effective leadership is akin to straightening the deck chairs on the *Titanic*. Further to this notion is the importance of people in the operation of IT. Perhaps too much attention has now been paid to the hardware and infrastructural requirements and that now more attention must to be accorded to the quality and style of the human resources. It is these people who will be the critical ingredient in determining the quality of return on the IT investment. The analysis of the rankings of leadership activities suggests a number of issues for schools to respond to in addressing and satisfying the leadership and management needs in the IT area. There is likely to be a need to change the orientation from one concerned with efficiency to one that focuses more on effectiveness with its consequential implications for evaluating goals and reassessing directions. Acknowledgement needs to be made to the emerging importance of staff development as a key activity of IT staff. Also allowance should be made in both staffing and time for this function to be adequately fulfilled. Whereas CIOs see aligning IT with business goals as their number one

leadership activity, this is not regarded as so important by their counterparts in education. It is conceivable that the CIOs have placed too much stress on this. It is however at least equally likely that schools need to make more provision in their thinking and planning to assist their IT staff to be more effective in aligning the goals of IT with those of the school as a whole. CIOs rate the development of a 'top-notch' IT staff and developing IT leadership as very important. A similar level of importance is not evident in the views of IT leaders. This is perhaps another area where schools can learn from the business orientation where greater stress is placed on the value and contribution of IT staff and the need for more people to cater for the increasing demands in this area. In doing this, schools must assist their IT support staff to appreciate the tactical importance of establishing for the IT department, a reputation for value and service. There is some evidence, that IT staff may not fully appreciate the significance of leadership skills especially in the areas of politics and PR areas. Encouragement of them to appreciate the value of these activities through appropriate forms of professional development may be advantageous.

Allied with identifying these leadership and management needs, schools must also become increasingly aware of the barriers that may be militating against their fulfilment. Unquestionably, paramount among these is time. The recurrence of a lack of time as a general complaint by many managers and teachers alike is clear evidence of the case that can be advanced for a greater time allowance for IT staff. Their tasks and responsibilities have not only grown widely and rapidly in scope but their relevance to core educational activity has also increased. While time cannot of course be created the problem can be addressed by altering staffing arrangements. Teaching duties can be reduced or replaced, specialist people can be appointed to LAN administration, technical duties, training, web management and the like, and recognition given to the nature of general IT management in schools. Furthermore, the time demands may also represent a serious barrier minimising the attractiveness of these sorts of positions to women. Whether IT staff in schools customarily are genuinely a part of the senior management group or not is a key question schools must address as part of their review of their management models. If the effectiveness of the IT investment is to be optimised it is critical that the IT leaders are closely allied with key decision-making processes. Gone are the days when IT could be regarded as a comparatively amateur operation with little or no relevance to the main

thrust of schools' operations. Now, just as happened in business, computers and other forms of IT are now mission critical and thoroughly intertwined into almost every aspect of a school's operations. School principals must play an especially important role in this respect. They must appreciate the importance of establishing a close and trusting relationship with the person with the key responsibilities for managing and leading IT for the school. It may be construed as merely symbolic, but an examination and resolution of the title given to this person might also be useful. Just as the realisation in business circles that the term *IT Manager* no longer properly reflects the scope of the work undertaken by such a person, so too schools need to reach a similar conclusion. As part of that process, principals must acknowledge that their IT leaders are really more than can adequately be described in traditional *HoD* or *TIC* or curriculum based terms with their associated confusion of curriculum and general operational responsibilities. The focus in IT in Education must now move away from the *Art* and on to the *Artist*.

CHAPTER 8

THE MANAGEMENT AND LEADERSHIP OF IT IN SCHOOLS: THE PRINCIPALS' PERSPECTIVE

> *The standard criteria for choosing top-level managers are technical competence, people skills, conceptual skills, judgment, and character. And yet effective leadership is overwhelmingly the function of only one of these — character. (Judgment is an important secondary criterion.) If you ask subordinates what they want in a leader, they usually list three things: direction or vision, trustworthiness, and optimism. Like effective parents, lovers, teachers, and therapists, good leaders make people hopeful.*
>
> (Bennis, 1994, Introduction to Chapter 5.)

8.1 Introduction

During 1999 nine school principals were interviewed about a range of issues relating to the management and leadership of Information Technology in schools. Interviewing was selected as the method for collecting data because the flexibility it provides means that it is possible to follow-up readily unanticipated responses or lines of argument. In addition the interview provides greater opportunities for explanation and elaboration with the result that it is typically possible to obtain a greater level of in-depth data than can be expected from approaches. Certainly during an interview special nuances and interpretations occur that really are unlikely to become apparent when other techniques are used and the interview provides the researcher with the opportunity to pick these up and explore them.

The principals were selected to provide a reasonable coverage of school types (composite, primary, full-primary, intermediate, secondary, state, independent, co-educational, single-sex, urban and provincial) given the small size of the sample. They were approached either in person or by email in the first instance then this was followed up by a letter explaining the purpose of the interview and the research. Although the principals all had some interest in IT and educational administration this was not a significant factor in their selection for none of them could really be described as specialists in either of these areas. As principals however they are educational administrators; a role in which IT is now an inherent and significant part.

The interviewer knew some of the principals, while others were suggested as people worth approaching for such an interview. These interviews, were typically an hour or so in length, and each focussed on the same set of pre-determined questions made available to the principals in advance of the interview. These questions determined much of the structure of the interview, but discussion was not always restricted merely to the specific questions identified in Appendix D. The interviews were recorded and later transcribed. The transcriptions were subsequently sent to the principals for checking and additional comment. As they were verbatim and unedited transcripts it was not always easy for the principals to follow all the material. As a further check on content copies of the drafts of both this chapter and the one that follows were sent out to the principals for them to verify that their views were fairly and accurately represented. A key was provided to each of the principals so that they could identify which quotations were attributable to them but not be able to identify any of the other principals. This process also allowed the principals an opportunity to gain an appreciation of the context in which their views were being used and for them to indicate any alterations that they felt might be necessary.

The interviews were designed to concentrate on obtaining in-depth qualitative data from principals about the management and leadership of Information Technology in schools. Though some quantitative data was sought this was restricted to demographic type information about the school. The size of the sample for this survey was such that it cannot necessarily reflect a representative range of New Zealand schools. It did however cover most of the main types of New Zealand schools over an area extending from South Canterbury in the south of New Zealand to Hawkes Bay in the north. While this chapter will be concerned mainly with presenting and analysing data in answer to Research Question 4 "*What are the perceptions of principals about the qualities needed in the people with IT management responsibilities in schools?* it should also help provide answers to Research Questions 2 and 3 (refer Appendix C) and should build on the more theoretically based material discussed in Chapters 3, 4 and 5.

While acknowledging the differences between the educational and commercial environments it was also hoped that it might be possible to learn something from the experience of business in the area of Information Technology. A separate, but similar set of interviews was conducted with a group of business CIOs (Chief

Information Officers) to allow comparisons to be made. The details of the interviews with CIOs are outlined in Chapter 9.

While clearly as Chapter 7 has helped establish, the changing role of IT and the role of IT leadership is now widely understood in commerce, it is likely that a comparable level of awareness does not exist in education about a similar role in schools. An important theme in the discussion with principals involved exploring a range of issues that have been identified in earlier chapters. These included the power of IT to transform such fundamental aspects of management as, strategy and organisational structure, the role of IT leadership in the effective realisation of core operational activity, and the extent to which IT now permeates almost every aspect of organisational life making its management much more sophisticated and complex.

8.2 Leadership Qualities

Until recently the people with the primary responsibility for Information Technology in schools have had a very hands-on and practical role especially given the lack of funding for staffing in this area. A particular matter to investigate, was the extent to which principals perceived technical skill as a prerequisite or major requirement for the job. The nature of their replies might reveal the extent to which schools were moving in a similar direction to business where there is a trend for the role of the CIO to move away from technical planning and implementation to focus on strategic planning. (Korn/Ferry – Financial Times, 1999).

In response to a question about the most important personal qualities and skills needed in the person with the primary responsibility for IT in their schools principals tended to provide similar answers. Generally technical know-how did not rate particularly highly, though most still considered it to be important. The need for vision was identified much more positively and clearly.

> *The primary attribute would be having a vision for where they want to go.*
>
> (Principal 1)
>
> *A vision for what should happen not only for our school, but for schools and young people in general.*
>
> (Principal 2)

Someone who has a strategic vision yet has some person skills and the ability to manage and prioritise effectively.

(Principal 4)

They also need to have flexibility and a vision to know where they're going, ...

(Principal 5)

I would expect the person to be quite creative in their thinking. Certainly they need to have a lot of energy and drive to get things done, they must have a real interest in how kids learn and it's that vision and drive that I think that's really important.

(Principal 6)

...they have to be competent leaders, they're the chief visionary in the team.

(Principal 8)

Such responses are consistent with research findings on the qualities of successful CIOs (Earl, 1996). They also certainly give strong support to the view that principals have a concern for more than just technical skills, and that they regard the role as being very much a leadership one with quite clear strategic implications. It is significant too, that they do not appear to regard vision as the exclusive prerogative of the principal or even the Board of Trustees. It would not however be painting a fair picture to create an impression that principals saw technical skill as having no place at all. Most principals did identify some form of technical skill as important.

...a background understanding of hardware, software, what things, what machines and software are capable of and are able to put that into a vision that can be incorporated into the school.

(Principal 1)

The first thing is an interest and an expertise in the area of IT.

(Principal 2)

Technical skills across the network obviously and within individual computers...

(Principal 4)

I would presume that this person has got technical expertise otherwise they would have not have been appointed to the job.

(Principal 7)

Secondly they need obviously, the technical knowledge of their subject and be able to teach in the field.

(Principal 9)

Only two of the principals appeared to rank technical expertise particularly high on their lists of key qualities or skills and several did not mention it at all. Indeed one principal went so far as to comment when referring to some of the characteristics of people who have tended to move into the IT area in schools:

> *In jargon terms they are "nerds", who like the technical function of the computer and the fact that you can play around with it in a technical way and make it do things. Now I don't believe that those are necessarily good or important characteristics in the Head of ICT.*
>
> (Principal 7)

Such views are consistent with Luftman's (1996) argument and the impact of computer hobbyists that were outlined in Chapter 6. This comment also alludes to a theme that was picked up by almost all of the principals and that is the place of human or interpersonal qualities. These sorts of attributes were often regarded as being particularly important or necessary.

> *You have to receive the person before you receive the message so they have got to have the respect of all parties.*
>
> (Principal 1)
>
> *... a very good communicator with other people and I think that's pretty important too...*
>
> (Principal 2)
>
> *They've got to have people skills. .... They need to be able to work as a team person.*
>
> (Principal 3)
>
> *I'm looking for people who can communicate because so many people in IT tend to be a bit tunnel-visioned, they don't have a global vision and they're not necessarily strategic. Someone who has a strategic vision yet has some person skills and the ability to manage and prioritise effectively. This is actually very important because one of the predicaments of these people is that they need to deal with everyone from the computer whizzo type staff and students through to total klutzes.*
>
> (Principal 4)
>
> *Really good management skills, people skills and to be extremely well planned, would be other things I'd put in as skills they need.*
>
> (Principal 5)
>
> *So my view is those human qualities, those abilities to manage people, get along fine, listen, to empathise and to motivate they are the critical issues. .... I think that many people in IT are technically*

very competent, but in terms of the human qualities that you need to be a good manager, they don't have them. So my view is those human qualities, those abilities to manage people, get along fine, to listen, to empathise and to motivate they are the critical issues.

(Principal 7)

They have to have the interpersonal qualities that will allow them to employ experts, or engage experts or whatever who will possibly know more in certain fields then they do. Above all, in terms of the interpersonal qualities, the start point, and the most important attribute is an ability to set an environment of calm. A sense of being able to cope with stress and calm people who overreact when mechanical or electronic things fail. That's the chief interpersonal quality I think they have to have, the ability to deal with people who are in stress.

(Principal 8)

First of all they need to have strong people skills in terms of being able to relate to people to see where people are at and take them on from there in terms of their development.

(Principal 9)

Another issue that emerges in discussing the qualities of the person with responsibility for IT is the extent to which this person really needs to be a trained teacher. Not all the principals mentioned this as an attribute, but several clearly saw it as being particularly important. As is of course true for other qualities that may have been identified, some principals may well regard a background as a trained teacher as a given, and therefore they may not have isolated that quality for special mention.

They have to be a skilled practitioner, which means a skilled teacher. To me they have to have teaching capabilities at the high end of what I would expect from the delivery of the classroom practitioner. Basically I rate that highly because that's what we're talking about with regard to the IT in the school, that it's there as a tool to deliver, to help deliver the curriculum effectively to kids. So therefore a skilled practitioner first up. ... They need to lead by modelling.

(Principal 3)

They have to have a knowledge of curriculum but they've got to see IT not merely as another curriculum area, in other words, all it's doing is facilitating other curriculum areas.

(Principal 5)

In any other subject area, let's take languages for example, a person can be a very efficient classroom practitioner and can lead the other staff by example. In the IT area, while there is a

classroom teaching component, that is not actually the most important part of the job.

(Principal 7)

Ideally having been trained as a teacher the IT person would develop into the IT field as a specialist. Bring together the trained teacher and IT specialist and then out of that experience at the coal-face of IT, interfacing with the teaching and learning, the IT specialist would become a leader strategically. ...What you're ultimately going to have is somebody trained as a teacher, in other words an effective communicator or a person who understands curriculum and pedagogy.

(Principal 8)

As IT now is a major item on most schools' budgets it would seem reasonable to expect that financial and budgeting skills might have ranked among the higher priorities. These sorts of skills were not however often specifically identified by principals but tended to emerge more from their discussions of other matters.

A key area is the budget and these days the IT budget tends to be very large compared to other departmental budgets so the person in charge would have greater responsibility for a greater proportion of the school's operations grant.

(Principal 1)

I think they need to be able to manage the resource that we have effectively and to be able to take primary responsibility for budgeting. ... It's important because your IT or IT budget tends to be quite a large component.

(Principal 3)

... the IT area is swallowing huge chunks of budget. I'm sure every IT teacher worth their salt in this country is having to quietly negotiate the cost benefits of various purchases and initiatives ...

(Principal 5)

It's a senior position in terms of the budget responsibility it carries and the decision making that has to go on in terms of the resources that are allocated.

(Principal 7)

I would see the principal as having a vision, and possibly going as far as developing a strategic plan, but with the IT person implementing it and having the latitude to use their own initiative along the way, provided of course, they stayed within the bounds of general school policy, and budgetary constraints.

(Principal 9)

Apart from issues relating to financial management the principals much more readily identified other management responsibilities such as planning, organising, controlling and practical implementation.

> *This person needs to be a mover and a shaker, it's all very well to have the bright ideas and the vision but they've also got to have the oomph to get it done.*
>
> (Principal 1)

> *We need somebody who is able to plan, therefore take something through to implementation and be able to work it out; basically carry out an action plan. They have got to be the kind of person that's flexible, they can't be just a wire head.*
>
> (Principal 3)

> *Really good management skills, people skills and to be extremely well planned, would be other things I'd put in as a skills they need.*
>
> (Principal 5)

> *They need to be very much involved in the planning for IT and the implementation of the plan. They've got to have skills in organisational management. A person who is extremely well organised and who can set goals and then achieve those through careful management. Certainly organisational management skills would be absolutely to the fore, but the key tasks would be in planning and implementation.*
>
> (Principal 6)

> *I believe that management and leadership skills are the most important skills that an IT leader should possess. ... Here the Head of IT has a much broader responsibilities than virtually any other subject department in the school. Because of that it is absolutely crucial that those leadership and management skills are well developed. ... From my point of view then management and leadership skills are the most important skills that a person who has the primary responsibility for IT within the school should have.*
>
> (Principal 7)

Reinforcing the views of principals about the importance of interpersonal skills, communication skills although not exclusively management skills were also seen as among the more important qualities.

> *Also a very good communicator with other people and I think that's pretty important too because he's got a lot of work to do in terms of setting up training and enthusing other staff*
>
> (Principal 2)

> *I'm looking for people who can communicate*
>
> (Principal 4)

I think they have to have a very clear view of where IT is going and have the communications skills to give a very clear view to everybody on where IT is going. We have had the boffin mentality and that's fine as a backroom quality, but there is really no place for people who cannot communicate the strategic positioning of an organisation through IT. From the strategic position the leader must then work that through to the technical and operational levels, in a way that communicates with people and brings them on board.

(Principal 8)

I think it is really important that people think carefully about what they're doing. I think they've got to have a high degree of good communication skills, not only within the school but also with their colleagues. I think that's really important.

(Principal 9)

In addition there were some other quite specific management type skills that were mentioned only occasionally. These included flexibility:

They have got to be the kind of person that's flexible, they can't be just a wire head.

(Principal 9)

Advocacy and salesmanship:

They have got to be, whether you like it or not, salesmen. ... The IT leader has got to be a good sales person.

(Principal 9)

An orientation to quality, continuous quality improvement and to the notion of a customer:

Being prepared to be a learner and an ongoing learner and to take a lot of courses and things in his or her spare time.

(Principal 2)

They need to also have a sort of focus on quality and that things that are done in IT are done with a high expectation.

(Principal 5)

So the person I have in mind will be serving the customer.

(Principal 8)

Entrepreneurship:

> *The IT area is one of constant change, evolution and development and so on, so there is an element of almost entrepreneurial qualities required but not necessarily in the financial sense. ... Entrepreneurship would be one thing that I would be looking for apart from the technical skills.*
>
> (Principal 4)

An understanding of contracts and related commercial relationships:

> *To have some understanding of contracts and a commercial head would be a great advantage because in reality most people in this area get tangled up in contractual relationships and business discussions of a nature that you wouldn't dream of.*
>
> (Principal 4)

Networking or schmoozing (see Chapter 7 for comment on the role of networking and schmoozing):

> *I think that in comparison with other senior staff members, probably the Head of IT has to do a lot more networking and background research before he makes decisions and sets general directions and then specific tasks, because IT is changing and developing so very rapidly.*
>
> (Principal 7)

Research:

> *The Head of IT is required to go out there and find out what's going on at the cutting edge for the school.*
>
> (Principal 7)

Change management:

> *You also need somebody who's leading curriculum change.*
>
> (Principal 3)
>
> *The most important part of the job is to organise hardware and software for both long term and short term development and also to lead the staff in the introduction of the IT technology in the curriculum delivery. ... It is very very difficult for staff not only in terms of their competencies but also their attitude.*
>
> (Principal 7)
>
> *Everything else in the school is in evolutionary change but in IT it is a revolutionary change and this puts a much greater pressure on the Head of IT to keep up with industry developments and the latest thinking than it does any other person in the school.*
>
> (Principal 7)

People who are leading IT in schools have got the most stressful job because they're at the interface of the whole change that is about to occur in education.

(Principal 9)

Apart from management qualities the principals also put considerable store by a leadership attributes other than vision that included motivating, enthusing and inspiring.

They need to lead by inspiring, and motivating. ... Motivation and enthusiasm are also part of those qualities along with trust.

(Principal 3)

They need to motivate people and to enthuse them as far as that is possible.

(Principal 9)

An orientation to the "big-picture"

A critical part of the job is having a bird's eye view of what's going on and advancing the introduction of IT skills both to students, staff, parents, Board - everybody across a broad front incrementally...

(Principal 7)

...I think they have to have a very clear view of where IT is going...

(Principal 9)

Being a "team player":

They need to be able to work as a team person and that's our particular structure but we are heading towards one person having that primary responsibility.

(Principal 3)

Well number one I think they have to know IT and the IT environment, they have to be competent leaders, they're the chief visionary in the team.

(Principal 8)

Having credibility:

I think the person has to have credibility, which would come through being a skilled practitioner. ... I can see the demand on the person to have a suitably professional status and credibility for they may be challenged at times by teachers who have views of use of IT which may not always be sympathetic.

(Principal 3)

Rather surprisingly however other leadership qualities like influencing, persuading, creativity, passion, political acumen and risk-taking were seldom if ever mentioned directly.

Several principals who obviously considered skills in this area to be of significance identified the role of the IT Manager/Leader in staff development. Again though this was not a role that was highlighted by the majority of principals as one they saw as particularly important.

> *Professional development is certainly a key thing. ... Setting up training and enthusing other staff.*
>
> (Principal 2)

> *Another key task is to be a coach and they need to have some level of technical ability to answer those everyday questions or be able to access that sort of information.*
>
> (Principal 3)

> *Included in that is a training responsibility for the Head of IT to lead the staff in terms of development of skills. ... One of our main tasks is the up-skilling of staff and the Head of IT needs to develop strategies that introduce the staff gently to the possibilities that are available. ... The Head of IT is going to have to develop some circular process to encourage the staff to want to use IT in curriculum delivery, and as a result want to learn the new skills, that are going to enable them to do that. Now just at present that in my view would be the top priority for our Head of IT. ... The biggest challenge and the biggest job description area that I would have for the Head of IT is to do with staff training and helping to introduce curriculum approaches that use IT and a regard for IT as an integral and necessary part of the delivery process. ... I would make the statement that in my view there are very few people working in schools and IT that are up to the task (of staff development and training in ICT). ... I really think that depends on the size of the school but at the top level I would put the visioning, the strategic planning, and the staff training.*
>
> (Principal 7)

> *The IT Manager would implement that plan, and attend to the nuts and bolts of it, overseeing staff development, staff training and hopefully generally assisting them.*
>
> (Principal 9)

The qualities and skills that principals identified as desirable in the people responsible for leading and managing IT in schools can be summarised as is shown in Table 8.1.

Table 8.1 Leadership and Management Qualities

Category	Desired Quality
Leadership	Vision An orientation to the "big-picture" Motivating Integrating people as teams Credibility Inspiring Networking and Schmoozing (Political skills)
	Enthusing
Management	Technical skills Communication Change Management Organising Controlling Practical Implementation Planning Contracts and commercial relationships Advocacy and salesmanship Flexibility Entrepreneurship Orientation to quality, the 'customer, and continuous quality improvement Research Budgetting
Education & Training	Training as a teacher (knowledge of the business) Expertise in Training and Staff Development

The analysis provided in Table 8.2 does not give an indication of weighting or frequency of the various qualities as these are very difficult to quantify accurately and meaningfully on the basis of the interview transcripts, but is simply a list of all those that principals identified as important. Despite this it does seem to reflect an orientation more to management than leadership. Drucker's point (Chapter 4) that practical implementation is very important for, "having a good idea is one thing but implementing it is another", is recognised in the principals' observations but perhaps less as a function of leadership than as one of management. Of the key qualities of a successful CIO identified by Earl (Chapter 4), vision was very clearly identified by the principals, though the nature of that vision and its relationship with strategy was not enunciated so directly. The remaining three of Earl's qualities, a close relationship with senior executives and especially the CEO (principal), a willingness to pay attention to day-to-day IT performance, and ability to judge the importance of emerging changes were only rarely highlighted. This is in contrast to the importance given to the CIO-CEO relationship by CIOs. (Refer to Chapter 9).

Table 8.2 Tools for Successful IT Leadership.

Blodgett's Ten Tools for the Successful IT Leader
Assess corporate culture
Understanding the business model
Building relationships with key decision makers
Establish credibility
Cultivate a group of confidants
Focus on building empathy
Have an 'open door' policy
Set realistic goals (under promise – over deliver)
Conduct an inventory
Identify staff strengths and weaknesses

(Refer to Chapter 4 for further details)

A few principals gave some consideration to the political and cultural qualities required. Despite the views of Bennis and Blodgett (Chapter 4) about the role of politics and an ability to assess the corporate culture as tools for leaders, however, these sorts of qualities did not really emerge as pre-eminent ones. The ten tools that Blodgett (1999) lists as necessary for an IT leader to be successful (see Table 8.2) are only fleetingly referred to. It may be a moot point whether Blodgett's contentions are correct or relevant, or whether perhaps there are aspects to the leadership and management of IT in schools that have not yet received the attention that they deserve. Notwithstanding the variances between the views of principals and scholars the principals have clearly demonstrated that they consider that the people responsible for IT in schools must have both leadership and management skills and qualities.

8.3 Tensions between the Roles of Teacher, Technologist, Manager and Leader

Apart from looking directly at the identification of leadership, and management skills another approach is to examine the tensions that emerge from the various roles of manager, leader, technologist and teacher, all ones that have to be played by the people with the primary responsibility for IT in schools. The more general tensions that exist in the implementation of IT in Schools are discussed in a later section of this Chapter. The discussions with the principals revealed the following sources of such tensions.

Between technologist and leader/manager

> *You can't have your 'computer nerd' if you like an 'expert' who doesn't have people skills running IT, you've got to have a master of all.*
>
> (Principal 1)

> *I think that there is a tension between the actual computing area as the master of their own domain, and the person who markets IT across the school. ... I think there's huge tensions between those roles of computing teacher and the management of the network.*
>
> (Principal 4)

> *... these jobs should be split up, but historically Boards of Trustees and principals have had one man, a "jack of all trades" swapping hats 5 or 6 times a day spreading energy and time across all these different areas. Boards, in particular, have difficulty in recognising that there is a much greater need for different staff in the IT area than in any other area of the school because it is not*

just a teaching subject it is a curriculum delivery subject. ... I think many of the people responsible for IT in schools concentrate on the technology systems, which is just a part of it, and in doing so they actually compromise the effect of Information Technology in the school wide sense. ... The most important part of the IT manager's job should be that of manager and leader. Teacher and technologist can be easily cut off and given to somebody else who has got lesser leadership and management abilities.

(Principal 7)

It's ridiculous that we expect people to go and teach an ordinary class and lead technology in the school and I think we're in a very difficult period right now.

(Principal 8)

Time:

The tensions perhaps result from time. The person who is in the role of lead person has demands on their time that can grow to a degree that their classroom responsibilities, which are their prime responsibilities, end up suffering.

(Principal 3)

The first is the time conflict. It must be extremely difficult for the Head of IT to meet all the demands on his or her time because all of those functions, the manager, leader and technologist. These can be thought of as being integral areas of the job they do, and not only do they have to prioritise these in their own minds, but they have to get that priority order over to the staff in the school so that they accept it. I think that must be extremely difficult.

(Principal 7)

We are under pressure because there isn't time to work through those things. I compare the amount of time available in commerce with that available in teaching. There is no comparison.

(Principal 8)

These observations are of course consistent with the views of the IT Leaders who identified time as a major impediment to them working effectively. (Refer Chapter 7 Section 7.7).

Resourcing and budgetary constraints:

There's another tension there, that is as Resource Muncher, for the IT area is swallowing huge chunks of budget. I'm sure every IT teacher worth their salt in this country is having to quietly negotiate the cost benefits of various purchases and initiatives and that also has tensions.

(Principal 4)

The tensions could be over financial constraints. The whole area of planning and the consequent spending can be complex with tensions arising. ... You spend so much in one area with a result that there other areas that are going to miss out and everyone is wanting to push their barrow.

(Principal 6)

Looking around I see that the tension is going to continue to be there because schools are not resourced. This is the key issue for the secondary sector. Schools are not resourced to employ specialists who can actually devote their time to getting the thing right. I mean the hardware and the software costs are one thing, but until you've got proper leadership you're dead in the water.

(Principal 8)

There's a tension in the budgetary constraints that emerge out of the divergence between the governance and management areas. Those who are trying to manage and implement IT want as much as possible but there isn't a bottomless bucket.

(Principal 9)

Lack of training:

The other thing is schools are going to continue to waste hardware money and software money because the people who are the key to this whole operation are not being trained. The average teachers who are trained in IT have come to it through their own initiative, their own drive and their own good will. That cannot continue.

(Principal 8)

Curriculum requirements:

Secondly some teachers are going to embrace IT wholeheartedly and others are going to be a bit diffident about seeing the relevance of IT. They already operate in an overcrowded curriculum and much depends on how easily they see IT integrating into the curriculum. IT can't be a standalone thing.

(Principal 9)

These latter responses are less direct in identifying time than the IT leaders themselves did. (See Chapter 7) Perhaps the principals descriptions of the major sources of tension while not necessarily contributing much further to the identification of leadership and management qualities, do serve to fill in the bigger picture. Much of the discussion till now has focussed on the micro level; the school level. What principals have drawn attention to are the management and leadership needs that exist at the macro or national and government level. In particular they have drawn attention to the need for more time and expertise to be available for the

management and leadership of IT and to develop the provision of funding to cover staffing as well as hardware and associated infrastructure. There is also a suggestion that the time issue may be a particularly pervasive one, especially when it comes to the demands of a burgeoning curriculum.

8.4 The Role of Professionalism and Integrity in IT Leadership

While the principals were asked about the role of professionalism and integrity as part of the survey this line of enquiry did not, in most instances, engender a particularly strong response. This may reinforce the contention of Lashway (1996), advanced in Chapter 4, that most schools do not encourage the discussion of ethical issues. Rogerson (1995) asserts that it is totally unacceptable to assume that the moral dimensions are properly catered for in business IT. This absence of a strong response from most principals may suggest that is equally unacceptable to make comparable assumptions about the moral dimensions of the implementation of IT in schools.

> *The person in charge has to be beyond reproach really and have the confidence and the respect of all the other staff members. I can see why there could be advantages in having a Code of Conduct or a Professional Association.*
>
> (Principal 1)

> *We have not had a power struggle, but I can well see that that possibility always exists. ... I mean it is possible for virtually a terrorist campaign to be run by this person. I mean they have got huge power, they have got a huge amount of money at their disposal and if they're not working very, very well with the rest of the staff you've got a really difficult problem.*
>
> (Principal 2)

> *I thought high levels of professional integrity are something which are universal. I don't expect more or less.*
>
> (Principal 4)

The influence that these people have is no different from the Business Manager no different than for a Buildings and Grounds person. It is also no different than for principals when they check the budget and have to allocate money across a wide spectrum of departments. I don't therefore see it as being a single position in the school. I agree it is certainly a very real danger, but the danger would be that the wrong person has been promoted into the job. In my view the major danger is that you have a teacher who has drifted into IT because they have an interest in it but probably no professional qualifications.

(Principal 7)

Having said this however, the same principal also goes on to illustrate the particular importance of integrity and the role it plays in the principal IT leader relationship.

The current person I have in the position has an integrity that is without question and so I have full confidence in what he does. It means that I don't have to race to keep up with any technical issues or any day to day fire fighting issues. I can afford to sit back, tap into what other schools are doing, read broad-based literature and concentrate on general direction rather than specific day to day management issues. I can afford to do this because I know that is what he's doing in that area and he is good at this and if he says it can be done, he will have thought of the facilities, the personnel, everything that is involved in it.

(Principal 7)

They do have power. I had the experience of a law firm and also a couple of people in the firm I worked for who were called to account because the IT people knew what was going on. ... when pornography or anything else came on line IT was called to account. The other thing was you imported nothing; you didn't have screen savers or imported software. If you did it was almost a case for suspension and in one case it was a sackable offence. Everybody knew that IT were in charge. Now the issue for the IT people was that they were bound to a level of integrity themselves. The controls on the Head of IT were among the most strenuous.

(Principal 8)

I'd expect them to already have it after all we're talking about a staff member who's already a teacher.

(Principal 9)

One of the assumptions reflected in the remarks of the principals is to the effect that as teachers are professionals with a corresponding level of integrity expected of them, so to the IT leaders will automatically have the required moral and ethical attributes. The extent to which these qualities may be transferred to the IT area and the degree to which they may be necessary is one that did not emerge clearly. The

significance of the need for particular levels of integrity and ethical behaviour for this type of position certainly do not seem to be high in consciousness levels of principals. Perhaps this is attributable both to Lashway's (1996) notion and the fact that for schools IT is still a relatively new area with many of the associated issues yet to emerge to the same extent as they may have done in the commercial sector.

8.5 Governance and Government

The macro tenor of the discussion is a relevant lead in to the next aspect of the leadership and management of IT in schools. Apart from the person with the primary responsibility for IT in a school there are of course other people and groups who also have responsibilities in this area. Among these are the principal (CEO), the Board of Trustees and the Government. The IT staff in schools can only do so much and have to work within the resources and constraints imposed by higher authorities. Issues emerging from analysis in this area include a determination of the appropriate responsibilities of each of these groups, as well as those that might also be true for the general senior staff in schools. A problem that no doubt occurs quite frequently for many schools is the tension that can arise out of misunderstandings about the respective roles of governance (the primary responsibility of the Board of Trustees) and management (the primary responsibility of the principal and teaching staff). A particular example in the IT area can occur when there are well-meaning people on Boards of Trustees who wish to promote particular courses of action in the IT area within their schools.

> *...but the reality is that so many Boards have got professional people who have got expertise. I think that there are advantages to be gained in having their expertise sought after, but on the other hand it needs to be balanced by the reality of what you can spend and what kids are like and so on.*
>
> (Principal 1)

> *The Board of Trustees have got to be kept right on side with that because they've got the purse strings. We've talked about the principal's position and I think a principal who doesn't have more than a good working knowledge of what's going on does run the risk of being quite disempowered and could be quite alienated.*
>
> (Principal 2)

> *The Board of Trustees see themselves as really providers of the funding. With regard to delivery and the curriculum they have said, 'You are the people who are responsible for delivery of the*

curriculum, therefore you are the people who are responsible for developing the IT plan, the IT strategy, the models for it and the delivery of it'.

(Principal 3)

There's a lot of issues in there, probably the one issue that I haven't covered is that the Board of Trustees tend to be highly politicised in most organisations and parents put a lot of pressures on.

(Principal 4)

The Board of Trustees need to produce a strategic plan incorporating IT in the overall strategic plan and to discuss the issues. At that stage everybody in the community has got commitment to that. Once you've got that base line commitment in place then the process for implementing the decision is no different than for anything else. There are the same responsibilities in implementing IT for the Board as there is for any other area of the school.

(Principal 7)

The Board of Trustees sets policy both long and short term. In the IT area the principal must implement policy. However the average principal of a school is not sufficiently IT literate to know what to do or where to go. The internal IT person could be conned by the latest salesman walking in the door. We are critically under-trained, under-supported, and under-resourced. The interface between the Board and the senior management should be a 'reference group' that actually drives and works with the IT management in the school; to be as it were a 'subset' of the Board. A danger here occurs if the Board tries to set it up from within their ranks. What I think Boards will have to do, is look at employing an external agency, 'consultants' is the only word I can think of, who will be able to independently drive the matter together with staff of the school. The key problem you have there is the cost of the consultancy and it seems to me that it's a critical bit of the whole structure. Where Boards give the task to some bloke who knows all about IT; well disaster lurks at the door. That person may be quite the wrong person; voted on by a whole group of parents who are not skilled to know if the person is suitable or not.

(Principal 8)

I would expect the Board of Trustees to be supportive of the vision and development plan that the principal has put before them. I would expect the support firstly to be in the way of general approval and secondly in terms of ensuring that budgeting was correctly carried out to allocate the resources, including staffing. I can't really see their role going much beyond that. I see the principal as being primarily responsible for drawing up a strategic plan based on the visions that he or she has for the implementation of Information Technology in the school. The IT Manager would implement that plan, and attend to the nuts and bolts of it, overseeing staff development, staff training and hopefully generally assisting them.

(Principal 9)

At the level above the Boards of Trustees is the government. Without the leadership of the government and the resources they are able to provide, the vision and plans that may develop in schools may come to little. While principals took some comfort from recent initiatives of the New Zealand government they also see some very marked restrictions emerging from deficits in government action and policy. Rather paradoxically however they also often acknowledge reasons why the government may choose to react with caution.

I think it stinks quite frankly that they expect schools to keep up to speed with the information age but they're not prepared to fund it. On the other hand I can see why. In NSW schools were given one computer for every six students or something like that. The computers have just been dumped in the schools and they haven't been used properly in a lot of cases so I can understand the government not wanting that to happen. I think however there need to be funds available for people to contest. It has got to be available so that schools who want to go ahead have got the funding to be able to do so. The government has got to put their money where their mouth is. ... Funding for related Professional Development is also very important. We got $3000 this year that doesn't go very far at all but that's for the ITPD of staff. So the government is doing a little bit there. ... The government needs to do a lot more and it's not happening unfortunately. It's like everything, it's done on a shoestring and they expect us to prepare students. The problem is that you need to prepare staff first and I guess therefore that Professional Development needs to come first.

The 'Principals' First Seminar' is I suppose a first step; it's a small step but unless they follow that up with something gutsy it will all be for nothing.

If a School was a business with a comparable level of investment in equipment and plant and so on the number of people who would be

involved in maintaining and running IT would be much higher and that would be their only job rather than one of many.

(Principal 1)

I think it is a huge issue and I think the government, even the amounts it's now offering are pathetic. I think they have not really made a genuine commitment to schools to ensure that IT really has the kind of emphasis that it does need. It's an expensive undertaking but its very, very necessary and I think the piddley amounts that are being put in at the moment are just well, they are better than nothing, but that's all I can say. ... I cannot see how schools can hope to do IT without putting money into Professional Development. Schools are tending to buy the gadgets and then start learning what they might do with them afterwards and I think that's not necessarily a good way to go.

(Principal 2)

The Minister talks about the IT strategy but what he says doesn't connect to the reality. He can use all the words he likes but the tension occurs because they don't put their money where their mouth is. The talk is good but the resourcing to back that isn't there. ... We're doing it on a shoestring. The government appear to have bought the Victorian State concept lock stock and barrel but they haven't bought the infrastructure or put the infrastructure in place.

(Principal 3)

I've actually been encouraged by government rhetoric in recent times. I think the direction they've taken in encouraging some development and keeping it accountable is a healthy development. The tensions I guess are that schools are not resourced for the goals set for them and so that means organisations like mine have to develop some very creative strategies to make sure we can do what we want to do and be in the market.

(Principal 4)

I still think someone's got to hold the big vision up for you otherwise everyone gets misguided. The fundamental tension is that the government is setting the goals and saying, 'This is where you should go', but at the same time they're putting the onus of responsibility for resourcing IT back on the schools.

(Principal 5)

There was a lack of real direction from the government, until they appointed the National ICT Co-ordinator, Carol Moffat. With the 'Principals' First Seminars' we are really starting to get some direction and help. The Ministry of Education really left all that too long. Schools were doing their own things, they were floundering around; it was all piece meal. I think they could have done some good planning a lot earlier and getting schools into a better programmed way of introducing IT as well as helping them

with finance. That's all coming a bit late for some schools. We've put a lot of money into IT; heaps of money into it. We're getting a little bit from the Ministry now which gives us another boost that puts our plans a little bit further along, but it's always been a bone of contention in a school which is a high Decile one. ... I think there are some good things happening and money now being spent in the right direction but it's just a pity it has taken a while coming.

(Principal 6)

I think that the government and through them the Ministry of Education are so far behind what should be happening that they're certainly not leading they're following. When I look for how governments should operate I look at Singapore and I look to the Victorian government in Australia who are in actuality taking the lead, putting the money where their mouth is, and making a very real difference in schools. Because the New Zealand government have committed so little money to schools in the IT area it really makes no difference at all what they say. ... It's not good enough just to talk about it. To be a success in the classroom ... the governments in areas like Australia and Asia are putting in place substantial support because they know that in the long term society as a whole and the economy of the country will benefit from the expenditure. They're not doing it through any soft altruistic reasons, they're actually doing it because they feel that in the long term the country itself will benefit from the up-skilling.

(Principal 7)

I'm quite pleased with the recent developments for next year (2000) every school will get a base grant for IT of $2500 plus $25 per pupil conditional on submitting an IT plan to the Ministry of Education. This means that we will get about $13 000. In addition to that we will get, for the next 3 years at least, on top of that, a further $13.60 per pupil for ongoing IT costs so that will give us about another $5000 for each of the three years. We can do something with that, although we'll still have to have cake stalls. Until recently hundreds of millions of dollars have been spent on computers in New Zealand schools and the government hasn't contributed a cent of it.

(Principal 9)

As these extracts demonstrate, virtually all the principals had a lot to say on the role of governments and in many instances the stance they took was strong and uncompromising. A high degree of unanimity emerged from what the principals said. It was also accompanied by a marked level of condemnation of the lack of leadership and funding from central government to enable schools to have a realistic chance of performing in accordance with the goals set for them. In practice what seems to have happened is that while the rhetoric of government has often been

strong and supportive of the role of IT in education, the reality has often been quite different for many schools. The message in terms of the leadership and management of IT in schools is quite clear; the government needs to match its rhetoric with action and to do it smartly.

8.6 The Role of the CEO/Principal and the CEO-CIO Relationship

Without doubt the role of the principal as the CEO equivalent in schools is a vital one in any discussion of leadership and management in schools. The IT area is no exception. The examples that are provided in this section should provide a basis for a comparison with the findings of De Lisi (1998) as outlined in Chapter 4.

> *You've got to have a very good and open relationship with this person because if you don't all kinds of terrible things can happen.*
>
> (Principal 2)

> *... a willingness to be committed to give your time, and being able to delegate, to have the people that can work with you, that you feel that you can trust.*
>
> (Principal 3)

> *Trust and a shared or a negotiated vision; it doesn't matter how you get there, the bottom line is that you are on the same wave length and it is understood that the CEO and CIO are both taking the time to communicate effectively with each other. ... The reality is that it falls short because CEOs in most organisations are running fast and hard and are not necessarily investing as much as they should in that relationship. It's not merely about the CEO trusting the other person, it's also the other way around too so that integrity is respected on both sides. I see them (those responsible for ICT) as at Senior HOD level. I think that over time they will climb, there's no doubt about that in my mind. If you go into models of business process re-engineering etc. this will be a key function so you can see it will develop further. The market will see to it that it happens.*
>
> (Principal 4)

> *I'm the instructional **manager** of the school, but I certainly am not the instructional **leader**. There's no way in the school of this size that I'm ever going to be an instructional **leader**.*
>
> (Principal 5)

> *To provide, whole-heartedly, support for that person. I think there has to be a very close working relationship between the principal and the IT leader. My IT leader and I would meet daily to assess progress.*
>
> (Principal 6)

I think probably that the relationship I have with my Head of IT at present is just about ideal. He provides copious information when decisions have to be made. He researches extremely thoroughly so that when he makes a recommendation I know that he has dotted every 'I' and crossed every 'T' and as a result of that I can actually rely on his judgement and on the information and decisions that he is putting through to me. I have a really high level of trust in what he is saying because I know how thorough he is so I am confident to take his recommendations to the Board. The other thing that I would say that is very important is that he tells me what he is thinking and he does nothing behind my back or without communicating to me first what he recommends and why he recommends it. As a result I feel that it is a partnership. I feel that he is the leader in the partnership. I am a follower in this partnership, but it's because I have trust in what he is doing and trust in his judgement and thoroughness. I give him my full support in terms of what he is wanting to do and the directions that he is wanting to head. If there are issues and problems, which in IT there invariably are, because you can't cover absolutely every eventuality that is going to arise, I also give him my full support. I am able to do this because I know that (a) he will try to resolve them as quickly as possible and (b) that they have not arisen because of any carelessness or lack of wish to make things right on his part. So actually I think that the relationship I have with my own IT Director - Head of IT is virtually an ideal relationship.

(Principal 7)

... Principals shouldn't be experts in IT necessarily, although they could be. What they do have to understand however is what IT is going to be doing in the next five to ten years. The biggest disaster I feel between a CEO and the Head of IT is simply lack of trust. As soon as the Head of IT thinks the CEO isn't supporting him or her there's a huge amount of stress comes into the organisation. There has got to be open and manifest support of the IT person by the principal. If performance is an issue then it should be dealt with and smartly because this one person is going to affect the lives of every other person in the school. If that person is coming to school depressed because of a poor relationship with the CEO, you're finished.

(Principal 8)

I'm pleased you haven't implied that the principal has primary responsibility because I believe the idea of the principal as an instructional leader is a textbook idea and impractical. The principal has a very important role as an instructional leader but I'd have to qualify that statement. I believe that the principal, like the conductor of the orchestra, doesn't have to play every instrument. ... . I would hope that the ideal relationship would be one where the principal could trust the person to go ahead and do this and that the person could have confidence the principal

would give the support; the moral support the resource support necessary to see it through.

(Principal 9)

There does not appear to be a high degree of correspondence between De Lisi's (1998) recommendations and the views about principals and their views of their relationship with their IT managers. To some extent this is explicable by the differences in orientation. De Lisi was advising on strategies for CIOs to take to improve their relationship with their CEO. The principals in this case were commenting more on their own role and the desirable qualities they see in the relationship between them and the people with IT responsibilities in their schools. It may also be a reflection that many principals, as they themselves acknowledge, often have only limited training in management and therefore they may be less likely to think in terms that management scholars deal with as a matter of routine. A further possibility is that the requirements of the two sets of relationships, those in business and those in education, are so different that what is applicable in one area is not really relevant to the other. Certainly principals clearly articulated the need that they be as supportive of their IT people as possible and to establish an open and mutually trusting relationship. It would seem too, that at least several of the principals were suggesting that the IT leader in their schools should be assuming instructional leadership responsibilities in the IT area. These principals, contrary to the rhetoric of the New Zealand Ministry of Education, do not see necessarily themselves as instructional leaders, but more as managers or overseers of instructional programmes. They also have identified some particular needs of principals. One is a generic one, to become better trained in management, the other is more specifically to be much better informed about the role and value of IT. This second need is tempered to some extent however by an acknowledgement that principals cannot be expected to have the requisite skills and knowledge in every area so they need people on their staff who can provide them with sound, timely and dependable advice.

The principal like the conductor of the orchestra doesn't have to play every instrument.

(Principal 9)

8.7 The Place of Qualifications

So far the qualities that might be expected in the people with responsibility for managing IT in schools have been examined at the level of professionalism appropriate to their position. The survey interviews sought principals' views on the nature and place of formal qualifications for these people. As has already been noted, the IT Managers in schools may often have more or less drifted into their position out of interest or mere serendipity. Such a situation would not seem therefore to be really appropriate for people with the level of responsibility of IT leaders. This section will build on, and possibly reinforce, much of the material discussed in Chapter 5 "IT Training for Teachers: Where to put the Emphasis". Principals in discussing the place of specialised training and qualifications for School IT Leaders commented as follows:

> *I think probably one of the best Professional Development programmes would be like that Diploma Course that was set up at the Central Institute of Technology. The sort of training I think they need, is something practical, but which has a theoretical base; so a mix of both worlds I suppose. I think it would be highly advantageous to have that sort of qualification, but along side of that I think you need once again those other key attributes that we talked about before, vision, get up and go, and people skills. It's the usual story that someone can have all the qualifications, but unless they've got what it takes; their personality as much as anything, it's not going to happen is it?*
>
> (Principal 1)

> *There's a need for it yes, some of the stuff that's available has not been as helpful as we might have wanted to so I suspect that places like the Colleges of Education and some of the Universities are still getting their head around this. I would have thought a qualification in this general area would be useful in terms of making an appointment, or to a person in terms of their own career development.*
>
> (Principal 2)

> *That would be wonderful but I don't see a source for it. An academic qualification in this area would be of some use but it's not the whole ball game by any means.*
>
> (Principal 4)

> *There are so many management issues that they've got to contend with, there's budgets and the whole management of buying, leasing all that sort of stuff, the professional development area so there's a huge area of training that's really needed. There certainly should be much more leadership training and administration and*

management skills as well. So much is being done on the surface of things but there's no depth to a lot of the things that are happening in training. Perhaps something more formal in terms of qualifications could improve that. It would be very useful to have formal qualifications as perhaps they might be an excellent guide for the selection of people for appropriate positions.

(Principal 6)

It's not that the things that I think need to be taught are not available because in fact I think they are. Strategic planning, operational planning, financial budgeting are the things that are being taught in various course levels but not particularly in connection with IT. There are plenty of technical courses, and there are actually plenty of people around with really good technical skills. That's not the critical issue, as you can buy them in quite easily. It's the people that can sit back and tie the package together that we're missing and that are scarce and missing in virtually every management area. So the skills I think we need are the high-level management skills, vision, and strategic planning. If you could have a specific course that tied that in with IT it would be wonderful, but I have to tell you, I don't think there are very many people out there that have the ability to cope.

(Principal 7)

We are not well trained in these areas as teachers. I compare the training provided in the commercial sector with the little that teachers get and it is clear this area is now a big one for us to get into as we look at IT development. It's interesting that in the last 30 years the people who are inherently interested in IT are the most successful at it. In other words they're self-learners, they self-motivate and so on. There's just no question about that. What I think is dangerous about that is that they are highly focused on the mechanistic side of IT, the nuts and bolts, the operation of IT, making something work and getting excited about it. But these people must realise it has to be ultimately working at strategic level. We must understand and see how IT can affect the pedagogy. To me that is something which has got to be debated and teased out and I think that's where training comes into it.

(Principal 8)

I'm not convinced that academic qualifications in this area are necessary. I've got members of my staff who are fairly au fait with all this and who can readily develop and implement Information Technology programmes and policy in the school. I'm talking about people who have got this knowledge through practical hands-on experience rather any sort of tertiary study. Having said that however I can also see that the advantage of a tertiary qualification would be that they would probably have a broader approach in terms of integrating IT across the curriculum. I can

see academic qualifications taking on more and more prominence in the future.

(Principal 9)

Principals then, albeit with some equivocation, do see an important role for qualifications in the area of IT management in schools. They observe however that this area has not yet been fully developed and that there is little that they are aware of that is available suitable for school IT leaders, and only one alluded to the ADITE programme discussed in Chapter 5. The specific requirements of any programmes leading to such qualifications as having a sound foundation in leadership and management skills but with an additional emphasis on associated pedagogical and integration issues. They also felt that such a qualification will not only become more important in future but may also have a useful role in the appointment of staff to this sort of position.

8.8 The Staffing Requirements of IT in Schools

Increasingly there appears to be a growing awareness that IT in schools has special staffing needs of its own. With the growing scale and complexity of the investment in IT equipment and associated infrastructure there is a need to ensure that the resource is effectively managed and that schools are positioned to optimise the return on it. While the desired qualities of the people charged with these sorts of responsibilities have already been enumerated there has not been an attempt to quantify this either in terms of numbers of personnel, or the range of responsibilities they may have to assume. Some principals have already identified the paucity of funding for much development in this area but they do nevertheless still see a clear need. Examples of their views in this area include:

I think you need someone (the one in charge) who has IT as his or her sole job. They also need I think underneath them a computer technician, a full-time computer technician who has the expertise to run the hardware, the software, networks, that sort of thing, so two full time people apart from staff that actually teach the subject area. I'd see that as a minimum, but I'm thinking here more of our school as a small one, if you're a big school, we've only got 2 suites of computers but if you're 1600 plus students you'd probably need a couple of people and a couple of full-time technicians.

(4 – 5 full-time equivalent positions including the subject teacher)

(Principal 1)

Although there are times when the workload is probably too much for our Network Manager at the moment, the Network Manager has 5 non-teaching periods that are dedicated to that, the equivalent of a day a week plus 2 management units. Now I think he probably needs more than that, but not hugely more, because of the way he works as a director. In addition I think ideally we need a full-time technician, and I think that we need one person working at least the full-time equivalent in the curriculum area for IT.

(3 – 4 full-time equivalent positions including the subject teacher)

(Principal 2)

Obviously a technical person employed full-time as a technician, a network administrator, a role which is different from the technical role. Then there is the 'ideas champion across the curriculum' and I guess you've also got a specialist computer teacher.

(4 full-time equivalent positions including the subject teacher)

(Principal 4)

I would have 2 staff. I'd have one roving throughout the classes that could be called on when necessary and I'd have one still taking the classes we've currently got going..

(2 full-time equivalent positions excluding technical support)

(Principal 5)

A full time person involved in IT for staff development, staff management and teaching support and also a full time professional technical support person. I would like this as a designated position and I think the more we go down the government's commitment to IT in schools the more likely it is that this will happen.

(2 full-time equivalent positions)

(Principal 6)

I would want my top manager to be spending quite a lot of time enthusing, encouraging, working alongside staff to make them kick start the changes that need to happen. The next people down I would have is the classroom teacher. Probably alongside that position I would have the hardware and software manager and under that I would have the technical staff. In there somewhere would be a curriculum development function, that the Head of IT would be fully involved in. ... The next development I see in IT here is to have a person to manage our web site development. Now this is mainly a marketing function and that would be the first stage of it, but if the money was available I would then like that person to be available to staff to develop lesson plans, and curriculum delivery packages in different areas of the curriculum. I don't see us as being able to fund this person at present but that's somebody that I would like to have.

(6 equivalent full-time positions including subject teacher)

(Principal 7)

Well in an ideal world in a school of our size we could certainly do with one person, when I say one person I mean a teacher, full-time on the management and teaching side of it. Now by that I mean they would be able to work with other teachers encouraging them to use Information Technology as a teaching tool in all curriculum areas. They would be able to assist with the modelling of that in classrooms, they'd be able to assist with direct teaching of IT and they would be able to generally see that the resources are up to scratch and that people have got what they need. There is another category too that of support. I would see that as more of a technician's role. I'm talking about trouble shooting technical problems, maintaining equipment and so on. I couldn't really say how much time we would need to devote to that but I would think, and this is only a guess, if this person was responsible for preventative maintenance as well as trouble shooting and so on I can envisage employing someone for a day a week.

(Approximately 1.2 equivalent full-time positions)

(Principal 9)

There are difficulties in interpreting this information as the principals came from a range of types of schools from medium sized provincial primary schools to large urban secondary schools. Some principals included subject specialists and some did not, others included technical support while others identified training and staff support roles. What did emerge very clearly however was that all the principals saw a need for designated full-time equivalent positions in this area; even the principal of the smallest primary school. Furthermore they all indicated that the extent of the need was such that in all cases their needs exceeded one equivalent full-time (EFT) staff member. Indeed the principals of larger secondary schools typically identified 4 or 5 EFT positions. The principals identified seven main types of positions and a brief summary of them and their associated responsibilities are shown in Table 8.4.

Table 8.3

School IT Staffing Requirements

Title	Brief Position Description
Subject Specialist	A teacher who teachers IT subjects such as Computer Studies…
Network Administrator	A person, not necessarily a teacher, who has responsibility for administering the schools Local Area Network. This role might also expand as school's networks expand to become more akin to WANs.
IT Manager/Leader	A person with a teaching background who has responsibility for leading and managing the school's IT resources, programmes and staff.
Web Master	A person responsible for the management, development and maintenance of the school's Intranet and Internet sites who might also have a curriculum support function as well.
Trainer/ITPD Specialist	A person with a teaching background who assists teachers to develop their IT skills and knowledge.
Curriculum Support Specialist	This person would also perhaps have a curriculum support and development function which would involve research, developing support materials and assisting teachers to better integrate IT across the curriculum.
Technician	A person with a technical background who can carry out routine maintenance and attend to technical problems and breakdowns.

All principals expressed concern about the cost of these needs, but there was general agreement that nevertheless they were real and necessary. Although they were not asked specifically about ways of minimising costs in this area, some suggestions were made. These included outsourcing, and sharing staff with other schools. One principal had a clear vision of how this might work, especially for primary schools.

> *Primary Schools are going to need a service organisation very much like we used to have through the New Zealand Department of Education. Schools do not have within themselves the resource to do all the things we're talking about. What we need to do is to get together, syndicate and set-up school targeted agencies and pay them out of some funding because to buy it commercially would be out of the question, and they'd be paying anything from $250 to $300 per hour. ... Co-operation at this level, in an environment where many schools may see each other as competitors, is very similar to how you buy services on the open market in the commercial sector. A firm that buys training services has to ensure that the trainers do not get hold of proprietary material and then deliver it somewhere else.*
>
> (Principal 8)

This summary of the categories of positions is not designed to suggest that all the principals identified all of them, nor that they felt that they were necessarily full time equivalent positions. The Table serves more to describe the range of positions envisaged by principals many of whom prefaced their remarks with references to *In an ideal world.* Despite that caveat however, principals were quite clear that there is an immediate need for designated staff in the IT area and that the need is growing rapidly. While the list seems quite extensive only one of the principals mentioned any staffing needs in the Internet or general telecommunications areas. The overall potential impact of Computer Mediated Communications (CMC) despite its prominence in the computers in education literature (Hunter, 1990; Collins & Bostock, 1993; Hiltz & Turoff, 1993; Hiltz 1995; Krause, 1995; Turoff, 1995; Lai, 1996; Wenmouth, 1996) did not feature particularly prominently in the comments made by principals.

They did not make much reference either to the place of staffing to cater for the needs of other related technologies such as video and audio equipment, projectors, faxes, telephone systems and photocopiers. The Internet and telecommunications constitute an aspect of the IT operation of most schools that is growing and likely to take on even more significance in future. Certainly some schools already have people with some designated responsibilities for the management of their Internet sites. If schools begin to incorporate any distance learning, or virtual school technologies, into their operation then these sorts of areas will burgeon and with that kind of development so too will the need for specialised staffing grow. Furthermore the distinctions that perhaps could once be made between photocopiers, general audio-visual equipment and the more computer based equipment have become increasingly blurred; a trend that is likely to continue rather than diminish. With the former distinctions vanishing, and a more holistic and coherent approach to the management of IT responsibilities in these areas also need to be taken into account.

Business has moved to a model that is more oriented to the management of information and knowledge than mere IT hardware.

> The number of corporate CIOs has increased dramatically over the past two decades as information management moves from the wings of company operations to center stage. The CIO's role is shifting from the technical business of data processing to the more broadly conceived job of 'knowledge management.' So important

> has managing knowledge become to the success of a company that harnessing knowledge may be a corporation's most pressing challenge - and at the very heart of a CIO's evolving role.
>
> (Korn/Ferry International, 1998, p.1)

This trend is reflected in the commercial environment through titles of positions such as Chief Information Officer (CIO) and Chief Knowledge Officer (CKO). As yet there does not seem to be a comparable paradigm shift in the approach of education authorities to what is clearly happening in schools. The improved access that schools now have to the Internet, the emergence of schools' Intranets, integrated document management systems, the more prevalent adoption of local area networks (LANs), the widespread use of CD-ROMs, DVDs and the like mean that the traditional place of school librarians must now also be scrutinised. This emerged in Chapter 7 in the discussion of *Position Description* that highlighted the merging of responsibilities between IT and library management. It seems logical that the role of librarians should also be incorporated into the overall examination of the Information management needs of schools.

8.9 General Tensions in the Management of IT in Schools

The specific tensions that emerge from the roles of teacher, technologist, manager and leader have already been discussed, but these are not the only sources of tension within the IT area in schools. The principals identified another range of tensions that are of concern to them.

> *First of all the stand-alone subject versus cross-curricular applications. Another is do you have a computer suite or machines in every classroom. Marketing; the community likes to see schools having computers at the forefront. One of our marketing ploys is to offer computer courses for every student at every level except one from Years 7 to 13. ... There are tensions between that role* (classroom teacher) *and some of these other roles like providing support for all staff to integrate the use of this technology across all curriculum areas.*
>
> (Principal 1)
>
> *There are tensions and it really depends on the kind of people that are being appointed. I mean one of the areas that we do have a particular problem with is the area of Computer Studies. We've got, in this area, the equivalent of the boffin kind of person operating and he simply does not have the vision or the energy to think of computers beyond delivering the program to his Year 12's and 13's. This is in a sense how these other people have all come*

into the picture because they knew it wasn't happening so they made sure they got themselves up-skilled and trained and in a sense almost hijacked it. I think sometimes principals have leaned on those people who are in the Computer Studies area to do this and they really aren't always the right people. ... In a sense we're competing against each other and in a sense by showing how good we are with IT to our parents we are marketing, there's no question about that.

(Principal 2)

We do have such a low turnover of staff and it can be a problem because you've got people who have been on your staff for yonks and who are very reluctant to move beyond a piece of chalk and a blackboard in terms of delivering the curriculum. Most of the staff have done incredibly well but there is a group that are still finding it difficult.

(Principal 3)

We've got such a crowded curriculum, and there is so much change, that if IT is seen as an essential skill in whatever children are doing at school, then perhaps with integration we're cutting down a bit of the tensions. ... Schools now market themselves through areas like IT. People moving into this locality from other areas are looking at schools that they think are ahead in IT. The school that's got a commitment to computers has a marketing advantage, for IT is an important thing when people are looking around. ... some of the other functions that teachers have in terms of the reporting functions, the assessments and the management tasks that they're being called on to perform using IT tools

(Principal 6)

... encouraging teachers to realise that there's the potential to use Information Technology as a teaching resource in every curriculum area and helping to look for ways to do that, because this is different from the traditional ways that the curriculum is being delivered. Staff training; there can be a tension there because you can get teachers who are too scared to turn the computer on at one end of the spectrum, and at the other end, those who take to it like a duck to water.

(Principal 9)

Several principals highlighted *Marketing* in their discussion of general areas of tension in IT. The tension in this respect emerges from potential conflict between the genuine needs of students and the curriculum and the need to position IT equipment and IT activity so that they are prominent and obvious to *customers*. They were not of course suggesting, that these two requirements are necessarily mutually exclusive, but more that with the constraints on resources that many schools experience,

tensions could develop. Certainly IT activities with high learning value are not necessarily ones that are easily used for promotional purposes and those that are suitable for promotional purposes, are not necessarily always of high instructional value.

Principals too still have to grapple with the way their IT resources are allocated and positioned around their schools. While this is a resourcing issue, it is also one of strategy. Decisions have to be made about the need to concentrate resources in a few areas such as computer laboratories, spread them out into clusters or pods, or spread them even more thinly by putting one or two machines in each classroom. A concentrated approach means that teachers may experience difficulties integrating IT tools across the curriculum, but equally, spreading them out may obviate whole classes from working in a concentrated way on the machines.

The place of IT in the curriculum is also a source of tension. It plays a role as a specialist subject such as Year 12 Computer Studies, but it is also often taught in a separate subject context at many other year levels as well. Apart from this role it also has a place as part of the New Zealand Technology curriculum and has to serve as a general set of tools across all curriculum areas. The curriculum is a very full one and there is a feeling that it is increasingly difficult to cater for all its needs and deal appropriately with the IT issues as well. Further complicating this picture is the role that IT plays in both the general educational and business management activities of schools.

Staff Development is an area of tension in many schools. The capacity for teachers to adapt varies enormously and their skill range, confidence and attitudes also can be at a whole range of places and levels. Catering for such a wide range of individual differences among the staff, let alone the students poses particular problems both in terms of training requirements and the expectations for the delivery of classroom programmes.

IT is not therefore an area where the sole or indeed the main problems and tensions emerge from technical issues and the acquisition of hardware, software and network infrastructure. People with management and leadership responsibilities have to grapple with a much more diverse range of issues.

8.10 The Role of Pedagogy in IT Management and Leadership

Apart from the technical aspects of implementing IT and the general issues relating to the leadership and management of IT, schools also have to deal with the pedagogical role of the technology as well. In some ways these sorts of requirements are similar to the need for CIOs to have a sound understanding of their business. Principals viewed this as a particularly important matter.

> *Well I think that's fundamental to the whole thing. How IT can enhance the learning in the classroom is a fundamental issue.*
>
> (Principal 2)

> *The level of importance, we place on pedagogical issues in the school is very, very high.*
>
> (Principal 6)

> *Teachers generally have caught onto the notion that IT is going to be the biggest opportunity for self-paced learning we have ever had. I just wish that I were younger, for I think we're moving into the most exciting period in pedagogy that we've ever had. The reason is that self-paced learning is waiting at the back door and there are people all over the world who are developing some excellent tools for self-paced learning. Unless they are learning efficiently and effectively, and unless they are delivered in a non-threatening way, however, teachers will avoid the new methodologies and still be stuck in front of classes doing the 'one teacher to student group' traditional thing. I see the teacher of the future having real teaching that is tutoring. Young people will have taken up new ideas at their own pace and the teacher can then tutor. ... if you're going to get the paradigm shift in terms of the pedagogical changes there's got to be an enabled IT and you're not going to do it incrementally. You've got to do it in big steps and that's going to require some vast funding. I don't know where that's ever going to come from.*
>
> (Principal 8)

These sorts of observations emphasise the importance of the relationship between pedagogy and IT in school. They also further reinforce the views expressed by many of the principals that leaders in this area must be trained as teachers so that they have the necessary pedagogical background to carry out the responsibilities effectively. Clearly although the principals acknowledge that this IT leadership role requires a broad range of leadership and management skills they believed that a necessary prerequisite for anyone undertaking this role was for them to be trained as a teacher. The principals appeared to be signalling that only with this sort of background would a person be suitably equipped to gain not only the credibility of other teachers, but

also to understand the school culture and develop appropriate strategies and priorities to allow them to carry out their duties effectively.

8.11 Integrating IT Across the Curriculum

Allied to the pedagogical role of IT, and one that has already been referred to by principals is its place as an integral tool across all areas of the curriculum. While acknowledging that integrating IT across the curriculum was a major goal and a matter of importance, many principals made remarks to the effect that this was one of the things that they were finding particularly difficult to achieve. There were several factors that they identified that they considered were instrumental in obstructing the level of progress they wanted to achieve.

> *Access to machines. The availability of machines and also the integration of the computer systems with the subject matter. I guess that raises issues of units of work; of being able to be set aside time to develop units that incorporate these technologies, or having professional packages readily available that schools can buy at a reasonable price so that they can integrate. By that I do not mean the latest computer related textbooks, but access to the Internet and all that sort of thing.*
>
> (Principal 1)

> *I see there are aspects in every single part of the curriculum that are able to use Information Technology. What we're trying to do is make sure that teachers are really up with some of this new learning theory that we now know about with regards to the way young people learn. I think that providing access to IT enhances some of those aspects of learning and really ought to be improving the learning environment in the school hugely. You need however to have a teacher who is well trained and understands not only about their own curriculum but also the learning needs of their students. Training is perhaps the most critical factor in maximising the success of the process.*

> *There have been a few training initiatives out of the Ministry of Education; contracts that have been delivered but which I'm not an enthusiast for, because some of them are so scrappy and so badly done. Our local College of Education has gone for a number of these contracts but I just don't feel that the delivery has been good enough. We're able to do better ourselves. I think part of it is that they're not getting the right people to do the delivery. I think you're also right (about attempts by trainers to cover too many bases) because I know our staff have gone along and they've been with Years 1 to 13 teachers all at the same time. There's no doubt about it, there are some wonderful things you can do with your*

Year 1's, but they're obviously going to be different from what you can do with your Year 13's. They've attempted I think to do too much, and it's been too generic.

(Principal 2)

It's very important to me at the moment because I feel as though that's the area that's going to help across the curriculum. No one really owns the related issues, so the problem for me in this regard is the management issues.

(Principal 4)

I think that there are probably aspects of the curriculum that IT can deliver better in classroom teaching than can be done with the chalkboard. I don't see there is any point in using IT if a classroom teacher can deliver a particular skill better another way but I believe there are certain curriculum learning areas and skill areas that can be better taught through use of ICT. I think probably that research, and those types of areas would be the things I would be concentrating on. I do think that we have to be quite careful and quite discerning in the things that we develop for delivery through ICT. I think probably one of the areas that needs to be considered and thought about is in those things where there's a multitude of resources that are available. In particular through the Internet, but also through the library system and where we clearly want students to read, discern, decide, discover, comprehend - those sorts of skill areas. The ability of the Head of IT to maximise the process for the teachers is particularly critical in maximising the success of that integration process.

(Principal 7)

The process of integrating IT across the curriculum is very closely allied with the place of pedagogy and ranks with principals as having a similar level of importance. They have experienced considerable frustration however in their attempts to expedite this in their schools. Access to resources, both computers and ready developed professional packages, that make it easier for teachers to see how they can incorporate the technology into their teaching programmes. At least one principal (Principal 7) tempered the level of enthusiasm for this concept by pointing out that while IT has a very useful role to play there is no need for it to be used merely because it may be thought desirable.

A significant problem that was raised by principals both in this context and in responses to questions in other areas was the absence of the requisite skills and attitudes among many staff members. Some felt that this problem was exacerbated by a paucity of suitable training in the area, again highlighting perhaps a need for some form of central or national initiative to address the problem. Principal 4 raised

the issue of 'ownership' of the problem. This may be a matter that is quite pervasive through many schools and is perhaps one of the responsibilities that ought to be addressed by the people responsible for managing IT in schools. This of course begs the question, because so many schools have either limited or no real staffing for any such purpose. Certainly Principal 7 clearly saw the ability of 'Head of ICT' as being critical to the success of the integration process. Apart from the responsibility for assisting in the process some skills were sent as being especially suitable for development with IT tools. These included issues that, not surprisingly, are all associated with the processing of information and included reading, discerning, deciding, discovering, comprehending, and evaluating. Tools that were seen as especially helpful in this regard included Library Information Systems, the Internet, Intranets and CD-ROMs (for example dictionaries, encyclopaedias, atlases, the National Geographic).

8.12 The Effects of a 'Can do Culture'

It was put to the principals that in New Zealand there has often been a sort of do-it-yourself mentality, a kind of 'Can do Culture', references to which are often accompanied by allusions to 'number 8 wire'. It was postulated that it might be ironic that this sort of approach which may have contributed so much may also have much to answer for. Many schools in seeking solutions to their many IT dilemmas may have tended to opt for highly touted solutions that have then all too often have resulted in a debris of disappointment, disillusionment and cynicism amongst even well intentioned educators. This scenario being a result of, often out of necessity, believing that people with little or no expertise can make well-judged decisions and also a conviction that any problems that arise can be attended to with the legendary 'number 8 wire approach'. This proposition was put to principals in an attempt to elicit from them their perceptions of the need to move away from an amateur 'add-on' approach to the management of IT in schools to one that is much more professional. In this manner it was intended to be an extension to the issues addressed earlier in the discussion on integrity and professionalism.

> *Yes, I'll say, it's quite amusing really, but rather close to the bone too.*
>
> (Principal 1)

Well I think that's always going to happen though I don't know if it's sort of 'our can -do culture'. I think it's to do with the structure of our school system which I think has been immensely time wasting in terms of things like IT because we're now into the self-management market model kind of stuff. I would say that there would be hundreds and hundreds of lessons that could have been learned and shared that are probably not appropriate to the kind of education system that we've got at the moment.

(Principal 2)

I think that's the biggest problem schools currently face. You have bits and pieces everywhere. Some places are consolidating but I mean if you just take this school as an example we have had a 'grow like topsy' development. Databases have not been integrated. Financials did not 'talk' to Pupil Files. We are getting it straight, but it should never have occurred in the first place.

(Principal 8)

I do agree with that analysis about our 'can do' culture. It has resulted from limited resourcing, in fact a total lack of resourcing. People have wanted to do this in their schools but the capital has had to come from cake stalls and so on. There has often been no money left for servicing equipment so quick-fix or highly suspect solutions have been the result. If the resource isn't there then people have either had to use the "number 8 wire approach" or they've done nothing and that is where the debris of disappointment comes in.

(Principal 9)

It is an approach that was perhaps borne out of necessity from isolation and lack of access to resources in the earlier days of New Zealand's development. The irony is that this development, which has had to emerge again in a technological area during the years leading up to the 'New Millennium', has in too many cases, instead of assisting development, all too often impeded it. The genesis of the problem is clearly attributable to a lack of funding accompanied by strong imperatives to adopt technology and achieve new goals. Qualities that have assisted many New Zealanders in the past may now paradoxically be hindering them. The CIO perspective of this sort of quality and initiative will also be dealt with in the next chapter that examines the views of CIOs from the commercial sector. With the amounts of time, effort and money that so many New Zealand schools are investing in IT it is not acceptable for its effectiveness to be jeopardised in this way. Schools need ready access to the resources that allow them to plan effectively, identify their

needs, and implement the technology based on sound and thorough decision making processes.

8.13 Conclusion

While it would be dangerous to assume that the principals interviewed in this survey were representative of the views of New Zealand school principals as a whole they nevertheless have provided some useful insights into the views of principals. They clearly see the need for a major rethink of the staffing needs in school IT and equally strongly believe that leadership and management skills in this area are of crucial importance. The person they see as most appropriate for this job, though still having a degree of technical skill, needs to have a much wider range of skills. The principals clearly believe that this position is not the one for the computer 'boffin', and they put considerable emphasis on the requirement of leadership, interpersonal and management skills. There is also a consensus that this person needs a sound pedagogical background and would therefore most likely have a background as a trained teacher. This attribute would not only provide the person with a comprehensive knowledge of the teaching-learning process, the core business of schools, but would also assist them in establishing credibility with teachers.

Of the generally recognised leadership skills principals identified most of them, but they put particular stress on qualities like vision, abilities such as being able to see the 'big picture', motivate, inspire, enthuse, establish credibility and integrate people as members of teams.

Notwithstanding the views of Koenig (2000), Pastore (1999) and Wallingford (2000) other leadership skills like political nous or acumen were not identified explicitly as being so important.

While leadership skills were clearly regarded as important the principals put perhaps a little more stress on the need for skills that fit more into the management category. Certainly the traditional management tasks of planning, controlling and organising were all clearly identified. They also mentioned other more specific qualities that included technical skill, networking/schmoozing, handling change, practical implementation, communication, advocacy/salesmanship, entrepreneurship, flexibility, budgeting, researching, and a quality focus.

Apart from the need for the person be a trained teacher considerable store was also put on the training skills of this person, who principals often regarded as having a major responsibility for assisting the development of staff skills in the IT area. This area was seen as especially important because many principals felt that it was difficult to obtain relevant, timely and cost-effective training from existing external sources. Additionally they also felt, reinforcing the contentions advanced in Chapter 5, that there was considerable scope not only for specific training of the IT leaders, but also in providing them with formal specialised qualifications.

While some principals appeared to indicate that these qualities should be the key ones in the person with the major responsibility for managing and leading IT in their schools, they also acknowledged that the associated tasks might be spread over several people. Apart from the sample size, there are many other variables that prevent an accurate gauging of the staffing needs in this area. Indeed because of the wide range of circumstances, a strict 'metrics' approach to assessing staffing levels might not be particularly helpful. Comparisons were made between the IT staffing in schools and those customary in business, to reveal the extent of the deficiencies in school levels of staffing. Apart from the general area of management and leadership, principals also identified several other key tasks that included network management, training, web management, specialist teaching, curriculum and technical support. They were not necessarily advocating for equivalent full-time positions to cover each of these tasks, but they did see each of them as important and consuming varying amounts of time. The extent of schools' needs in this regard vary according to a number of factors including the size of the school and its stage of IT development. Despite that, the principals indicated that their schools, that ranged from middle sized primary to large urban secondary, had immediate IT staffing needs extending from about two to six equivalent full-time positions.

At the macro level many principals were highly critical of the absence of adequate resourcing from central government, though some did concede that recent government initiatives appeared to be heading in a better direction. Specific areas they mentioned as problems included funding for equipment, training and staffing. They also felt that the leadership from government had not always been particularly helpful with many principals citing the gap they perceived between the "rhetoric and the reality" as an obvious deficit. Another more specific frustration lay in the

imbalance between control and responsibility with central government setting goals and expectations but not simultaneously equipping schools with the resources to fulfil them.

A corollary to this situation was also identified at the micro or school level. It is the one that can occur when Boards of Trustees lack the necessary expertise to make well-informed and sound decisions. This sort of leadership gap, which the principals highlighted, can exist therefore at both national and local governance levels.

While principals feel the need to be supportive of their IT managers, and to develop a trusting relationship, they do not feel the need necessarily to be instructional leaders. That level of responsibility they see as being one more appropriately delegated to other members of their staff. Principals see their role as being more concerned with the overall management rather than a concern for the finer operational details; *the conductor rather than the player.* The recent *Principals First* initiative of the New Zealand Ministry of Education that targeted principals for IT skill and knowledge development received a mixed report. While acknowledging that it is not necessary for principals to be IT experts it was also appreciated they do need some degree of understanding of IT. To some extent the *Principals First* seminars were seen as rather *too little too late.*

Formal qualifications were seen as potentially quite useful especially in the management rather than the technical aspects of IT in schools. This support was however qualified by the problem of provision. Many principals observed that there did not appear to be anyone providing the sort of training or courses that would lead to suitable qualifications. These sorts of credentials would not only possibly assist interested people to develop the requisite skills but would also be helpful to principals in selecting suitable people to appoint and to individuals wishing to advance their career prospects.

An area addressed by principals that has so far received very little attention from the education authorities, but one that they considered very important was the provision of staffing in the IT area. All principals believed that they had immediate needs for full-time staffing in excess of what they were currently able to employ. Even the smaller primary schools still could accommodate additional staffing in this area, a need likely to grow as more schools adopt and expand computer networking, Internet

connections, develop web-sites and become increasingly dependent on the IT infrastructure for day-to-day operational activity. Even at this stage in the IT development of schools principals were able to identify seven discrete types of positions for people working in this area of schools. (Refer Table 8.4).

While the tensions emerging from the various roles of teacher, technologist, manager and leader were acknowledged, principals were able to point to several other areas of tension in the implementation and development of IT. These ranged from the number and location of computers, through marketing issues, allocation of staff responsibilities, curriculum pressures, resource allocation and consumption, and staff development. Technical sources of tension were not generally regarded as posing as many difficulties as were those to do with management and leadership issues.

Of particular importance to principals is the pedagogical role of IT and its associated role as an integral tool across all aspects of the curriculum. These factors come right to the heart of schools operations and as such impact of the core business of schools' - teaching and learning. Several barriers were identified as impeding progress in these areas including access to computers, access to suitable software and courseware, and staff training. The role of Head of IT was seen as a critical one for determining success in this integration process, and all believed that the person with this responsibility ought to have a sound teaching background; a comprehensive knowledge of their business.

Most principals perceived the relevance and even the irony of the impact of the 'can-do culture'. It is an aspect of the operation of schools that they regarded as being ultimately immensely wasteful and counterproductive, yet one born out of necessity. The irony of a mentality that may have been of assistance to New Zealanders in the past but which now too often hindered progress was also acknowledged. The remedy was clearly identified as better resourcing especially a more professional approach to the provision of staff in the IT area.

In comparison with the view of these principals the next chapter will examine the views and ideas of the CIOs from the business sector. The analysis presented in that chapter should permit both comparisons and contrasts to be drawn as the CIOs comment on similar issues to those dealt with by the principals, but from different perspectives.

CHAPTER 9

THE MANAGEMENT AND LEADERSHIP OF IT IN BUSINESS: THE CIOS' PERSPECTIVE

The CIO profession has won a perilous victory. Chief Information Officers have earned the right to be regarded as enterprise leaders transforming the business and steering the company to new and vital destinations. Enterprise leadership now comes with the CIO title. But with that mantle of leadership comes thick new folds of complexity and uncertainty.

Unfortunately, experience running an information systems organization does not guarantee success in enterprise leadership. A credibly run IS group is only a ticket to a seat at the executive table. Once seated, the CIO has to change; even his thought patterns must flow in new channels. Within an IS department, there's a technical right and wrong. The program either works or doesn't work. But enterprise leadership functions within a miasma of maybes, as politics and personalities work to obscure the best course of action. How can CIOs cut through the murk to influence and inspire people who don't owe them allegiance? What are the necessary tools, skills and disciplines? How do they avoid the traps and apply their expertise?

(Pastore, 1999, p. 1)

9.1 Introduction

During 1999, eight people were interviewed, seven CIOs (Chief Information Officers) and one CEO (Chief Executive Officer) who was interviewed because of his particular interest in IT. Despite the literature indicating that women are not well represented in the IT area three of the CIOs interviewed were women. These interviews were designed to parallel as much as possible the interviews with school principals described in Chapter 8 and were also an hour or so in length. In each case the interview was recorded and later transcribed. The interviews were based around a set of questions very similar to those used for the interviews with principals and this material was made available prior to the interview taking place. The people selected for interview were chosen after discussions with people in the IT industry. The main factors taken into account when selecting these people were that they must have had recent experience as a CIO or an equivalent position, and a particular interest in the management of IT. In some cases contact came through a referral from someone else in the industry or direct contact initiated as a result of a

publication either authored by or featuring that person. The resulting transcripts were subsequently sent to the people interviewed for checking and additional comment. As they were verbatim and unedited transcripts it was no always easy for the CIOs to follow all the material. Thus, as a further check on content, copies of the drafts of both this chapter and the one that follows were sent out to the CIOs for them to verify that their views were fairly and accurately represented. A key was provided to each of the CIOs so that they could identify which quotations were attributable to them but not be able to identify any of the other CIOs. This process also allowed the CIOs an opportunity to gain an appreciation of the context in which their views were being used and for them to indicate any alterations that they felt might be necessary.

The interviews were designed to gather in-depth qualitative data from CIOs about the management and leadership of Information Technology in a business environment. No attempt was made to try to gain a representative cross-section as this would have been very difficult given the number of people interviewed. The organisations represented varied in size and the type of activities on which they focussed. All of the CIOs had worked in other businesses and so their experiences were not limited to the companies for which they were currently working. While all the CIOs were based in Wellington most of the organisations they worked for were national operations, some with international connections. These organisations came from both the private and public sectors. The major purpose of this chapter is to present findings from the CIO interviews and to analyse this information so that it can be compared with comparable material obtained from both the interviews with principals (Chapter 8) and that emerging from the survey (Chapter 7). The results are intended to assist in answering Research Question *5 What are the perceptions of CIOs about the qualities needed in the people with IT management responsibilities in business and how does the management of IT in business compare with the way it is managed in schools?* Indirectly this analysis will also be of assistance in answering Research Questions 2 and 3

While the role of CIO is now well established in business circles it is nevertheless a comparatively new one, especially to the executive wing of organisations and as such is in many respects, still evolving. Regardless of this, it is a role from which much can be learned that is applicable to not only the management of IT in schools but also the culture and organisational climate that surrounds it. Earl (1997) demonstrates

some of the ways in which the CIO role has expanded and how the list of attributes that make a good CIO has increased. Earl contends that in the early 1990s the model CIO possessed four significant qualities: ability to be a vision builder; ability to build relationships with peers, supervisors and particularly the CEO; sensitivity or tactical judgement; and ability to deliver. With the developments in technology and its increasing importance to so many businesses, Earl has added four extra imperatives to reflect the changing demands with which successful CIOs will have to cope. The new order now includes expectations that CIOs be: strategists; capable of addressing the architecture of the implementation of the technologies; and capable of initiating and handling reform; able to manage both internal and external alliances. Changes like the emergence of the information superhighway and electronic commerce have changed the business perception of the importance of IT. In education however, such developments may not yet have had a comparable impact on the perceptions of the strategic and management role of IT in schools. However, it is likely that these developments will soon, at least to some extent, begin to exert similar influences on schools that will result in changed perceptions of the strategic value of IT and the ways it can be managed better in schools.

9.2 The Qualities of a Successful CIO

It is important to establish that despite the differences between the CIO role and that of the people responsible for managing IT in schools, there are still important similarities and perhaps, more importantly, lessons that can be learned about how the CIO role has emerged and developed. CIOs now hold executive positions in their respective organisations and they are charged with the responsibility for their organisation's information assets and technology. In this role, they have to manage not only the information but also the technology that finds, interprets, packages, and distributes it. This role has evolved from a rather mystical back-office function to a much more strategically based one tightly woven into the fabric of most commercial and public-sector organisations. In many respects, the management of IT in schools is undergoing, or needs to undergo, a similar sort of metamorphosis. The leadership and management qualities that CIOs perceive as important to being successful in their jobs should therefore be a useful indication of the attributes needed for people

doing comparable work in schools. It should make a useful basis for comparison with the views of the principals outlined in Chapter 8.

Many of the CIOs very readily identified communication and interpersonal skills as very important to the job. These observations are then in concert with the remarks and observations of the principals and contrast strongly with any perceptions that technical skill is the predominant quality required.

> *I think that listening skills is probably number 1. The role of a CIO in an organisation is to listen to the business. The CIO needs to listen and understand and be able to distil and analyse business needs as expressed by business managers, business unit managers.*
>
> (CIO 1)

> *For me the two most important skills that a CIO should have are the same skills every other business manager should have. They are the ability to communicate and the ability to make sensible and sound commercial decisions.... A part of being a good communicator is understanding when you're being lobbied and when you're looking at a set of commercial facts. If you can't differentiate them then you shouldn't be in a senior management position because you are going to be subjected continually to the noisiest or most effective lobbyists as opposed to be driven by business outcomes.*
>
> (CIO 2)

> *It depends on the company and it depends on the level of the organisation, but in a big complex organisation at a senior level if you don't have management skills and if you can't communicate what you're doing then you're going to fail.*
>
> (CIO 3)

> *Probably one of the most important is communication skills as you're not just providing technology you're providing systems.*

You can't live in an ivory tower, you've got to listen and communicate and understand and work with the business and that means understanding it. As with anything communication is the attribute I consider to be most important to being successful.

(CIO 4)

Very good communication skills, in fact I'd put that as number one. Ability to converse with personnel right across the organisation. If you take an organisation like this in which we have to talk to everyone from manual workers right through to the CEO. We have to be able to take the mystery and the nightmare and the fear away from the technology.

(CIO 5)

Interpersonal skills I would have thought are particularly important here. This person has to have credibility. If you're going to convince the General Manager or CEO and all the other senior management that you are a worthy peer then you've got to have credibility which means you can't be a starry eyed, palm waving sort of person.

(CIO 7)

These observations are entirely compatible with Earl's (1997) observations that survivor CIOs were very good at relationship building and the trend noted by Korn/Ferry (1998) that the perceived success of the IT role is currently associated more with internal communications and networking than with external-based technology support. It is significant that these views are in accord with those of principals.

The place of technical skill is an issue that the CIOs and principals also saw as important. The issue in this regard is not so much the importance of technical skill but more that it is much less significant than other qualities within the range of attributes required.

There are a whole lot of other issues surrounding IT developments including people, relationship and change issues that I believe are more of an Achilles' heel in IT projects than the nuts and bolts.

(CIO 1)

I don't for example think that a CIO necessarily needs to have detailed technology skills.

I don't see that a CIO needs to be able to discuss in detail the differences between NT and Windows for example.

(CIO 2)

You don't have to come from a technical background, but if you don't you'll have to make sure that you have got senior support staff that you trust.

(CIO 4)

I think we are seeing a big change in the type of person that will be the CIO or who is moving into CIO roles. Previously they were heavily technology driven and probably came out of the operations or the analysis environment, the traditional mould. The new CIOs who are coming in have got a much wider perspective of how businesses operate. They certainly have a technology understanding and have come through the technology side of things, but they have a much wider perspective than comparable people would perhaps have had five or ten years ago.

(CIO 5)

I suspect it's easier for somebody from a business background to acquire the technological capability than for many technology managers to acquire the business capabilities. As long as you're reasonably open minded.

It's more difficult; it's more time consuming to acquire business experience than it is to acquire technology knowledge

(CIO 7)

So in terms of personal qualities and skills certainly the business rather than the technical.

There's no specific set of technical skills that you have to have although it depends which business you're in but I don't think that particular technical skills are that important.

(CIO 8)

Apart from the observations made directly by the CIOs it is also worth noting that apart from the instances already quoted, technical skills were more obvious for their omission than for their inclusion. Some CIOs did not really mention technical skill at all and certainly when it did come up it was not of paramount importance. This is further evidence that the role of the CIO, and perhaps too the general role of IT management, is now moving away from technical implementation. The focus seems to be increasingly concerned with issues related to gaining the best possible business advantage from the technology and to issues related to long-term strategies. Among the implications for schools is a need to give less attention to the place of technical skill in selecting people for the IT management role and more to the range of other skills that are manifesting themselves as increasingly necessary for success. The days when this sort of activity could be carried out solely by technocentric types with high levels of interest and skill in the technology itself probably should now be gone.

Just as the principals saw a clear need for a very direct connection between the core activities of schools to the desirable qualities required in the people with responsibility for IT in schools, the CIOs saw a very strong link between business activity and the IT role. While education is not usually strictly a commercial activity it is, however, the core business of schools. The parallel that can be made in this instance is that just as principals saw that it is necessary for their IT leaders to have a thorough grounding in the teaching-learning process so the CIOs regarded an understanding of business as very important.

I do think that a CIO needs to be able to understand their business sufficiently well and technology in sufficient detail to see how they could apply the technology to grow the business.

(CIO 2)

You don't have to be an expert in telecommunications to support a telecommunications business, but you do actually have to be involved in the business strategy and the business operations. You can't live in an ivory tower, you've got to listen and communicate and understand and work with the business and that means understanding it.

We support the business, we are a key supporting part of the whole business. To do that effectively you can't just provide bits of hardware, you need to understand and work with the business in order to deliver successful joint processes and systems that support them, and to provide the competitive edge and to automate things and provide them with information.

(CIO 4)

An IT manager or CIO would be clearly have to have a very very good understanding of the role for technology in the business.

Probably more important than an understanding of technology is the ability to understand the business of the organisation and its strategic directions.

(CIO 7)

First and foremost the IT manager is a businessperson, with the business skills.

(CIO 8)

A major difference that does appear to emerge between the views of the two groups is that principals see a background in their core business of education as being essential. In contrast, the CIOs do not necessarily believe that having a specific knowledge of a particular business operation is a prerequisite, but rather possessing general business or management skills is more important. This of course is not to say that principals do not perceive these skills as desirable too. What principals believe is essential, in addition to many of those generic business skills, is that the leaders of IT in schools have a strong background in their core business of teaching.

While this is a difference, it does not diminish the importance of the role that an understanding of *the business* has to make to the management of IT.

An ability to think and plan strategically was identified by many of the CIOs as another important attribute. While the successful link of IT with business strategy may be a fraught one, "only marginally easier than reaching the summit of Everest" (Bensaou & Earl, 1998, p. 120), it is nevertheless not only a common and important objective, but also one where the cost of failure is high. As both businesses and schools increasingly want and need to achieve those sorts of goals then it is not surprising that the possession of relevant skills should be accorded a high ranking.

> *The second skill is probably strategy development. The CIO should be the person who listens to the business, is able to analyse business needs and requirements and to use that information to develop a picture that communicates the dialogue back to the business through the executive and business unit managers. It is a picture of where the organisation may or may not be moving to, and what its needs are in information management.*
>
> *I would see the key roles of in-house IT being strategy development and policy development.*
>
> *I think being strategic is the major thing but I think a lot of people have difficulty doing it.*
>
> (CIO 1)

> *The whole concept is really information strategy because that's really where IT's at. You have to have a thinking strategy; to have what I would call a CIO mentality. By definition that puts that person at a strategic level as opposed to an IS manager or an IT manager.*
>
> *The key task in our organisation is to focus very much on IS as a strategic asset. The fundamental task is really trying to understand and define what that strategy is and how IT fits into it.*
>
> (CIO 3)

I don't actually outsource strategy we do it ourselves. I actually insist on our department knowing enough to know that we're doing the right thing for information systems. A number of organisations do just have managers who manage information systems and they outsource most of their requirements. I'm less comfortable with that model, I think it's too important to our business, too critical, too fundamental, for us to outsource too much of the strategy.

(CIO 4)

The key tasks are actually to drive the IT strategies, the information strategies and to provide the IT infrastructure for the company to operate on.

(CIO 5)

Probably more important than an understanding of technology is the ability to understand the business of the organisation and its strategic directions. That means that the person has to be trusted by the management, especially the top management, the people who determine the direction of the organisation and actively participate in the decision making. So the CIO position is one charged with aligning the technology with the business.

(CIO 7)

This is one of the areas where the ideas and views of the CIOs differed from those expressed by the principals. Strategy was seen as importance to CIOs, but principals did not appear to give it the same level of priority. Perhaps principals see themselves as having the major role in strategic thinking whereas the CIOs, while not relieving their CEOs of this kind of responsibility, believe they have a major strategic role to play. Additionally, it is also likely that schools have still to appreciate the full strategic significance of IT to their operations.

While there may be some difference in views on strategy, the place of financial and budgetary-type skills can be much more clearly identified in both the CIO and principal groups. Unlike strategy, financial matters tend to have a much more immediate impact on operations and this may explain why principals raised these

sorts of issues rather than those of strategy. Clearly the CIOs saw skills in this area as being very desirable.

> *The credibility issue is crucial to IT because it has generally been seen as a black hole that continually soaks up dollars. People are not always sure of the value they are getting from IT and there may even be resentment within organisations about the money the IT folk are walking away with. It is therefore incumbent upon IT to demonstrate the value it delivers to a business.*
>
> (CIO 1)

> *The other task that I think is critical for a CIO is to manage the program of IT investment so that it is prioritised according to company rather than technology goals. You know IT costs a lot, it's always quite a high percentage of revenue and no one has enough money to do everything they want.*
>
> (CIO 2)

The CIOs did not dwell on this area to the same extent as the principals although, as emerges later in this discussion, they were concerned about the reputation of the IT industry for delivering value for money and completing projects within budget and on time. CIOs appeared to have more concern with providing value and the perceptions that might develop about IT expenditure, than they did with budgeting.

The CIOs identified a number of other management type skills and qualities.

Advocacy

> *The CIO is **an advocate for a strategic framework** from within which technology options can be considered, rather than **the advocate for technologies**. I see the CIO's role as being the custodian and advocate for a strategic framework for a five year vision. The CIO needs to be the advocate for that architecture as well as an advocate for standards and policies and things that will make that a reality.*

In terms of being an advocate, I would not necessarily see a CIO as an excitable propeller-head who runs around telling people about technology because that often happens in a way by itself.

(CIO 1)

Managing Expectations

The role of the CIO is all about managing relationships, managing expectations and managing others to deliver. The critical thing for success is to manage expectations.

(CIO 1)

Performance Measurement

The other task I think is to establish metrics that allow you to really understand the performance of your information systems and technology investment. To measure what you're getting for your money, and whether you're doing that internally or through outsourcing, you still need good metrics for measuring performance.

(CIO 2)

Networking and Schmoozing (see Chapter 7 for comment on the role of networking and schmoozing)

Managing relationships is probably the most important thing, because the whole history of IT is that users can be ruthless in making excellent technology a major disaster.

You need business analysts, people who are able to sit down with members of the executives, with business unit managers and maintain close relationships to understand their needs and where that part of the business is going

(CIO 1)

CIOs have to figure out mechanisms to take them outside the lobbying, and they have to state their direction in such a way that the lobbying is minimised. Lobbying can be healthy as a degree of

lobbying should be happening anyway. People should have forums where they can put forward their views, but once the decision is called, I think it's about implementing not relitigating.

It's actually about networking and making sure that you can get access to the skills without necessarily having them as a fixed cost and there are only a few core skills that you need to retain internally.

(CIO 2)

Staff Recruitment and Retention

An ability to recruit the right kind of people and motivate, train, and retain them so that the project is completed. That's a particularly difficult challenge in IT because those people are typically fairly transient.

(CIO 3)

You've got to make sure you've got the right people in the right jobs in IT, so you don't have a technical person dealing with the unions or a very touchy, feely communicator type person trying to fix the PC's. It has got to be the right person for the right job.

I always think it's important to have a good team, so you have to make sure you can recruit and retain good people and that's quite hard in the IT industry currently, there's such a lot of work, such a lot of change that it's quite hard to keep people.

(CIO 4)

The third thing that you've got to have is a team of people who are going to be able to work together to produce that solution and then keep it going.

(CIO 6)

Project Management

Experience in varied project implementations because that's where you do all your learning and that's also where you get your fingers

burnt, where you do even more learning in terms of revisiting or never revisiting that project again.

(CIO 5)

Customer Orientation

This must be done without smokescreens and it must ensure there is a mechanism whereby customers can see all the line items of service delivered to them.

IT needs to have a service mentality and a service culture.

(CIO 1)

Understanding the needs of the customer and knowing that there are the internal as well as the external customers. So you're dealing with your internal customers to deliver a service, but you're also dealing with the external customers who are on the receiving end or the provision of information so your net is being cast a lot further.

(CIO 5)

Coaching

In this newer role the coaching element is still quite significant, it was significant before, it remains significant, and it will continue to be significant for I think another five years and then the coaching role of the CIO will probably not be required to the level it is now. The reason for that is whereas previously you had a management structure that had not been exposed to technology, that has now changed

(CIO 5)

Change Management

It's quite a challenge for CIOs to keep up on top of things and to maintain an awareness of the range of things available for things change very rapidly

(CIO 1)

In New Zealand we're a smaller market; as change moves more quickly you therefore have to do able to move quickly to keep up.

(CIO 4)

The more successful CIOs, the more dynamic ones tend to be very accepting of change. If IT doesn't change this week it's going to change next week so you not only have to accommodate it you have welcome it

(CIO 6)

Contracts and Commercial Relationships

The position of IT Manager generally implies more of a nuts and bolts person, but an IT Manager could be somebody who manages the commissioning of work, contracts, relationships with the vendors, the supply, and has the custodianship of the technology infrastructure; the utility.

(CIO 1)

They have relationships with systems integrators and vendors who then do virtually all the work.

(CIO 4)

While networking and schmoozing activities were mentioned they only occurred incidentally. This would seem to reinforce the findings of the CIO.com survey described in Chapter 7 in which Networking/Schmoozing was placed 16 out of 18 in CIO's rankings of IT leadership activities.

A comparison of the management qualities identified by principals and CIOs can be found in Table 9.1

Table 9.1

Management Qualities Identified by Principals and CIOs

Management Quality	CIO	Principal
Advocacy/Salesmanship	✓	✓
Change Management	✓	✓
Coaching/Training	✓	✓
Communication/Interpersonal	✓	✓
Contracts and Commercial Relationships	✓	✓
CQI and Customer Orientation	✓	✓
Entrepreneurship		✓
Expectations Management	✓	
Financial	✓	✓
Flexibility		✓
Networking Schmoozing	✓	✓
Organising		✓
Planning/ Strategic Development	✓	✓
Practical Implementation/Project Management	✓	✓
Research		✓
Staff Recruitment and Retention	✓	
Technical Skill	✓	✓

(✓ indicates the presence of the particular quality)

While Table 9.1 cannot be taken as definitive it is indicative of the extent to which the views of the two groups overlap. The most obvious areas of difference are being research, flexibility, expectations management, staff recruitment, and entrepreneurship. Principals would almost certainly regard staff recruitment and retention as their responsibility. CIOs also would regard them as a responsibility delegated from the CEO to them. Certainly, at present, schools, as noted elsewhere, have only minimal staffing in the IT area. Thus, at least at present, recruitment and

retention are not particular issues. Another difference is that networking/schmoozing seems to rate more highly among principals whereas strategy was more likely to be identified as an important area by CIOs. It is also worth remembering that in most cases there is a significant difference in scale and resourcing of the two areas. The levels of staff and general resourcing available to the CIOs would most likely be much better than in schools.

Apart from those qualities that can be categorised as primarily in the management category, the CIOs also identified a range of attributes that might be more specifically classified as leadership qualities.

Credibility:

> *It is the job of IT professionals to establish the credibility of Information Technology and to educate the organisation about Information Technology. The credibility issue is crucial to IT because it has generally been seen as a black hole that continually soaks up dollars.*
>
> (CIO 1)

> *The second thing you have got to have is very high credibility amongst your peers and users, because ultimately they're going to be the people who either accept or reject your solutions.*
>
> *I don't believe a CIO can do the job effectively unless he or she has got the respect of peers and of staff.*
>
> (CIO 6)

> *The person has to be trusted by the management, especially the top management, the people who determine the direction of the organisation and actively participate in the decision making.*
>
> *This person has to have credibility. If you're going to convince the General Manager or CEO and all the other senior management that you are a worthy peer then you've got to have credibility which means you can't be a starry-eyed, palm-waving sort of person.*
>
> *Persuasion and credibility are really quite critical qualities*

(CIO 7)

Demystifying IT

The CIO also has a major task to demystify IT. Information Technology is now becoming more and more, thank goodness, available and in the control of the end-user, but it's a classic specialist area in which we've developed a stunning range of acronyms and words so that we can keep it pretty much a black art. I think one of the significant roles for the CIO is to demystify that.

(CIO 2)

We have to be able to take the mystery and the nightmare and the fear away from the technology.

(CIO 5)

Vision

It needs very rational thinking, because of all the kinds of system implementation types of project management skills, and also quite visionary skills because increasingly information systems are strategic assets as opposed to simply support functions.

You typically start with vision and that's not particularly unusual except that the vision required for IT is so much more ambiguous because it's so less clearly defined.

(CIO 3)

As long as you've got the vision and you understand where you're going and that you can convey that vision effectively to management, to your peers, to your users throughout the organisation, you're going to get benefits.

(CIO 6)

Mentoring

To be a good manager you know you need to mentor your people which means hopefully knowing what they need to do and knowing

parts of their job and knowing enough so that you can actually predict them as well I guess gain their respect too

(CIO 4)

Being a Team Player/ Leadership

Being a very strong team leader who can bring together the disparate range of people who work in IT is the third main skill.

(CIO 6)

You have to have the standard capabilities and skills as anybody who leads a team of people in terms of motivating, developing and all the rest of it.

(CIO 8)

An Orientation to the "Big Picture"

The job of CIO does require a bigger picture view, more planning, an ability to change and to create new things.

(CIO 4)

Vision

..., and also quite visionary skills because increasingly information systems are strategic assets as opposed to simply support functions.

Organisations need someone who can implement a set of complex systems or applications and once it's implemented they really need somebody with a vision....

You typically start with vision, and that's not particularly unusual except, the vision required for IT is so much more ambiguous because it's so less clearly defined.

The almost unique skill that they would have is that combination of vision and skills.

It is IT's responsibility to have a broader vision than most users will have.

(CIO 3)

Table 9.2

Leadership Qualities Identified by Principals and CIOs

Leadership Quality	CIO	Principal
Orientation to the "Big Picture"	✓	✓
Team Leadership	✓	✓
Mentoring	✓	
Credibility	✓	✓
Vision	✓	✓
Demystifying IT	✓	
Creativity		
Passion		
Political Acumen		
Risk-taking		
Influencing/Persuading		

(✓ indicates the presence of the particular quality)

I think that taking responsibility for the strategic, the visionary part of the job is really the key that fundamentally differentiates between an IT Manager and a CIO.

Too often the IT person in a smaller organisation is an IT person who gets to play with the PC's and all the new packages and things. A 'techo' rather than a person who's had that vision. These sorts of people aren't actually looking at the business as a whole and working out what they could be doing. They are often perhaps hijacked by the technology instead of the related processes and systems and you're seldom going to achieve competitive edge with that sort of approach

(CIO 4)

As long as you've got the vision and you understand where you're going and that you can convey that vision effectively to

management, to your peers, to your users throughout the organisation, you're going to get benefits

(CIO 6)

The most obvious difference in the views of the two groups was the place of vision. Several principals rated vision as the most important quality and most mentioned it as a highly desirable attribute. By contrast, CIOs rated communication and interpersonal skills as more important and gave vision much less attention, although they did place considerable emphasis on an ability to think and plan strategically. As occurred with the principals, there were several leadership qualities that were not really mentioned at all by CIOs. Persuading and influencing, while not really explicit stated they are probably suggested in *managing expectations*. The principals did not appear to see much of a place for risk taking while the CIOs approach to this area was more to do with risk management and the avoidance of surprises. It would seem that neither group felt there was much justification for risk taking in the IT area and this accords with the feelings of both that credibility can be jeopardised by unsuccessful ventures; ventures based on undue risk. Political acumen is an attribute that is closely aligned with networking and schmoozing which is an activity that CIOs particularly did not rate of much consequence. Perhaps it is not surprising that it should not feature. What is surprising however is the slight disparity between the views of principals and CIOs over the importance of one of the more fundamental leadership qualities, vision. Principals regarded this as an especially important, if not a key attribute, whereas CIOs, although acknowledging it as important, did not appear to rate it anywhere near as highly. This observation is offset to some extent by the fact that the CIOs put considerable store by strategic skills that are closely allied with vision. It may appear that there is also some variation between the views of the CIOs and the work of Earl (1996) as outlined in Chapter 4, however, Earl's work was done some time ago and the priorities for current circumstances may be rather different. Indeed Earl's (1999) later work reinforces such an argument as he acknowledges that CIOs, while still needing the qualities identified in earlier work, increasingly are confronted with new responsibilities, and they need a much better understanding of business processes in general and strategic planning in particular.

The differences between CIOs and principals over management and leadership qualities are comparatively few and seem likely to be attributable to the different

nuances associated with the business and educational environments. It is also possible that the views of the CIOs may reflect a set of circumstances that have not yet fully impacted on schools. Among these factors could be the comparatively low levels of staffing for IT support and development in schools, and the as yet largely unrealised potential of IT to impact in a much more fundamental way on the operation and administration of schools.

9.3 The Similarities and Differences Between an IT Manager and a CIO

A distinction can now be made between the two roles of IT Manager and CIO. Both have responsibilities for IT management but the approaches and responsibilities of the two positions are significantly different. A pertinent question is the extent to which the management of IT in schools should be heading in the same direction as the corporate world. Caution must be exercised in making assumptions about this line of argument for it does not necessarily suggest that all schools have to do what many businesses have done. The point is the extent to which emerging business trends have relevance to IT management in schools and how current practices and planning might be effectively improved from the lessons that can be learned from those already experienced by the business IT community.

In an attempt to clarify thinking about the respective roles of IT manager and CIO, the CIOs interviewed were asked to identify what they considered to be the important points that distinguish the two positions. The CIOs interviewed offered the following ideas as their suggestions of the major distinctions.

Strategic Orientation

> *I think being strategic is the major thing. The difference between the CIO and Information Technology Manager is that strategic view and also having a focus more on information and business processes than on technology.*
>
> (CIO 1)

> *Taking responsibility for the strategic, the visionary part of the job is that really the key that fundamentally differentiates between an IT Manager and a CIO.*
>
> (CIO 4)

Level of Seniority

The level of seniority of a CIO should be comparable to a CFO. The position of IT Manager generally implies more of a nuts and bolts person.

(CIO 1)

Many more organisations have now got CIOs reporting through to CEOs. The tradition of having it tucked under the CFO is rare, though it still exists it is much reduced.

(CIO 5)

Scope of the Job

The job of CIO does require a bigger picture view, more planning, and an ability to change as well as create new things.

(CIO 4)

CEOs see IT going right across the organisation, previously they didn't have access to IT to the same extent, so they were to a certain extent hamstrung in their ability to get to the technology.

(CIO 5)

An IT Manager is somebody who manages the computers. The IT Manager has been the person who was responsible for making sure that the network is up and that the desktop systems get upgraded and who manages the roll-over purchasing and capacity management on the servers and all that sort of thing. The CIO looks upwards and outwards into the business and downwards into the technology.

(CIO 7)

Focus on Information Systems

An IT manager probably has a fairly set and clear cut job to do whereas the CIO actually has to plan how information systems process information to support the whole business.

(CIO 4)

The over-riding key task for a CIO is to maintain the highest level of credibility of information systems at senior management level so that the other senior managers of the organisation perceive that they're getting value from the investment that they have put in

(CIO 7)

The Korn/Ferry (1999) survey which covered 340 CIOs in the United States, the United Kingdom, Germany and France was designed to produce an accurate and detailed picture of the changing role of the CIO. The key trends uncovered by this survey include:

- The role of the CIO is moving from technical planning and implementation to strategic planning. The relatively limited visions of the IT function will need to be expanded from the tactical short-term approach to one that is more strategic and long term in focus.
- The CIO is becoming an important voice in strategic planning and as such needs active participation at the top levels of corporate planning and decision making.
- Leading the transformation of the CIO role is an important human resource challenge, which will necessitate a rethinking of the skill set associated with the function.
- The ideal resume of a CIO will come to include technical finance, marketing and strategic planning qualifications.
- The CIO will become increasingly involved with external as well as internal customer support
- CIOs tend to be more strongly motivated by new and stimulating job challenges than by financial incentives.

CIOs are now in an environment that is not only continuing to change rapidly but one in which they have increasingly to become involved in strategic business planning at the highest levels of their corporations. Organisations that can successfully handle this transition may be able to gain an enormous competitive advantage over those who do not understand and adapt. Evaluating the relevance of this sort of

development to education is not straightforward but there do seem to be some clear signals especially about the need to move away from an orientation to technical specialists whose particular skills are no longer exclusively sufficient to meet the changing circumstances. Schools, like many New Zealand organisations, are comparatively small operations and so they have a particular dilemma to solve in this regard.

> *Too often the IT person in a smaller organisation is an IT person who gets to play with the PC's and all the new packages and things. A* "techo" *rather than a person who's had that vision. These sorts of people aren't actually looking at the business as a whole and working out what they could be doing. They are often perhaps hijacked by the technology instead of the related processes and systems and you're seldom going to achieve competitive edge with that sort of approach.*
>
> (CIO 4)

> *The problem we have in New Zealand is that the vast majority of organisations are so small that it's an artificial distinction to some. The danger is you could have somebody who thinks they're a CIO yet isn't prepared to get their hands dirty on the technology, or conversely you get an IT Manager who is so excited about the technology that they forget about the business. I think that probably the biggest challenge that we have in this country is to handle that sort of situation.*
>
> (CIO 7)

There is a need to attain a balance that can cater for the day-to-day demands of the technology and associated support requirements, yet also provide for the strategic and visionary parts of the job whilst simultaneously keeping within reasonable staffing levels. Clearly, many schools will not be in a position to provide specialist staff to cover all the roles. As was discussed in the previous chapter, schools do appear to be drastically under-resourced for IT staffing so this should not be construed as an argument to avoid altering staffing ratios. Increasingly, schools like businesses will need people who can focus on information systems, work in a job

where they have responsibility for seeing the bigger picture, have sufficient seniority to be a key part of planning and decision-making at the highest operational levels, and who have a clear strategic orientation. The point is to ensure that the emerging skills and qualities are not only available in schools but that the people possessing them have appropriate ranges of responsibilities and an environment in which they can utilise those attributes effectively.

9.4 Tensions Between the Roles of Manager Leader Trainer and Technologist

As with the principals, the CIOs were asked about sources of tension. (Refer Appendix E for a list of the key interview questions). The conversations with the CIOs revealed the following issues which many of them also identified as not necessarily being unique to the IT area.

Role Ambivalence

> *The tensions for me are probably largely because we're still in a hybrid role. We in IT haven't quite worked out what it is we should be doing with the value that we can add compared to the value that we can get others to add and what it is that we do best. We even have confusion over what it is that we do best. We commission work that we need to perform while we take on work others should perform.*
>
> (CIO 1)

> *Different skills sets are needed depending where you are in the lifecycle of the business. When you start off you may be focusing on a certain set of skills and problems and over three years or so down the track you have quite a different set of problems emerging that require different skills. Typically most managers don't do a very good job handling this sort of situation.*
>
> (CIO 3)

These two observations do reflect some ambivalence about the role of CIO but rather surprisingly no-one specifically referred to the tension identified by the Korn/Ferry report (1998). The report notes that many CIOs are now feeling a tension that is

attributable to them seeing themselves, with their often technical backgrounds, as high-level technical experts rather than in the role of business strategists.

Training Role

> *Technology completely changes the role of the trainer in lots of situations because the trainer now has to adopt almost a facilitator role as opposed to a knowledge role for much of the knowledge is contained in the technology.*
>
> (CIO 2)

> *The trainers have a really difficult problem in that they're dealing with end users*
>
> (CIO 6)

The role of the trainer is changing from its more traditional role of knowledge dispenser to a more facilitative role. On the other hand, trainers are still faced with the difficulties of meeting the wide range of individual differences among end users and the wide range of circumstances in which they work.

Sales and Users

> *More typically there is just a constant significant degree of tension in an IT group between the people who sell the product and the people actually having to work with it. Typically the engineers who run the code and actually have to put the applications together hate sales people because they know exactly what sales guys do.*
>
> (CIO 3)

Pace of Change

> *There are tensions that relate a lot to the rate at which technology is changing the way business can be done and the way it is changing across a broad spectrum of business functions and processes*
>
> (CIO 2)

The pace of change poses particular problems for people trying to anticipate how the technologies will emerge and develop and the subsequent implications of the application to the business.

Information Power Relationships

> *Information can now be readily and consistently available from central sources to a whole lot of people whereas before a lot of that information was dispersed. Technology allows you to get that knowledge and capture it, in such a way, that it's available to thirty other people. That means the thirty other people aren't clustered in a group waiting for this one knowledgeable person. From a perspective of revenue, it gives you a much better opportunity to generate thirty people capabilities effectively.*
>
> (CIO 2)

Whereas in the past considerable power could be wielded by being in sole possession of a key piece of information this will be less of an issue in the future as technology makes the sharing of information much easier. This may necessitate some changes in roles and relationships.

Leading and Managing

> *The tension that exists between the IT visionary looking to the future and the users demanding functionality from the IT department. It is quite similar to Finance in that respect. The Finance are the people always saying no, while the IT are the people who are always talking about the future and where things are going.*
>
> (CIO 3)

> *There are however always tensions what users want and what we can deliver because you can never deliver everything they want when they want at and the price they want to pay.*
>
> (CIO 4)

There are tensions between the role of leader and manager because you've got heaps of competition for resources whether that resource be people or printers or money or whatever.

(CIO 6)

There are particular tensions between the role of Manager and CIO in the smaller organisations where you have to cover the spectrum. In a small organisation the person concerned might be having to do network administration at a hands on technical level and at the same time be fighting to be taken seriously and fighting for a place on the senior management table.

(CIO 7)

There are clear tensions between the role of the leader, the person with the vision wanting to move things forward, and the manager, the person who has the responsibility for effective utilisation and implementation of existing resources. For people in smaller organisations, this problem may be further exacerbated by the need to be the technologist, the manager, and the leader whilst simultaneously fighting to gain a place at the senior management table.

Technologist and Manager

There are also possible tensions between leadership and management especially where you've got a team of technologists who might be confident technical people but who are not necessarily very good at the more human skills.

(CIO 7)

In larger organisations, the tensions may move into another domain with increasing demands being made on people with sound technical skills to perform functions that require good people skills, skills that the technical people may not always possess.

There are a number of similarities between the tensions identified by the CIOs and those highlighted by the principals. Notably, the CIOs did not raise time or money as sources of tension. The other explanation would seem to be that the business people are typically adequately resourced, a situation that is of course in marked contrast to the situation that prevails in most schools. Other tensions such as those than can

develop between the managerial, leadership and technologist roles were clearly identified by both groups. The CIOs did isolate sources of tensions that, although not mentioned by the principals, may begin to have relevance for schools. With the development of intranets and sophisticated document management systems, some of the old tensions that emerged from possession of critical information may be ameliorated. This may be offset by new tensions emerging from many more people having access to the same information within much shorter periods of time. The pace of change may be such that even more people will have difficulty in adapting to the changing needs of the organisation. Associated with the problems emerging from the pace of change may be ambivalence among those who have in the past had responsibility for managing IT. They may now find that the technical skills that they depended upon to do the job in the past are no longer sufficient and that they need a different set of personal qualities to carry out their emerging responsibilities effectively.

9.5 The Role of Professionalism and Integrity in IT Leadership

The CIOs produced a much sharper and stronger reaction to questions about the need for more professionalism and integrity in the IT area. They did not dwell much on possible abuses of power. For them this was not normally too much of a problem, and certainly not as much of a problem as it could be in other business areas such as marketing and finance. This sort of view is exemplified in this comment:

> *Professionalism and integrity are no more or less important to somebody in a CIO or an IT Manager's job than it is say for a CFO or an HR Manager. Why should we expect information systems to be different? Clearly however they are very important.*
>
> (CIO 7)

The CIOs did however identify one area about which they clearly felt very strongly. This view was consistent with other remarks about managing expectations which was identified as an important quality for anyone involved in IT management.

Expectations and Delivery

> *I think IT in most organisations has a fairly poor standing and typically IT people are seen as over-promising and under-*

delivering. We in IT need to do a few things; we need to flag possible and emerging risks well ahead, and we need to have a culture of no surprises.

(CIO 1)

Nuts and bolts matters are relatively trivial in any project. Much bigger are the costs of changing the business process, the overhead project management, change management, training, any delays with people, production losses, adopting new work practices, all of these far outweigh the costs of the bucket of nuts and bolts. IT people typically focus only on the nuts and bolts and whether the nuts and bolts things might fall apart. They don't go into the broader issues so that when somebody asks them how long it will take to do something, they typically say, "Yep we can knock that off in a couple of weeks".

(CIO 1)

The IT field is rife with over-promise and under-deliveryy kinds of issues. From that sense the whole sales, see this isn't IT, this is the sales side of IT there are huge issues with people going in there just blowing so much smoke and confounding and confusing the layman who then writes out a big cheque only to find out that it doesn't work. I think that's probably a huge issue.

(CIO 3)

When it comes to professionalism and integrity however I think that the vendors and the consultants could rather do with rather better levels of professionalism and integrity, IT Managers often have that but it's not much good to them if they're being let down. There is too a danger of us getting into a syndrome where new computer systems are expected to take too long, cost too much, and not work when you get them.

(CIO 4)

Professionalism I would say was about being responsible with what you do with those high value assets and that high value information.

(CIO 6)

Why should we think for instance "Hell we're lucky if we get an 80% success rate and it'll be no more than 1.5 years late". It might have been possible to get away with that sort of attitude 20 – 30 years ago but now the whole world is dependent on these systems surely to goodness there's a need for professionalism.

(CIO 7)

IT Managers have to have a high level of professional integrity. The major problem that IT Managers have today is credibility because what's happened over the years is that many of the IT managers have been techo rather than business people. Thus technical aspects of projects have been OK, but they did not manage the business aspects, and this is where most projects fail.

(CIO 8)

The overwhelming concern of the CIOs was for their colleagues to improve their performance in the area of expectations and delivery. They clearly felt a degree of embarrassment about the reputation of the IT industry regarding over-promise and under-delivery. This is probably indicative of a tension that is created between the leadership and management roles.

They also have to excite the CEO and interest the CEO in technology and what technology might be able to do for their business. I think in the CIO role there is a lot of selling required.

(CIO 2)

On the one hand, there is an expectation that the IT people should have a vision and a strategic view that fosters the adoption of new technologies. There is a need to do this in a manner that is not disruptive, time-consuming, and over-budget. This is a direct parallel to the situation that prevails in many schools. Schools are encouraged and usually want to be as near to the forefront with technology as they can. They

need people with vision who will help to push development within the normal constraints of time and money.

Although all the CIOs regarded professionalism as very important the place of ethics may be rather more problematic. One CIO observed:

> *Ethics however is not one of the more popular subjects in tertiary education. I've gone a few times to give a talk to some of the 3rd year students. I do not get a universally warm welcome; some students embarrass me. For example I was talking about the imbalance between men and women in IT. During this talk I suggested that perhaps one of the reasons for this is that computers, in the last 10 or 15 years, have developed as "boys toys" with a very masculine terminology, and these guys in the back of the lecture theatre were barracking, despite there being only three women in the audience.*
>
> (CIO 7)

There is of course an issue about the respective places of men and women in IT, but this was not the point made by this CIO. The argument was that ethics may not be seen as important or taken seriously enough especially by people who are entering the profession or who have only limited experience. All the people interviewed were people with many years of experience in the industry, so it may be that the problem relates more to those who have comparatively little experience. Perhaps a combination of youthful enthusiasm and a lack of experience may be a major factor more conducive to ethical and professional problems. While it may be difficult to resolve, it is nonetheless important that those responsible for training people who are may have responsibilities in the IT area address this issue. They need to ensure that these people are given a thorough grounding in ethics and professionalism so that they can develop a clear understanding of their obligations and responsibilities and the implications of shortcomings. This is equally relevant in education where limited resources and time pressures make these issues just as important as they are for business.

While the CIOs strongly endorsed the need for greater levels of professionalism, it is important to put their remarks in context. They were not suggesting that IT people

lacked integrity, indeed several CIOs were careful to make the point that they believed the IT area was comparatively well served in this regard.

> *I think there is a lot of integrity and professionalism in the industry already.*
>
> (CIO 2)

> *I don't think IT people are any more or less honest or lack or have integrity more or less than anybody else in the organisation. If anything they are probably less tempted by things that cause people to fall off the rails. So I don't think they are tempted by external forces, the temptations that maybe a sales guy could be tempted by or somebody who deals with outside people.*
>
> *I don't think that's really an issue.*
>
> (CIO 3)

It should also be noted, as is discussed in Chapter 4, that the IT industry has made strong efforts to establish itself as a credible profession. There are several organisations in New Zealand including the New Zealand Computer Society (NZCS), the Information Technology Association of New Zealand (ITANZ) and the Telecommunications Users Association of New Zealand (TUANZ) which actively promote guidelines for good practice and professional responsibility. Internationally, there are many more organisations like the Association for Computing Machinery (ACM) that expect all members to maintain a commitment to ethical professional conduct.

9.6 Relationship with the CEO

The relationship between the CIO and the CEO is one that received attention in Chapter 4. It is clearly not only an important relationship but one that has begun to change as the CIO role has emerged and changed to one with a much clearer focus on strategy than had been the case in the past. The CIOs interviewed felt that this relationship should be a direct one and that the days when they reported indirectly through the CFO for instance should now be gone.

Given what Information Technology is going to mean to the world, business and education and any other sector the link between the senior leader and the person responsible for deployment of IT needs to be really tight.

(CIO 2)

Senior people often only pay lip service to the importance of IT and IS. They often actually say, "Yes IT is really important" but that doesn't mean they are still genuinely getting the input from that part of the organisation.

Information systems are a lot more complex, in too many cases the IT area is down in an organisation.

(CIO 4)

In the 1960's and 1970's it was pretty well irrelevant whether the CEO had much understanding of IT, but in the 1990's and 2000 businesses are going to stand and fall on their implementation of IT.

(CIO 6)

The closer the relationship the better. The CEO has to have good people to turn to and obviously the structures of the organisation have to be such that these people can report to directly to the CEO. The CIO should be part of the senior management team.

(CIO 7)

Again the relationship is that the CIO must report to the CEO.

(CIO 8)

Apart from the need for the CIO to have a direct and close relationship with the CEO the CIOs felt that the relationship should also incorporate a range of other characteristics.

In keeping with the comments made about the desirable qualities of a CIO and in particular the need to manage expectations, CIOs felt this relationship should be one that avoids surprises and is established as one of mutual trust.

My job is to try and avoid surprises by letting him know what's happening, or that might be coming up. I meet with my CEO once a fortnight to keep him aware of things that might be happening. I meet with the executive once a week and at that weekly meeting I mainly focus on risks, risks to do with continuing operations, risks that may be coming up, and any other exposures.

(CIO 1)

I think that when a CIO has a direct report to the CEO, they need to win trust and respect and to make sure they deliver, to hear clearly what the CEO wants.

(CIO 2)

The relationship needs to be a very trusting relationship. There's actually got to be a very good rapport and appreciation of the direction of the organisation is going and if the CEO and the CIO are on different tangents with the direction of technology they're not actually going to gel.

(CIO 5)

DeLisi (1998) stressed the value of communication skills and the fact that the CIOs rated this as one of the most important qualities of a successful CIO, it is not surprising that they considered this important in their relationship with their CEO. The need for a special level of refinement in this regard comes from a combination of the often complex nature of the technology and the fact that although many CEOs have a sound financial background, they do not necessarily have the same degree of expertise in technology.

They also have to excite the CEO and interest the CEO in technology and what technology might be able to do for their business. To do that a CIO has to be able to almost speak and think like a CEO. The CIO has to understand what they are looking at, in terms of balance sheets, to understand the sorts of priorities they have in terms of investment, to be able to talk the IT speak without using a single acronym.

(CIO 2)

The CIO does need to be able to clearly distil a technological argument or position into language that a non-technical person can really understand. I'm not sure that's any different from the CFO or the Marketing person being able to explain a complex product or package. Technology is however a little more difficult to get your hands around. You don't get to be a CEO unless you have a pretty good financial background whereas that isn't necessarily the case with technology.

(CIO 3)

I'm in a very fortunate position right now where I've got a CEO who's actually worked in a technology area. I'm not having at that level to translate everything into simple language, which is something the CIO often has to do

(CIO 5)

The rationale for the position of CIO also had a bearing on the CIOs views.

I focus on high level strategic things that I might be concerned about rather than the rats and mice.

(CIO 1)

The relationship between the CIO and the CEO is exactly the same as it is between the CEO and other senior officers except that technology is starting to change the way businesses develop and grow.

(CIO 2)

Most companies really need the top IT person to be in the senior management group because most businesses are now so dependent on IT for day to day operations and because so many advances and so many new business opportunities are going to include technology and information. If the business hasn't got somebody in there who understands all of that then you've got a problem.

(CIO 8)

Reinforcing earlier discussion about the tension that emerges out of the dual leadership and management role, one person remarked about the relationship between the CIO and CEO:

> *CIOs have a tougher job than a lot of people do because of those conflicting objectives of vision versus delivery. In contrast Marketing could be pretty much mostly vision, and Sales pretty much mostly delivery. So the CIO does have a more challenging role in that respect.*

(CIO 3)

There is a high level of correlation between the views of the CIOs and those of DeLisi, though there is less convergence with the views of principals. The principals do not appear to have gained a full appreciation of the extent to which IT has the capacity to impact even more on the way their schools operate. Schools are perhaps still in a similar position to that experienced by businesses some ten years ago when IT was seen as an ancillary or support activity. A position which is in stark contrast to the current approach of many businesses which realise that IT is a key and integral part of their operation with a strategic role that may be vital not only to their future effectiveness but also even to their survival.

9.7 The Place of Qualifications

The personal qualities and skills required in a successful CIO have been examined as has the need for professionalism. During the interviews, CIO's views were sought on the nature and place of formal qualifications. CIOs have not necessarily drifted into their current positions through any kind of serendipitous effect. However it is acknowledged that for many of them the nature of there job has changed quite dramatically as it has gained a greater business focus and is less technically oriented than some years ago. This adds to the material discussed in Chapter 5 and the related section of Chapter 8. The information gleaned assists in providing answers to Research Question 1. CIOs generally did not appear to consider formal qualifications to be especially important in their role and gave more emphasis to the acquisition of practical experience. This is not to say that they were opposed to tertiary education but rather that they were less inclined to see it as the best way to

become qualified for the demands of their job. Where they did consider there to be a possibility for relevant qualifications was, not surprisingly, in the area of business management.

> *Certainly formal management training I think helps enormously. There's knowing and knowing. There's the big business language, knowing how to talk in terms of knowing how to do business cases, knowing how to be comfortable in looking at things from the perspective of the whether the business is going to deliver rather than the perspective of the technology. Managing relationships is probably the most important thing.*
>
> (CIO 1)

> *I'm in two minds about the place of qualifications. I mean I'm strongly of the view that education is a critical pre-requisite to being successful in any sphere, but I also know that there are people out there who have no formal education who are really good at what they're doing. I don't believe you need to have specialist technical expertise or huge educational background to be successful as a CIO. I think you have to have a good business and commerce background, good ability to communicate*
>
> (CIO 2)

> *No I mean Bill Gates dropped out of Harvard so I rest my case. It doesn't mean that an academic grounding is bad but I consider that academic qualifications become increasingly unimportant as you go up. Academic qualifications at some point simply become evidence that you're prepared to do some work and go through a process that requires thought and study. Having qualifications in a certain area can actually be a big disadvantage because what you really need to be able to do is just continue to change with the technology or at least understand the technology. This might be one of the very few areas where actually formal qualifications that unless they're the type of qualification that's very fluid would be negative.*

(CIO 3)

Academic qualifications are important but not paramount, as I prefer people to be broader rather than narrower in outlook. Training and education are very important but learning when you're actually on the job is even more important, particularly in such a changing environment. You can't teach people to be good processors either, it's a skill, they think that way. You can teach people to be good programmer but some of the other things we need such as quality, communication skills and integrity cannot really be taught

(CIO 4)

People just starting out from school just don't have a choice they've got to go to university. It's really the practical experience however that gets you there in the long run and a pragmatic approach. You can have all the qualifications under the sun but it's demonstrable ability to actually put things in place that works along with sticking around long enough to actually see them through. They are the qualities that I look for in employing people.

(CIO 5)

What I find is that half of the people that have formal qualifications are no use to man nor beast, but yet they've gone through the syllabus and they can answer the questions all right, however they've got absolutely no idea how to apply things.

(CIO 6)

I think the personal satisfaction factor is an important one as is a view to long term prospects but I would advise any young person not to take a purely IT related tertiary qualification

(CIO 7)

In summary, the CIOs were somewhat more equivocal about the value of specific qualifications than were the principals. Most of them put more emphasis on the importance of personal skills and attributes which they believed could not be taught.

There was some acknowledgement of the need for qualifications that would assist CIOs to cope with the way their responsibilities are evolving. It may be, as one CIO pointed out, that these views are influenced by their own academic backgrounds.

> *A lot of people who come through the IT route haven't got basic qualifications and really haven't even got a degree and don't see any need for it particularly as most people in IT are being overpaid anyway. In these circumstances it's easy to say, "Well who would want qualifications, look how much money I'm getting". So you probably haven't got great support from a lot of people who are in senior positions in the business at the moment.*
>
> (CIO 8)

While there may be some truth in this observation, it could not have been a major influence as most of the people interviewed did have tertiary education qualifications including several at post-graduate level. For educators there is a need for a comprehensive knowledge of business practice, much of which can be applied to the school environment. The importance of personal qualities such as commitment, ability to learn, a focus on quality, and ability to communicate effectively, though perhaps difficult to teach directly, are still relevant informal qualifications. Furthermore, if the people with the responsibility for IT management in schools are to come from a teaching background, as the principals believed is essential, then they may not have had the opportunities to gain on-the-job experience as most CIOs have done. In this respect, the relevance of formal qualifications to school IT Leaders may be greater than is the case for CIOs.

9.8 IT Staffing Requirements

In Chapter 8, a case emerged demonstrating the special IT staffing needs of schools. As the impact of IT is a much more recent phenomenon in schools than it is in the general business community, there may be a lesson to be learned from business experiences.

As might be expected there is no ready answer to the question of determining adequate staffing levels. Quite apart from trying to translate findings from the business environment to schools there is a problem within business itself. The needs of different businesses vary enormously and they also tend to change over time and

some are very much systems oriented. Schools in contrast to the vast majority of businesses have to be much more people oriented and have a much higher number of users who range enormously in age, ability, and the number and range of the computer applications they use.

> *Well the staffing level that is needed will depend on what level of services the organisation needs and what the availability of those services needs to be.*
>
> (CIO 1)

> *For me staffing is about the industry sector that you're in and how much that industry or vertical sector relies on the use of Information Technology.*
>
> (CIO 2)

> *There's such a broad range now that you actually need a number of different people and no one person can cover the whole range. You need different people at different stages in the business.*
>
> (CIO 4)

> *It depends on so many other variables. There's no rule of thumb, I don't see how there can be a rule of thumb*
>
> (CIO 7)

Apart from the extent of the need for services, there is also the issue of what sort of service staff may be called upon to provide.

> *I think there will be an increasing role for an information management area but not necessarily the IT techno's*
>
> (CIO 1)

> *You'll need people who are able to understand and interpret the business strategy and who can provide the opportunities for improving information management that supports the business strategy.*
>
> (CIO 1)

One way to try to approach a determination of appropriate staffing levels is to use a metrics approach which seeks to establish ratios, for example IT to total employees ratio, or benchmarks that may have a fairly universal application.

> *I think those kinds of metrics, they're useful in the same way as financial ratios are useful, just to kind of get a match up. As something to rely on however they're quite dangerous actually because typically it's a little bit like financial statements; which are used as a rear view mirror as opposed to what's evolving and if you're not aware of that I think they can be quite dangerous*
>
> (CIO 3)

> *The overseas metrics type reports are always interesting. I actually find the ones of most interest however are not those written by those big management consultancies, but the articles written by people who are real visionaries.*
>
> (CIO 4)

> *The metrics type survey information is useful to a certain extent although some of those surveys are difficult to complete. I'll get half way through it and I think I can't do the rest of it because the information has got out of kilter with the environment that I'm working in. I do look at them but I think there's a big slant towards the large organisations, the likes of Telecom, Social Welfare and the IRD sort of organisations.*
>
> (CIO 5)

> *Organisations like the Gartner Group, usually they get a wee bit carried away with the importance of their statistics, but I think if you took them down a bit then they're generally a useful guide.*
>
> (CIO 6)

> *The way I work it is on the Total Cost of Ownership model and I work on how much it costs per user per PC per month and I work on a basis of keeping that under $400 per PC per month. That cost*

covers the purchase of the machine, a person to maintain it, a help desk, licenses, software, the whole works

(CIO 8)

The metrics approach then is generally regarded as being at best a useful guide. It is interesting to note how IT staffing benchmarks compare with IT staffing in schools. Figures published on the Information Technology Staffing Scoreboard (http://itmweb.com/blbenchstf.htm) cite benchmarks for four different industry categories (All, Airline, Transportation, Insurance). The insurance industry had the highest ratio of 1:14 with the ratio for all industries being 1:50. Even allowing a considerable margin for all sorts of variables and debate over what constitutes a user, these ratios are all much higher than the IT staffing level found in most schools. On the basis of these sorts of figures, an average sized primary school with around 200 students could expect to have an IT staffing component of four people. A medium sized secondary school with 700 students could anticipate an IT staffing of about 14 people.

Perhaps one way of addressing IT staffing requirements is to outsource it. This typically involves contracting specialist firms to carry out the work. This can avoid some of the overheads associated with employing staff directly but this approach too has its limitations.

You can outsource perhaps the provision and the maintenance and the updating of software on your computers but I don't think you can outsource the decisions as to which software you're going to buy. You can't outsource the decisions as to whether you're going to run Office Manager, Office 98, or Unix server or something. At a technical level you need to know who's going to have access to which systems and who's going to manage the systems and security policies and you've got to stay in charge of your own business. Approaching outsourcing to save money, that is the wrong way to approach it.

(CIO 7)

In terms of outsourcing your support could be in or out but you've got to have people on-site. Most companies who outsource are actually finding that it's costing them more to outsource than to have their own people. I've got user support in-house here because I think that's the most cost effective way to do it. If somebody's PC goes or whatever you can't be calling someone in to fix it. It's only if you're in a fast moving environment of technologies where there is no way you can afford to keep a number of people and keep training them up to speed that you should consider outsourcing.

(CIO 8)

There may be a place for some degree of outsourcing of IT requirements for schools. It seems likely however, that the majority of schools will have requirements that will mean that they will have to cater for most of their IT needs in-house or at least share resources with other neighbouring schools. Certainly, the ideas expressed by the CIOs, while not giving a definitive answer, do appear to support the arguments advanced for School IT staffing in Chapter 8.

9.9 Concerns about IT Implementation in Schools

As a means of obtaining another view of the implementation of IT in Schools, the CIOs interviewed were asked if they had any concerns about this. Most of the CIOs either had children currently attending school or had children who had left compulsory education recently. Their responses were rather more wide ranging than was anticipated yet there were some consistent themes.

Perhaps not surprisingly many of the CIOs see education as an investment in which IT has a very important strategic role. Despite the significance of this role many still regarded it as an area of considerable concern.

I think that New Zealand needs to start educating our children in the effective use of Information Technology soon because if we don't the kids will be self-educating at home. What I see happening is that there's a lot of kids out there who at home have access to really good technology, they've really educated themselves well, but when they go into a classroom environment they're back to almost archaic stuff. Few schools have the money that they really

need to keep up. It's a challenge because by the time those we're educating now to come into the workforce it's going to be a global workforce. If our government doesn't invest in the infrastructure, in IT and education, we'll end up on a global scale as a non-competitive country. The bottom line is investment. If the education sector doesn't keep up with IT, then New Zealand will be behind the eight ball.

(CIO 2)

I have huge concerns with it because it just doesn't seem to be nearly as much of a priority here in New Zealand as it should be. I can relate to it to some extent because I have a four-year-old daughter who has her own computer and who would much rather be on the computer than in front of the TV. As long as you kind of regulate what they're doing; their books, the TV programmes they're watching, computers can be hugely more educational and more mentally stimulating than anything else children can do other than play with other kids of course. The idea that every kid doesn't have that opportunity when I just see how important it is is really disturbing and particularly for a country like a small country New Zealand that is certainly going to have to get the best out of what it's got.

The idea that there isn't a very comprehensive funded programme to ensure access to computers and the Internet and that all those things aren't an integral part of the school curriculum at a very early age is just hugely discouraging. I have massive concerns about that. I mean this is a fundamental strategic thing for education, it's just indisputable.

(CIO 3)

The problem you have with IT in education is the classic problem, you've got an education system that is under funded generally and there's no strategy for the whole thing.

(CIO 8)

Concern was also expressed about the content and methodologies employed by schools. Despite the commercial background of the CIOs it is interesting to note that many of their observations are entirely in accord with much of the educational discourse in this area.

> *There are huge opportunities in terms of using it as a medium that allows individuals to choose their preferred mode of learning. Most teaching is still at the stage of delivering pearls of wisdom. Information should be available in ways that we can access it and it should be in an interactive process. I think the role of an educator is to guide students towards the various sources of experiences and information that may be needed to gain the required set of skills, knowledge and understanding. I would see the role of teacher as being facilitator.*
>
> *I know that some people lament the fact that people can't add up or they just can't read a book, but maybe reading books will be an obsolete skill just as has happened since the days when people made their own shoes or whatever. Maybe there's a whole set of new skills involving technology.*
>
> (CIO 1)
>
> *There are so many possibilities with computers, the Internet, greater and easier access to information, new ways of teaching, more interactive ways of teaching, one on one teaching, where everybody can proceed at a reasonably individual pace. These are all things that education struggles with yet many of those can be resolved through the appropriate use of technology. There has to be a vision of that within a school and certainly at principal level.*
>
> (CIO 3)
>
> *Education tends to be more oriented towards the technology than towards information or appropriate information systems. A PC is treated as a PC rather than as the gateway to information or as something that you would run an application on. I think it is often the technical end that's emphasised rather than the processes and*

systems of information. I suppose we're using PCs for access to the Internet as a useful gateway, but often they're not processing information they're just viewing it. There's a lot more to information systems than viewing a magazine or just playing with a mouse

(CIO 4)

I suppose for a start that keyboard skills should be introduced at a very early age. That is proper keyboard skills, not just one finger typing needs to be introduced at the primary school level so as they are learning to write and the skills associated with writing they actually also learn how to operate a qwerty keyboard.

There's no way today's students are going to get through their work life without using a computer, absolutely no way yet we've got this technology in the schools and the school can't get all the kids exposed to it.

(CIO 5)

From a lot of young people that I know or have come in contact with in the workplace they're fairly good at using a word-processor but they're not as proficient in their use of the Internet despite what everybody says. Some of them are real whizzes and light years ahead of where I've ever been but there's an awful lot of them though who can play games and that's it! I think that's a bit sad because in this day and age schools are still a bit old fashioned and not really using computers to their full potential. I think that English for example should add on to that a high ability of computer systems to extract and interpret more information.

(CIO 6)

I believe that everybody leaving school today ought to have the ability to use Word, Excel and it's terrible really as this is all Microsoft stuff, but they really ought to have those products at their fingertips, and they should be able to type. Maybe in a couple of years we will get to the point where people are talking to their PCs.

I actually think however that people should come out of schools today with the ability to use a keyboard and with skills in office products, because there isn't a job today that doesn't use them.

(CIO 8)

The CIOs see a large measure of the responsibility for the causes of concern being in the Government's hands. They also have expressed anxiety about some aspects of current practice and the risks not only of not getting IT right but also the widening gap between those who have access to the technology and can therefore acquire the skills and those who do not have such an opportunity. Many believe that students should emerge from schools with some fundamental IT skills that will serve everybody well regardless of career. There was also concern about the need for more emphasis on process to ensure amongst other things that people who leave school can not just access information but know how to interpret and use it. The extent to which educators take issue with these views is debatable but what is certain is that the CIOs have highlighted problems that may in large measure have their genesis in the general under-resourcing of IT in schools.

9.10 The Effects of a 'Can do Culture'

As with the principals, the CIOs subscribed to the notion that in New Zealand there has often been a sort of do-it-yourself mentality, a kind of 'Can do Culture', references to which are often accompanied by allusions to 'Number 8 wire'. During the discussions, the CIOs were asked their views on the validity of this assertion and its possible impact on the way IT has been implemented in New Zealand. Their responses were not quite what was expected, especially in light of the views they had expressed earlier on professionalism, and they provided an interesting contrast with the reactions of most of the principals. While the principals, took a more negative attitude towards it, the CIOs tended to construe it as a more positive characteristic. One CIO however made it very clear that IT was too important to be dealt with by such an approach.

I think that's an over rated culture or phenomenon first of all. It can also be quite positive of course, but also dangerous in the sense of just assuming that people can be left to their own devices and they will make it happen. Sometimes it happens but sometimes

it doesn't. Every country I guess has its own set of cultural perspectives but to me IT is too important to leave to kind of an adhoc, she'll be right mate, kind of approach. You can't really criticise individuals for approaching it that way you can only compliment them, you can criticise more global level that has meant that's what people have had to resort to. I mean you should never criticise anybody for having adopted the old number eight wire approach, but you can criticise the circumstances that put them in a position where they had to cobble something together.

(CIO 3)

Other CIOs took a rather different perspective and actually saw it as a potentially positive trait.

Often the biggest failures we've had are caused by an international culture that's not ours and where we've actually used the big companies, the big country type processes and methods. There can too often be an assumption that we don't know it as well as somebody else does. We should actually have more confidence in our judgements. We are actually pretty good and I think in many cases the business or CIO or whoever should take more responsibility and be more confident in their own judgement. If we do things in the New Zealand style a bit more we actually do a better job of it. There is definitely still a place for the number 8 wire approach. Some of the best work we've got here is done from number 8 wire and the user's love it.

Thinking too big often causes disappointment and disillusionment. "Kiwi can do" often involves thinking smaller and just doing it. I think we make more mistakes by thinking too big than we do by being too "can do". What you come up with might not have been the best solution. You might not have planned it or designed it well enough but at least it's something that's there and it works and it does 80%. That's better than a 120% job that takes 6 months and never actually delivers anything because they run out of money or

the business changes or people leave. Sometimes the 80% option is better.

(CIO 4)

The interesting thing is that we actually have this belief that if we get in the experts, they're actually going to be more knowledgeable than what we are. When you hit some sort of problem you often actually need to resolve the thing within an hour or so and with some good old Kiwi ingenuity you can often resolve it. It's all a timing thing and a balance, but there are times of course when you've got to bring in the experts.

(CIO 5)

The apparent difference of opinion can probably be traced to a different background. Schools themselves have a long history of having to make do; to run cake stalls to buy even quite fundamental things. While businesses may experience financial difficulties, they do not typically have to contend with the ongoing shortage of funds that has been common for schools. For many schools, often there has not been an option to do it from other resources and initiatives, even if the outcome has been neither particularly elegant nor especially desirable. In effect, where schools have adopted the "can-do" culture they have done so out of necessity while businesses have done so from choice. The CIOs' view is more a perspective of this trait as one of self-reliance and confidence. However, as one CIO did observe, IT is far too important to rely on a "can do – she'll be right" approach but it can from time to time benefit from the skill and flexibility that are inherently a part of this characteristic. The message would seem to be twofold. First there should not be an undue level of dependence on the "number 8 wire", cobble-it-together approach. Second, there may still, from time to time, be occasions when it may be useful, and possibly provide an even better solution than what the experts can suggest.

9.11 Conclusion

While it is of course important to note that the views of these CIOs are not necessarily representative of their colleagues in general, it is equally important that their views not be dismissed as irrelevant. Their views were sought to provide a basis for analysis and building a picture that assists in answering Research Questions

2, 3 and 5. The business world has a much longer experience with the management of Information Technology than schools have. It should therefore be possible to extract from this experience ideas and principles that might have relevance to schools. Among the more significant developments that have evolved from the way businesses have approached their management and leadership of Information Technology is the role of the CIO. While this role is comparatively new and continues to be a dynamic one, it is indicative of a change in orientation in business that sees IT as less the technical business of data processing and more a broadly conceived one more concerned with knowledge management. It is also reflective of a view that clearly places IT as a key strategic activity that has a fundamental role in maintaining and enhancing business viability. No longer is IT regarded as a supplementary support-type activity dominated by technical people with a limited knowledge of core business activity, and only a very restricted capacity to contribute to the vision and overall strategic direction of the enterprise for which they work. Businesses have realised that Information Technology is perhaps the most dynamic dimension to their practice. The proliferation of increasingly sophisticated networking technologies has had a profound influence on the way people and business markets work and on the way information is created and distributed. To be fair, educators have for some considerable time seen and espoused the virtues of computers and IT generally. However, what has been given far less attention is the kind of culture; the styles of management and leadership with which schools will need to cope. This includes not only the continuing evolution and development of the technology but also the optimisation of the return on the investment it represents. Some times there is a reluctance to make comparisons between business and education because of the obvious differences. There are differences, but there are similarities. It is from these similarities that some lessons may be learned. In many respects business has the capacity to advance the implementation and adoption of technology at a faster rate than schools. All organisations have core activities on which they need to focus, they all have a need to be as effective as possible and as a major part of this process they all have a need to learn how to do things better. From the views of the CIOs and a comparison with those of principals some useful observations can be made and some very clear messages emerge.

Both groups saw a very clear need for vision. While principals identified this more directly and immediately, the CIOs also saw it as important though they were more likely to couch references to it in terms of strategy and planning. A dimension of this aspect that was stronger among the CIOs was the need for a close working relationship with executive teams so that IT was firmly and constantly on the agenda as a key tool in ensuring success. While principals did acknowledge the desirability of this, they were perhaps not as emphatic about it as the CIOs. To some extent this is explicable considering the differences in size and scale. It is also no doubt a reflection that schools, unlike many businesses, may not yet have awoken to the overall potential of the technology and the extent to which it is now increasingly woven into the fabric of the operation of their organisation. Both groups agreed that at least some technical knowledge was desirable, but not required as a pre-eminent quality. Indeed, both agreed that the mystical "nerdish" approach that may have been a characteristic in the past was no longer appropriate and was now more likely to be a hindrance than a help. This seems to be very much in accord with Bennis' (*Behavior On Line*, 1999).observation that no one is derailed from a top leadership position because of a lack of business literacy (his preferred term for technical competence), but rather because of lapses of judgement and questions about character.

Much more important in everyone's view was the need for sound interpersonal and communication skills. The CIOs in particular put special emphasis on the quality of the relationship between the CIO and the CEO. This was not so much an area of disagreement but more a reflection of the difference in position within their organisations. The principals are the bosses whereas the CIOs are employees. Although it was expressed in different terms, both groups were strong on the importance of an understanding of the *business*. Principals demonstrated this with their belief that the person responsible for leading and managing IT in schools should be a trained teacher, a person with a comprehensive knowledge of the teaching learning process which is the core business of schools. The CIOs were not so insistent that the knowledge had to be specific to a particular business but they certainly felt that is was necessary to have a good grasp of business. In essence, while the principals felt that they needed an educator, the CIOs felt that they needed

a business person. Both groups were saying they needed people with a good grounding in their key area of activity, namely, business or education.

Financial management was also an area of agreement. Schools so often have had very restricted budgets and certainly no capacity to overspend. Businesses too have budgets for their IT projects but the number of occasions when IT projects in the commercial arena have run dramatically over budget is legendary. The CIOs seemed particularly sensitive to this and were concerned as a result about the need to improve the reputation of IT and make it more credible by ensuring that better mechanisms were in place to minimise the risk of that sort of problem developing. Apart from the financial area, credibility generally was seen as a highly desirable attribute.

Numerous management qualities were identified by both the CIOs and the principals, though the principals may have put rather more emphasis on these sorts of skills than they did on those that are more oriented to leadership. The CIOs, while identifying clearly the need for a comprehensive range of management qualities probably put slightly more emphasis on leadership qualities than the principals who regarded the leadership role as primarily their responsibility. Rather surprisingly, neither group directly identified political acumen and schmoozing type activities as important notwithstanding the views of people like Pastore (1999), Wallingford (2000), and Koenig (2000).

Both groups did regard professionalism and integrity as very important no more important than for anyone else. CIOs were mainly concerned that people in their area were judicious in setting expectations and ensuring that they kept them within their capacity to deliver. It is possible, given the comparative youthfulness of the IT industry, and especially its role in schools, that more ethical issues will emerge as its power and influence spreads and new situations unfold.

While the principals gave some support to the need for specialist qualifications, the CIOs did not really see much need for them. This might be because, as one CIO observed, many of them do not have such qualifications themselves or it might be that the needs in education are more specific and therefore more readily addressed by qualifications.

No readily identifiable formula emerged for determining staffing levels but it was apparent that the IT sections in business are more likely to be better staffed and resourced than is typical in schools. The CIOs did not support the value of a strict metrics approach to staffing, favouring instead an approach based on needs assessment. Nevertheless they did concede that the information provided by metrics type surveys could be a useful guide. Although no definitive results emerged from the discussion to give staffing benchmarks, it did become clear that this was an area in which schools were disadvantaged.

The views of the value of the "kiwi can-do" culture provided perhaps the greatest contrast between the two groups. The principals were universally dismissive of the value of this sort of approach, while the CIOs tended to be more circumspect, seeing it as having a place. Both groups were very clear that IT was too important to be jeopardised by risky amateurism. The views did serve to highlight an important feature of the way in which the organisations the two groups represented have tended to work. Schools have had to rely on their own resources and therefore have not really been in a position to exercise much choice. They either utilised the resourcefulness of the "kiwi can-do" culture or went without. Businesses by contrast often were able to exercise more choice. Rather ironically the higher expectations and better levels of resourcing in the business arena have often been such that people in this area have often put greater store by the value of expert contribution than on their own resources even when a local solution may have been quite satisfactory. Therefore, schools need to be in a position where they can exercise more choice that will permit them greater access to specialist assistance while business perhaps needs to acquire more confidence in their own capacity to successfully handle a greater range of problems.

The ideas and views of the principals and CIOs have therefore contributed to the development of an overall picture of what may be required in the area of IT leadership and management in schools. It is a picture that covers both the skills and attributes needed as well as the characteristics of the culture that is needed to allow the contribution of IT to be maximised. In particular, it is one that is indicative of the need to establish a role of people in schools that closely parallels that of the business CIO and adopts a more strategically-oriented view of IT as a key component of the operation of schools.

CHAPTER 10

CONCLUSION

People tend to overestimate the impact of new technologies in the short run, and underestimate their long-term impacts.
(Levin & Darden, 1999, p. 20)

10.1 Introduction

This chapter draws together the many threads that have emerged in previous chapters and provides answers to the research questions that have been at the heart of this enquiry. To achieve this a similar sequence is followed to that found in the thesis as a whole. In this chapter however, specific comment is made on the research methodology, implications and areas for future research, emerging issues, and the limitations of this research project.

Over the last 15 years or so people like Cuban (1986) have been arguing that computers specifically, and Information Technology generally, as media for instruction and learning, are in many respects largely incompatible with the day-to-day requirements of teaching. Proponents of this argument point out that teachers have many students to teach, many subjects to cover (in primary schools at least) and are subject to higher levels of accountability than ever before. They also have to adapt to more rapid and more extensive social change and curricular demands than ever before. As a result, they conclude, it is often too difficult for teachers to effectively incorporate Information Technology tools into their regular classroom programmes. Additionally many teachers find that computers are not always easy to master and use and are prone to apparently inexplicable unreliability. Such perceptions may sway teachers to believe that it is barely worthwhile investing the effort needed to ensure their students use computers. Further exacerbating this situation, the prevalence of computers in many classrooms may be more attributable to the expectations of senior school administrators rather than to requests from teachers who have plans for utilising such equipment (Cuban, 2000). It needs to be clearly established however that regardless of the merits and validity of arguments of this sort it is a separate issue from the need for Information Technology tools to be used in schools. This thesis has accepted the tenet that Information Technology has a great deal to contribute to education in terms of its potential contribution to the

teaching–learning process, the administration and management of schools, the development of skills and knowledge, and the possibilities it offers to reform education. While there may be some problems associated with the adoption and implementation of Information Technology in schools, it is conceivable that there may be ways in which the use of IT as an educational tool can be made much more effective.

10.2 Brief Review of the Study

Despite nearly 20 years of effort and vast sums of money there has been, all too often, an observable failure of schools to genuinely use IT resources for meaningful educational gains (McKenzie, 1999; Becker, 2000; Cuban, 2000). With some notable exceptions, the new technologies are still essentially peripheral to routine classroom practice. McKenzie (1999) advances a number of cogent arguments and plans to ameliorate the situation. This thesis accepts the soundness of much of McKenzie's argument, but has sought to go further to examine the critical role of information management and the overall issues relating to the management and leadership of Information Technology in schools.

An important means of addressing some of the problems with the implementation of IT in schools is through appropriate IT leadership and management. People with these responsibilities have to serve a variety of roles and must possess a wide range of skills. For people undertaking this role Tagg (1995) identifies nine duties to be carried out in addition to the role of specialist teacher, of which six involve supporting, advising or training other staff. Unfortunately there is some evidence (refer Chapter 8), that many people currently undertaking these sorts of responsibilities may not be as well suited to many them as may be desirable (Her Majesty's Inspectorate, 1992). At present, with no formal qualifications or career pathway available, most people with the primary responsibilities for IT in schools are likely to have arrived in their positions through a combination of serendipity and enthusiasm. Within the next few years however the equipment and the needs of schools are almost certain to become even more involved and complex while the people in schools with the relevant responsibilities near retirement. Furthermore there is some evidence that there may be a "lost generation" of university graduates who do not have the level of IT competence that might be expected after over a

decade of computers in schools (Mellar & Jackson, 1992; Department of Education, Queensland, 1995; Hughes, 1997; Watson, 1997). There is then a clear need for planning and preparation to be underway to cater for the needs of the people currently undertaking these responsibilities. Catering for the long-term professional development needs of school IT leaders will require a flexible approach that allows for a variety of needs and interests, and a viable set of courses and qualification could be provided that would make a useful contribution (Kennewell & Selwood, 1997).

Principals alone cannot be expected to carry the IT responsibility, for Roden (1997) may well be right in identifying that principals are often not especially competent in the area of educational technology. Roden's apparent assumption that this is somehow the fault, or a matter for blame for principals is however by no means so clearly established. The nature of a school principal's job is now so complex and the tasks so diverse that it is unreasonable if not impossible for principals to be masters of everything. As Clemmer and McNeil (1998) have pointed out, a major stumbling block is a lack of effective leadership skills and a suitably supportive organisational structure and culture that facilitates the transition of good ideas to sound everyday working practice, rather than a lack of the ideas and motivation. It is then the responsibility of principals to be influential and to provide the environment, the right culture, and organisational structure. In doing this they provide the foundations on which other people with suitable leadership, and management skills can build and implement sound IT infrastructure and programmes.

The history of education is littered (Cuban, 1986 & 1993) with descriptions of unsuccessful attempts at technological innovation. Ameliorating this however is the evidence (Miles, Saxl, & Lieberman, 1988; Bruder, 1990; Strudler, 1991) that when suitably qualified people are positioned in appropriate roles within schools the chances of innovation being implemented effectively become much greater. Such advocacy must not however be mistaken for a demand for a cult of technical complexity. Rather ironically, at a time when there is often a cry for greater levels of computer literacy, there may also be a need, as described by Luftman (1996), for more *computer illiteracy*. This is a plea to escape the sometimes overwhelming and almost cult-like preoccupation with the technology and associated complex technical issues at the expense of the key issues associated with the people who are to use and

hopefully benefit from IT. Too often an opaque veil has been drawn over the discourse that accompanies IT proposals and development. The result is that not only is clear communication impeded, but also the whole process has tended to be mystifying and bewildering to anyone other than the technical elite; with subsequent counterproductive effects.

10.3 Responses to the Research Questions

The first of the research questions asks: *What form of qualification and training is most appropriate for teachers with responsibilities for IT in schools?* Currently the issues raised in this question are ones that are receiving very little attention. Attempts, such as CIT's Advanced Diploma of Information Technology in Education (ADITE) qualification were designed to specifically address needs in this area, but the level of interest and support for this programme was not great. Certainly in the case of ADITE it was not enough to make it a viable programme capable of recovering the costs incurred in its delivery. As a result the ADITE programme is no longer being offered. Notwithstanding this lack of support there have been successes with other similar programmes. There are several factors that contribute to an explanation of this state of affairs. Perhaps the most important of these is that the ADITE programme focussed very much on developing leadership and management skills and was oriented to the higher order cognitive skills (Bloom & Krathwohl, 1956) of analysis, synthesis and evaluation. Other programmes and courses e.g. Certificate of Information Technology in Education, the Graduate Diploma of Information Technology in Education (Waikato Polytechnic), and especially their predecessor the Diploma in Computer Education (DiCE) have tended to be concerned with different areas. These have been more concerned with the acquisition of knowledge and comprehension of computer applications, computer hardware, computer networks and related technical matters, and the application of IT to a practical classroom environment. In effect these programmes have given more attention to the knowledge, comprehension, and application categories of the cognitive domain. That teachers should display more interest in these sorts of programmes is consistent with evidence that there are still many teachers who lack either confidence or competence in the comparatively basic range of applied IT skills. Such an argument aids an explanation of the lack of success of the ADITE

programme, but does not necessarily mean that this sort of qualification is not needed. Principals, as is demonstrated in Chapter 8, indicate that a qualification specialising in the leadership and management of IT in schools would be advantageous. They identified the benefits of this type of qualification both in terms of its capacity to upskill the people with the associated responsibilities in school, and as a means of assisting principals to select suitable people to lead and manage IT within their schools. Both principals and CIOs indicated that while a certain level of technical expertise was necessary, it was neither the only nor the predominant skill needed. They very clearly identified skills that are more closely aligned with leadership and management as being much more important. Despite the apparent unwillingness of teachers to enrol in sufficient numbers in programmes such as the ADITE there is evidence to support the need for it or something similar. The views of educational and IT business leaders, as well as the ever present need to ensure the most effective utilisation of the investment in IT infrastructure within the education system, clearly suggest that there is a need for such an academic programme. It needs to be one that provides training and a qualification specialising in equipping the senior staff with responsibilities for IT in schools with an appropriate range of pedagogical, leadership and management skills.

The second research question asks: *What are the leadership and management needs of schools in the area of Information Technology?* In Chapter 8 principals identify a comprehensive range of leadership and management qualities that they consider necessary for the schools in the IT area. The CIOs, in Chapter 9, also identify a similar list of qualities needed for people in their area. The rationale for this type of comparison was based on a belief about the history of IT development in business and education. It is, that as business has had more experience with the management and leadership of substantial IT investment and infrastructure than is typically the case in education, then they should have views and expertise that might be translated validly to an educational setting. Both principals and CIOs put a high value on the need for IT leaders and managers to have well-developed communication and interpersonal skills. They ranked these sorts of skills much higher than technical computing skills. The views of principals that their IT leaders should have a comprehensive knowledge and experience of the education system is entirely compatible with the views of CIOs that a sound knowledge of business is very

important. Just as education is the core activity of schools so business is the core activity of commercial organisations. Both the principals and CIOs identified other leadership skills like capacities for vision, motivation, inspiration, team building, credibility and an ability to see the 'big picture'. In addition there is evidence in management and leadership literature of the significance of networking, schmoozing, political skills, and an ability to assess corporate culture, which were not always highlighted by either the principals or the CIOs. Nonetheless the arguments advanced by leadership and management scholars suggest that these sorts of qualities are also needed. While both the principals and CIOs placed importance on the role of ethical behaviour and professionalism as important attributes of leadership or management they generally did not see it as being more important for people in IT than in any other area. Although more in the management area, there are, in addition to those skills often associated with general management such as budgeting, planning, organising, and controlling, some less obvious qualities that principals also see as desirable. These include a practical orientation, and especially an ability "to get things done", an ability to handle contracts and commercial relationships, to promote and 'sell' ideas, flexibility, entrepreneurship, a focus on quality, and an associated customer orientation. Other needed skills included ability to research ideas and proposals, to have a sound knowledge of the core business processes that is education, and expertise in training adults and staff development generally.

The third research question asks: *What sort of management culture might be most appropriate for schools to adopt so that they can optimise the effectiveness of their IT investment?* In addition to the traditions and rituals of the school, school culture also includes the habitual ways of behaving, group and individual norms, reward systems, performance standards and communication practices. It also includes 'politics' in both the acceptable and unacceptable senses of the word. In essence, the school culture includes the moral, social, and behavioural norms and attitudes that permeate it. An observation of the culture lets you know what the school's management considers important and unimportant, and how it treats its staff and students. Deal and Kennedy (1982, p. 4), citing Bower, offer a more informal explanation as "the way we do things around here". In the context of this study there was never any intention to examine the whole culture of schools, but rather to

examine what ways schools "can do things", that are more conducive to optimising the effectiveness of their IT investment.

Perhaps the most succinct way of encapsulating what schools need to do is for them to professionalise the way they manage their IT operations. This means they have to employ teams of people with the various levels of expertise necessary to allow their IT equipment and infrastructure to operate effectively. They need to have a person who can not only lead the "IT team", but who also has the capacity to provide IT leadership throughout the school. Currently much reliance is placed on the principal to provide much of this leadership. As the principals themselves make clear in Chapter 8 the notion of them as "instructional leaders" is misplaced as they have too many other issues to deal with. They see their role as increasingly akin to that of a CEO who delegates particular levels of responsibility to other members of the senior management team. A key member of this senior management team must be the IT Director whose status and influence within the school needs to be on a par with deputy and associate principals, and curriculum directors. The undue dependence that so many schools have been forced to make on "can-do" and "number 8 wire" approaches must end as too much is at stake for it to be dealt with in such a casual and haphazard manner. In order for these kinds of changes in the way schools do things to take place, there needs to be a wider acknowledgement of the need for this kind of change, and access to trained and qualified people with the requisite skills and personal characteristics to make it all work.

The fourth research question asks: *What are the perceptions of principals about the qualities needed in the people with IT management responsibilities in schools?* To a large extent this question is answered in Chapter 8. It is also dealt with in answering Research Question 2. Principals are very clear that they do not want computer "nerds or geeks". They do want people with strong communication and interpersonal skills who not only are able to develop a vision but who are able to articulate it to others in a way that inspires and convinces. The people principals want are not only good managers with all the skills and personal attributes that such a role entails, but they must have a sound understanding of the teaching-learning process, and be able to command the respect of their professional teaching colleagues. Principals also expect that the person with IT management responsibilities in their schools will be a very competent trainer, with a good understanding of the principles of adult learning

and staff development. In essence principals want a person who is a teacher, trainer, leader, and manager, but not necessarily a technician.

The fifth research question asks: *What are the perceptions of CIOs about the qualities needed in the people with IT management responsibilities in business and how does the management of IT in business compare with the way it is managed in schools?* The solution to the questions is dealt with in detail in Chapter 9. There is a high level of comparability between the perceptions of CIOs and principals about the qualities required. It must be remembered however, that a critical difference between the two groups, is that CIOs are people performing IT management and leadership functions and responsibilities whereas principals, though often closely involved typically delegate at least some of the responsibility to at least one other key person. CIOs also place very high store on the value of communication, interpersonal skills and the ability to manage relationships, and comparatively less on the need for technical IT skills. While principals gave some credence to the value of strategic thinking CIOs considered this to be a particularly important quality. Just as happened with principals who identified some qualities not obviously picked up by CIOs, so the CIOs identified qualities not commented on by principals. Two of the more significant areas identified by CIOs included staff retention and recruitment, and expectations management (see Table 9.1). This is not surprising as CIOs typically have responsibility for a team of people whose skills and knowledge are highly sought after on the job market. CIOs are also very sensitive to the reputation of the IT industry for "over-promising and under-delivering", and the consequences this has for their relationships with clients. Neither of these have typically been issues to anything like the same extent for schools, but it may be that this will change once schools too have to attract and retain staff with similar ranges of competencies to those required in the business world.

The most obvious difference between the management of IT in schools and business is in the way business is resourced. There is little or no formal provision for specialised IT staffing for schools, so they have had, in many if not most cases, to make do with people with an interest in the area and some capacity to "learn on the job". Business by and large is well past that kind of situation and typically is at least adequately staffed with specially trained and qualified staff. While not all businesses are well resourced in terms of hardware and associated infrastructure they are

generally in better circumstances than schools. Indeed it is not uncommon for businesses to donate surplus or older equipment to schools. Another rather telling difference is that business have typically had recourse to expert consultants to assist with the resolution of technical problems whereas schools have normally had to tolerate the problem, or cobble some kind of a solution together from their own resources. It is fascinating to observe that principals believe that this sort of approach, which has been a characteristic of the operation of New Zealand schools, must stop. Somewhat in contrast, CIOs can see some value in what they would regard as a greater degree of self-reliance and self-confidence in ability to solve problems from within their own resources. Both principals and CIOs agree however that IT is far too important as a "mission critical" part of the operation of both businesses and schools to be left to an amateur, "number 8 wire" approach.

10.4 Review of the Research Methodology

While none of the research methods used were necessarily very large, there were several of them, and they were spread out over a period of six to seven years. A very extensive literature search was conducted that covered a wide range of related areas. This yielded some very valuable information, especially in the area of business information management, but it did not provide a great deal of material directly pertinent to the focus of this thesis. After an initial survey of teachers, and an examination of what relevant programmes were on offer to teachers a new programme, the Advanced Diploma of Information Technology in Education (ADITE) was developed and offered to teachers. Not only did the author play a major role in the development of this programme, but he also co-ordinated the delivery of the programme and taught a number of its courses. For two and a half years the author left the tertiary education environment to take an opportunity to undertake the role of IT leader in a prominent New Zealand secondary school. This time allowed him to gain experience at first hand of the demands and responsibilities involved in such a role. While people with designated responsibilities for IT in schools were not interviewed their views were sought through the survey designed to obtain information for comparison with the North American survey of CIOs.

Two sets of in-depth interviews were conducted, one with school principals and the other with business CIOs and a survey of school IT leaders was conducted to

compare with a similar one conducted among CIOs in North America. The research work concluded with a visit to Melbourne in Australia, where the author met with the IT leaders of five secondary schools to discuss their responsibilities, practices and circumstances.

10.5 Research Limitations

There are some identifiable limitations of the research conducted as part of this project. The major limitation is the comparatively small samples used for the interviews and the survey. In addition it may also have been helpful to be able to draw on data from larger scale quantitative surveys of principals and CIOs to support the data drawn from the interviews. As with any interview situation there is perhaps a danger that only people enthusiastic about the subject will agree to participate. The extent to which this may have been a factor, and how it may have influenced the outcomes of this study can only be the subject of speculation. While the experience gained by the researcher in "on-the-job" situations was illuminating and useful in providing a rich source of in-depth data it may have been helpful had it been possible to substantiate this further through comparisons with other similar situations. This project was intended to reflect a predominantly New Zealand situation and apart from reference to the literature does not draw on data from other countries. While the New Zealand situation will differ in many ways from those that prevail in other countries it is possible that valid comparisons might be made.

10.6 Implications for Further Research

Apart from endeavouring to replicate comparable data from larger scale surveys there are other implications for further research. A particular one would be to follow-up further on people who were involved in the ADITE programme both those who completed the qualification and those who withdrew at earlier stages. It would also be useful as a follow-up to examine in greater detail the reasons why the GDITE (Graduate Diploma of Information Technology in Education) programme offered by Waikato Polytechnic appears to continue to attract a viable number of students. Based on the observations made in this study it would also be interesting to follow-up on the changes that occur over the next few years in the way IT is managed and led in schools.

10.7 Areas for Future Research

As with any research activity inevitably several areas emerge where further research work would help cover areas not fully addressed or in need of further exploration. Given that there appears to be very little research in the area of the management of Information Technology in schools it is not surprising that such areas should emerge in this study as well. Perhaps one of the most obvious areas for follow-up to this work would be to conduct a set of interviews with people who are currently in the position of IT leader within schools. This approach might be more readily done by survey, but given the often complex and dynamic nature of information likely to be sought, interviews are likely to be more effective. Such interviews would be even more effective if they were accompanied by diaries documenting the different types of duties undertaken by school IT leaders. This research would help determine what responsibilities these people currently undertake, their views on the future of IT management in schools, and an indication of the kinds of attributes and skills that may be needed by people assuming these sorts of responsibilities in the future.

Apart from initiating a new line of enquiry like that, it would also be useful to seek to replicate the interviews conducted with principals and CIOs, but with a much bigger sample. This would serve either to confirm or refute the outcomes and arguments advanced in this work and perhaps expose some areas that were not considered at all. If the sample were large enough it might also be possible to compare the responses from different types of schools and from people with different academic and teaching or business backgrounds. While this research project was concerned with the situation in New Zealand, and did not therefore seek to find out about comparable situations overseas, this too would be a useful avenue to explore. The author's brief time in Melbourne indicated that, at least in the schools visited there, IT resourcing and management was approached quite differently, so there would appear to be scope for research seeking to make international comparisons in the way IT is managed in schools.

There are several issues to be explored in the area of qualifications for teachers. It would be useful to look at any similar qualifications that might be offered overseas and determine their levels of success. While a contention advanced in this thesis is that high levels of technical skill are not prerequisites for the job of IT leader in a school, it may be that there is a minimum threshold that is required. If this is the

case then it may be that there is a place for more than one type of training in this area. One might focus on relevant skill development, and another have a greater orientation to issues that are more related to leadership and management. In this respect a comparison between the Waikato Polytechnic programme and that offered at CIT might be illuminating.

The matter of outsourcing is a topical one in business IT management, and schools are exploring possibilities in this area as well. It would be very useful if there was some research that could identify and quantify the benefits, costs and viability of outsourcing as a means of assisting the management of IT in schools. This could range from leasing equipment along with suitable service and support agreements to contracting support services and even effectively transferring some of the responsibility to parents through the implementation of a scheme in which students lease/purchase their own portable computers. Apart from other considerations such an approach might serve to reduce the need for schools to supply and service their own computer hardware.

The principals interviewed as part of this research work were very staunch in their insistence that the IT Leaders in their schools should come from a teaching background. This contention has merits but it may be that it could be construed as *making a virtue out of necessity*. Additional research could be conducted to determine how extensive that view is, whether it would be altered if suitable funding were available, and to quantify the advantages and disadvantages of such a view. In a similar vein, much of the network administration undertaken in New Zealand schools appears to be undertaken by teachers, despite the rapidly growing complexity of the networks, and the high levels of dependence that many schools now have on the reliability and stability of their performance. The extent to which this is true could be more accurately determined, and the pros and cons of using teachers rather than specialist people with commercial experience in network administration warrants further investigation. A similar approach might also be taken to the provision of professional development and training activities. To what extent, and in what ways, is in-house training necessarily better for schools than that which is outsourced.

Neither the CIOs nor the principals interviewed for this research seemed particularly anxious about the ethical issues involved in IT, so this too may be a matter worthy of

further investigation. Not only do schools now routinely store vast amounts of data on both students and staff, but with the increasingly prevalent use of high bandwidth, high speed Internet access, and telecommunications tools there are much greater opportunities for sensitive or unacceptable material to be accessed. There would seem to be many issues associated with matters such as levels of access to files stored on IT resources, monitoring of Internet traffic and email messages, use of resources for antisocial or morally unacceptable purposes, and the allocation of, and access to, IT resources among other things.

While there may be some tension arising out of IT being set-up as both a teaching and a service area, there are no doubt benefits in the kind of close working relationship this can engender. Nonetheless it would be of interest to gather evidence about merits or otherwise of running these two areas of a school's IT operation either separately or together.

10.8 Key Recommendations for Action

Emerging from this research activity are a several recommendations for action. These are, in no particular order:

- That the need for suitably qualified and experienced people to manage and lead IT in schools be recognised through the creation and funding of a suitable range of positions.
- That the need for suitably qualified and experienced people to develop and maintain IT equipment and infrastructure in schools be recognised through the creation and funding of a suitable range of positions.
- That specialised education and training be available for people who are, or aspire to become, IT leaders in school and that this be recognised by the awarding of an appropriate qualification.
- That a much higher level of recognition be given to the provision of IT vision and leadership in schools through the appointment of suitable staff who can accept responsibility for developing and implementing IT initiatives that create and maintain leadership for the school.
- That the role of principal in the IT development process be acknowledged and maintained but that more emphasis now be placed on the role and

contribution to be made by a senior staff member with suitable training, qualifications and experience.

- That greater attention be given to identifying and addressing the management, communication and leadership needs of the staff with IT responsibilities in schools.
- That IT be recognised as an integral and strategically important aspect of the operation of schools and that the approach to its development and management be handled accordingly.
- That the school IT leader be a member of the executive management team of a school.

10.9 Key Learning Outcomes

While many things are learned in the process of conducting an enquiry such as the one this study represents the key ones can be identified as follows:

- The extent to which IT has permeated the management and operation of schools and the extent to which schools are now dependent on the smooth operation of IT infrastructure on a day-to-day basis.
- The lack of recognition of the skills and qualities needed for effective IT leadership in the school environment
- The extent of the *ad hoc* nature of the development and implementation of IT in schools.
- The importance of schmoozing and related political type skills to effective management and leadership.
- The importance of the notion of the school IT leader as a member of the executive team and the importance of their role in the school's strategic development.

10.10 Emerging Issues

Apart from the need for a major overhaul of the current approach of many schools to the management of IT there are several other issues that need attention, perhaps for research, but certainly at a government and general policy level. To date, at least in New Zealand, there has been little recognition of the need for specialised staffing in the area of IT. Many schools already have growing needs for staffing in the areas of technical support, network administration, Internet and Intranet site development and maintenance, with other areas such as telecommunications assuming ever increasing significance. Depending on the requirements of schools, the type of equipment and set-up they possess there may be several options for human resourcing but the issue needs addressing and resolution.

The professional development of teachers in IT continues to be an issue for many schools as they increasingly realise that without a sound programme of inservice education and training they will not be able to effectively capitalise on their investment in IT infrastructure. Compounding this problem is the need for specialised training and development for the people charged with the responsibility for leading IT in schools.

While perhaps the longer-term prospects may not be so bleak, there is still a continuing problem with the skill and knowledge base of people entering the profession. Despite the efforts of schools over the last decade or so to implement IT into their teaching programmes the IT competence of people engaged in pre-service training may not be as high or comprehensive as might have been expected.

Although it may be to a large extent a curriculum issue, there is also a problem in New Zealand about the place of IT as a curriculum area. Currently Information Technology is subsumed into the Technology subject area, and Computing as a separate subject will effectively disappear with the emergence of the National Certificate of Educational Achievement (NCEA) scheduled to commence in 2002. This development may pose a risk to the skill and knowledge development of students, and a possible diminution of student interest in IT as a career alternative. Regardless of these sorts of potential consequences such a development may provide a useful opportunity for restructuring responsibilities in the IT area so that they can be aligned more closely with the approach advocated in this thesis. Certainly

schools, if they have not already embarked in that direction, will have to address the potential for tension between the areas of Technology and Information Technology.

10.11 Conclusion

Many countries are taking action to ensure that their education systems are updated and are incorporating Information Technology into programmes within their schools. (Ministry of Education, 1990; Scottish Office Education Department, 1991; Department for Education and Employment, 1999; Blair, 1996; Cuban, 2000; Department of Education, 1995; Her Majesty's Inspectorate, 1992; ITAG, 1998; Cran & Spoon, 1999; Hendricks & Bryant, 2000) There appears to be a widespread acceptance among policy makers that this is necessary. They, not surprisingly, want to ensure that the citizens of the future will have appropriate skills and knowledge to equip them to be effective and productive members of a society that almost certainly will be very heavily influenced by the continued development and application of Information Technology. Despite this rich rhetoric however, there are still some gaps that may just be sufficiently critical to hinder the overall effectiveness of what is planned and implemented. To date there is rather disconcerting evidence that previous efforts to introduce the innovation of IT, and to realise its potential, have not been as profound or productive as might have been expected for much, as McKenzie (1999) claims, much still remains "outside the walls". To improve, the approach to IT in education must change. Even the type of change that McKenzie advocates may not be sufficient given the continuing impact of IT on the operation of schools. While the teaching-learning process, and the associated professional development needs of teachers may be at the heart of every school's operation, the full influence of IT on schools is unlikely to have occurred yet. It is necessary to take on board the lessons that can be learned from past experience, but more than that, the groundwork should be done now to help schools to more effectively cope with the continuing changes that will inevitably face them in the near future. This thesis has sought to expose, and advocate for, some of the ways in which this might be achieved.

REFERENCES

ACM. (1992, 16 October). ACM code of ethics and professional conduct. Available: www.acm.org/constitution/code.html (Accessed 1/9/99).

Albertson, T., & Selwood, S. (1995). *Faculty of Commerce application for accreditation of The Advanced Diploma of Information Technology in Education,* Upper Hutt: Central Institute of Technology.

Albertson, T., Lacy, M., & Selwood, S. (1998). *The Advanced Diploma of Information Technology in Education: Proposal for changes,* Upper Hutt: Central Institute of Technology.

Bailey, D. B. J., & Palsha, S. A. (1992). Qualities of the stages of concern questionnaire and implications for educational innovations. *The Journal of Educational Research, 85*(4), 226 - 232.

Beck, L. G., & Murphy, J. (1994). *Ethics in educational leadership programs: An expanding role,* Thousand Oaks, California: Corwin Press.

Becker, H. J. (2000, January). *Findings from the Teaching, Learning, and Computing Survey: Is Larry Cuban right?*. Paper presented at the School Leadership Conference of the Council of Chief State School Officers. Washington, D.C.: United States of America.

Behavior On-Line. (1999). *A conversation with Warren Bennis*. Available: http://www.behavior.net/column/bennis/ (Accessed 28/5/00).

Bennett, C. (1993). A staff development model for technological change. In D. Carey, R. Carey, D. A. Willis & J. Willis (Eds.), *Technology and teacher education annual* (pp. 273-278). Charlottesville, VA: Association for the Advancement of Computing in Education.

Bennett, C. K. (1991). Staff development in light of Maslow's theory. *Journal of Staff Development, 12(4),* 10-14.

Bennis, W. (1994). *An invented life: Reflections on leadership and change.* New York: Addison Wesley Longman, Inc.

Bennis, W. (1999). The leadership advantage. *Leader to Leader* [Online] *12*(Spring). Available: http://www.pfdf.org/leaderbooks/121/spring99/bennis.html (Accessed 15/12/99).

Bennis, W. (1999, 1 July). Enter the tender gender. *CIO Magazine,* 8-9.

Bennis, W., & Biederman, P. W. (1998). *Organizing genius : The secrets of creative collaboration* Cambridge, MA: Perseus Press.

Bensaou, M., & Earl, M. J. (1998, Sept/Oct). The right mind-set for managing information technology. *Harvard Business Review*, 119-128.

Blair, T. (1996, April). Computers and children: Partnerships for the future. *The Computer Bulletin* [Online] Special Supplement: IT in schools. Available: www.bcs.org.uk/publicat/ebull/apr96/supp/blair.htm (Accessed 15/12/99).

Bleach, P. (1986). *The use of microcomputers in primary schools* (interim report). England: University of Reading.

Blodgett, M. (1999, 15 May). The CIO starter kit; Ten tools every new CIO needs to succeed. *CIO Magazine.*

Bloom, B. S., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals, by a committee of college and university examiners. Handbook I: Cognitive domain.* New York: Longmans.

Boddy, D. (1998). IT and organizational change. In M. Earl (Ed.), *Information management: The organizational dimension* (pp. 337-346). New York: Oxford University Press.

Bolman, L. G., & Deal, T. E. (1991). Leading and managing: Effects of context, culture and gender. *Education Administration Quarterly 28*(3), 314-329.

Braun, L. (1990). *Vision: TEST (Technology Enriched Schools of Tomorrow): Final Report.* Eugene, OR: The International Society for Technology in Education.

British Telecom (1999). *Heading for the superhighway.* Wetherby: BT Educational Services.

Brookfield, S. D. (1986). *Understanding and facilitating adult learning: A comprehensive analysis of principles and effective practices.* San Francisco: Jossey-Bass.

Brown, A. (1994). Processes to support the use of information technology to enhance learning. *Computers and Education, 22,* 145-153.

Bruder, I. (1990, January). Education and technology in the 1990s and beyond: Visions of the future. *Electronic Learning*, 24-30.

Bruder, I. (1991, March). Schools of education: Four exemplary programs. *Electronic Learning*, 21-24.

Butler, G., & Zwimpfer, L. (1998). *ImpacT 2001 learning with IT: The issues* Wellington, New Zealand: ITAG and ITANZ.

Butler, G. (1996). *ImpacT 2001: How information technology will change New Zealand* Wellington, New Zealand: ITAG and ITANZ.

Camp, T. (1997, October). The incredible shrinking pipeline. *Communications of the ACM*, 103-110.

Camp, T., Miller, K., & Davies, V. (1999). The incredible shrinking pipeline unlikely to reverse. Available: www.mines.edu/fs_home/tcamp/new-study/new-study.html (Accessed 27/04/00).

Carey, D. M. (1993). Teacher roles and technology integration: Moving from teacher as director to teacher as facilitator. *Computers in Schools, 9,* 105-118.

Casey, P. J. (1993). Computing and technology: What an administrator needs to know. In D. Carey; R. Carey, D. A. Willis, J. Willis (Eds.), *Technology and Teacher Education Annual* (pp. 78-82) Charlottesville, VA: Association for the Advancement of Computing in Education.

Chamberlain, J. (1995, December). Computer Crazy. *North and South,* p. 6.

Chandler, D. (1990). The educational ideology of the computer. *British Journal of Educational Technology, 21,* (3) 165-174.

CIO.com. (1999, 8 October). Results of CIO.com's Self-Assessment Survey - Leaders in Action. Available: http://www.cio.com/forums/leadership/quiz3.html (Accessed 15/12/99).

Clemmer, J., & McNeil, A. (1989). *Leadership skills for every manager* London: Piatkus.

Collins, D., & Bostock, S. J. (1993, November). Educational effectiveness and the computer conferencing interface. *Educational and Training Technology International*, 334-342.

Collis, B. (1988). *Computers; curriculum; and whole-class instruction; issues and ideas,* California, USA: Wadsworth.

Cornesky, R. (1992). Leadership versus management. *TQM in Higher Education,* November.

Cottrell, J. (1992). I'm a stranger here myself: A consideration of women in computing. In *Learning from the past, stepping into the future.* ACM SIGUCCS User Services

Conference Cleveland, OH. New York: The Association for Computing Machinery.

Crane, T., & Spoon, A. G. (1999). *The CEO Forum School technology and Readiness Report*. Washington: CEO Forum (33).

Crossman, D. M. (1995). The Internet in higher education. In G. J. Anglin, (Ed.), *Instructional technology: Past, present and future 2nd ed.* (pp. 263-273), Englewood, CO: Libraries Unlimited.

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920,* New York: Teachers College Press.

Cuban, L. (1989). Neoprogressive visions and organizational realities. In *Harvard Educational Review* (pp. 217-222).

Cuban, L. (1993). *How teachers taught: Constancy and change in america classrooms 1890-1990.* New York: Teachers College Press.

Cuban, L. (2000). *So much high-tech money invested, so little use and change in practice: How come?* Paper prepared for the Council of Chief State School Officers' Annual Technology Leadership Conference. Washington, D.C. (January).

Daloz, L. A. (1987). *Effective teaching and mentoring: Realizing the transformational power of adult learning experiences*, San Francisco: Jossey-Bass.

Davenport, T. (1997, 15 September). A meeting of the minds. *CIO Magazine.*

Deal, T., & Kennedy, A. (1988). *Corporate cultures: The rites and rituals of corporate life.* London: Penguin Books.

DeLisi, P. (1998, 29 April). *CEOs look at the IT function.* Paper presented at the CIO Perspectives Conference. Orlando, Florida: CIO.com http://www.cio.com/conferences/perspectives/043098_1.html.

Department for Education and Employment. (1999). *The use of ICT in subject teaching: Expected outcomes for teachers in England, Northern Ireland & Wales*. London, UK.: Department for Education and Employment.

Department of Education, Queensland (1995). *Computers in learning: policy*. Queensland: Studies Directorate.

Doyle, W., & Ponder, G. (1977). The practical ethic and teacher decision making *Interchange* 8(3), 1-12.

Drucker, P. (1964). *Managing for results.* New York: Harper and Row

Earl, M. J. (1996). The chief information officer: Past, present and future. In M. J. Earl (Ed.), *Information management: The organizational dimension* (pp. 456-484). New

York: Oxford University Press.

Earl, M. J. (1999, 15 February). Change isn't optional for today's CIO. *Financial Times* sec. Mastering Information Management.

Fidler, Brian (1997). School leadership: some key ideas, *School Leadership & Management 17*(1), 23-37.

Frederick, H. & McIlroy, D. (1999). *The knowledge economy.* Wellington: ITAG.

Frenkel, K. A. (1990, November). Women and computing, *Communications of the ACM.*

Fullan, M. (1993). *The new meaning of educational change* New York: Teachers College Press.

Gardner, H. (1996). *Leading minds: An anatomy of leadership.* London: Harper Collins Publishers.

Gartner Group Consulting Services. (1996). *Total cost of ownership: Reducing PC/LAN costs in the enterprise.* London: Gartner Group Consulting Services.

Glesne, C. E. (1991). Yet another role? The teachers as researcher. *Action in Teacher Education 13*(1), 7-13.

Goldman, S. R. & Pellegrino, J. W. (1987). Information processing and educational microcomputer technology: Where do we go from here? *Journal of Learning Disabilities 20*(3), 144-154.

Guskey, T. R. (1986, May). Staff development and the process of teacher change. *Educational Researcher,* 5-12.

Hall, G. E., & Hord, S., M. (1987). *Change in schools: Facilitating the process.* Albany, New York: State University of New York.

Hall, G. E., & Loucks, S. (1978). Teacher concerns as a basis for facilitating and personalizing staff development. *Teachers College Record, 80*(1), 36-53.

Hall, G. E., Wallace, R. C. J., & Dossett, W. F. (1973). *A developmental conceptualization of the adoption process within educational institutions.* Austin, Texas: Research and Development Center for Teacher Education, University of Texas.

Hall, G., E., Louckes, S. F., Rutherford, W. L., & Newlove, B. W. (1975). Levels of use of the innovation: A framework for analyzing innovation adoption. *Journal of Teacher Education, 26*(1), 52-56.

Harris, D. (1999). Information and communication technology in the New Zealand educational context. Available: http://www.minedu.govt.nz/Schools/ITinSchools/.

Heck, S., & Goldstein, M. (1980, 7-11 April). *Structured and unstructured approaches to implementation: Who soes the Shoe fit?*. Change strategies; educational innovation; higher education; secondary education; policy formation; programme evaluation; research methodology; progress evaluation presented at the Annual Meeting of the American Research Association. Boston.

Hendricks, J., & Bryant, A. L. (2000). *The CEO Forum School Technology and Readiness Report: The Power of Digital Learning Integrating Digital Content.* Washington: The CEO Forum on Education and Technology (32).

Her Majesty's Inspectorate (1992). *Information Technology in secondary schools.* London: HMSO.

Herrman, A. W. (1988). Teaching teachers to use computers as writing tools *English Education, 20*(4), 215-227.

Hiltz, S. R. (1995, 7-10/3). Teaching in a Virtual Classroom [TM]. 1995 International Conference on Computer Assisted Instruction. ICCAI'95. Hsinchu, Taiwan.

Hiltz, S. R., & Turoff, M. (1993). *The network nation: Human communication via computer.* Cambridge, Massachusetts: MIT Press.

Hodas, S. (1993, September 14). Technology refusal and the organizational culture of schools. *Education Policy Analysis Archives, 1*(10).

Hughes, S. (1997). The Lost generation? The lack of competence in using Information Technology amongst postgraduate students of English entering initial teacher training. *Journal of Information Technology for Teacher Education, 6*(2), 185-204.

Hunt, N. P., & Bohlin, R. M. (1992). Instructional implications of teacher education students' attitudes towards using computers. In D. Carey, R. Carey & J. Willis (Eds.), *Technology and teacher education annual.* Charlottesville, VA, United States of America: Association for the Advancement of Computing in Education.

Hunter, B. (1990, October). Computer-mediated communications support for teacher collaborations: Researching new contexts for both teaching and learning. *Educational Technology*, 46-49.

Information and Communications Technology (ICT) Summit (1998). *Implementing ICT in schools: Goals for 2001.* Wellington, New Zealand: Ministry of Education.

Information Technology Staffing Scoreboard. Available: http://itmweb.com/blbenchstf.htm (Accessed 31 May 2001).

InfoTech Bytes. (1999, 3 May). *InfoTech Weekly.* Wellington, New Zealand.

International Association for the Evaluation of Educational Achievement (IEA) (1991). *A study of computers in New Zealand schools: A report of the IEA computers in education study.* Wellington, New Zealand: Research and Statistics Division, Ministry of Education.

ITAG (1996). *ImpacT 2001: How Information Technology will change New Zealand.* Wellington, New Zealand: Ministry of Commerce.

ITAG (1998). *Strategies for learning with Information Technology in schools: A submission to the New Zealand Government by the Minister of Information Technology's Information Technology Advisory Group.* Wellington, New Zealand: ITAG and ITANZ.

ITAG (1998). *Towards 2001 Information and Communications Technology in New Zealand schools 1993–1998.* Wellington, New Zealand: Ministry of Commerce.

Kanter, R. M. (1999, Summer). The enduring skills of change leaders. *Leader to Leader, 13.*

Kemmis S. & McTaggart, R. (1982). *The action research planner.* Geelong, Australia: Deakin University Press.

Kennewell, S., & Selwood, I. (1997). The professional development needs of secondary school Information Technology Co-ordinators. *Journal of Information Technology for Teacher Education, 6*(3), 339-357.

Kidder, Rushworth M. (1995). *How good people make tough choices.* New York: William Morrow.

Koenig, C. (2000, 1 March). Playing defense. *CIO Magazine*, 1-5.

Korn/Ferry International. (1998). *The changing role of the chief information officer.* London, UK: Korn/Ferry International Financial Times.

Krause, S. (1995, 1/5). "How will this improve student writing?" Reflections on an exploratory study of online and off-line texts. *Computer-Mediated Communication Magazine* [Online], 2(5).

Lai, K.-W. (1996). Computer-mediated communication: A new learning context. In K.-W. Lai (Ed.), *Words have wings: Teaching and learning with computer networks* (pp. 1-17). Dunedin: University of Otago Press.

Lashway, L. (1996, June). Ethical leadership. *ERIC Digest* [Online] 107. Available: http://eric.uoregon.edu/publications/digests/digest107.html (Accessed 3/9/99).

Leithwood, K. & Steinbach, R. (1995). *Expert problem solving: Evidence from school and district leaders.* New York: SUNY.

Levin, D., & Darden, C. (1999). *Report on the Forum on Technology in Education: Envisioning the Future.* Washington, DC: American Institutes for Research.

Liebermann, A. (1995). Practices that support teacher development, *Phi Delta Kappan.* April, 591-596.

Lindeman, E. C. (1962). *The meaning of adult education.* Montreal: Harvest House.

Luftman, J. N. (1996). *Competing in the information age: Strategic alignment in practice.* New York: Oxford University Press.

Male, M. (1988). *Special magic: Computers classroom strategies and exceptional students* Mountain View, CA: Mayfield.

Mallatratt, J. (1990). *A review of the effectiveness of national policies in the UK aimed at providing in-service training support to teachers.* Preston, UK: Lancashire Polytechnic.

Mallatratt, J. (1993). The preparation of teachers to use Information Technology across the curriculum: - a critique of the approaches in England and Wales. In D. C. Johnson & B. Samways (Eds.), *Informatics and changes in learning: Proceedings of the IFIP Tc3-Wg3.1.-Wg3.5 open conference on informatics and changes in learning, Gmunden, Austria, 7-11 June* (pp. 247-252). Amsterdam: Elsevier Science.

March, F. (2000). *Statistics on Information Technology in New Zealand 2000.* Wellington, New Zealand: Ministry of Economic Development.

Markus, M. L. (1999, 15 February). Organising a better IT function. *Financial Times,* sec. Mastering Information Management.

Maslow, A. H. (1968). *Toward a psychology of being* (2nd ed). New York: Harper and Row.

Maslow, A. H. (1970). *Motivation and personality* (2nd ed). New York: Harper and Row.

Mason, A. (1998, February). Magazine articles. Available: www.nzcs.org.nz/magazine/maseduc.htm (Accessed 30/9/99).

McCarthy, P., Barlow, R., & Hunt, J., Sutcliffe, C., & McDonald, N. (1999, January). *Heading for the superhighway.* London, UK: British Telecom.

McClelland, W. A. (1986). *The process of effecting change.* Alexandria, VA: George Washington University: Human Resources Research Office (ERIC Document Reproduction Services No. 015 038).

McDougall, A., & Squires, D. (1997). A framework for reviewing teacher professional development programmes in Information Technology. *Journal of Information Technology for Teacher Education, 6*(2), 115-126.

McGregor, D. (1960). *The human side of enterprise.* New York: McGraw-Hill.

McKenzie, J. (1994, May). From technology refusal to technology acceptance: A reprise. *From Now On.*

McKenzie, J. (1999). *How teachers learn technology best.* Bellingham, Washington: FNO Press.

McKenzie, J. (1999, June). Beware the shallow waters! The dangers of ignoring history and the research on change in schools. *From Now On The Educational Technology Journal* [Online] 8(9). Available: http://fno.org/jun99/teach.html#Anchor 1 (Accessed 21 October 2000).

Mellar, H., & Jackson, A. (1992). IT in post-graduate teacher training. *Journal of Computer Assisted Learning, 8,* 231-243.

Miles, M., Saxl, E. & Lieberman, A. (1988). What skills do educational change agents need? An empirical view. *Curriculum Inquiry 18* (2), 157-193.

Ministry of Education (1990). *Report of the consultative committee on Information Technology in the school curriculum.* Wellington, New Zealand.

Ministry of Education (1994). *Education for the 21st century* Wellington: Learning Media.

Ministry of Education (1999). *Learning technologies planning guide for schools: Using ICT to improve teaching and learning.* Wellington: Learning Media Limited.

NACCQ (1994). *Diploma in computer education.* Hamilton, New Zealand: NACCQ.

New Opportunities Fund (1999). *ICT training for teachers and school librarians: Information for schools.* London, UK.

New Zealand Consultative Committee on Information Technology in the School Curriculum. (1990). *Report of the consultative committee on Information Technology in the school curriculum.* Wellington, New Zealand: Consultative Committee on Information Technology in the School Curriculum.

Noffke, S. E. (1992). Action research and the work of teachers. In R. T. Clift & C. M. Evertson (Eds.), *Focal Points: Qualitative inquiries into teaching and teacher education.* Washington, DC: ERIC Clearinghouse on Teacher Education.

NZCS. (1999). *Guidelines for good practice.* Available: http://nzcs.org.nz/guidelinesgp.htm (Accessed 28/7/99).

Ogawa, R. T. & Bossert, S. T. (1995). Leadership as an organizational quality. *Educational Administration Quarterly, 31*(2), 224-243.

Olson, J. (1988). *Schoolworlds/microworlds – Computers and the culture of the classroom* Oxford: Pergamon Press.

Owens, J. Larry (1996). A survey of computer use in New Zealand schools. *The Research Bulletin* No. 7, 1-10.

Papert, S. (1987). Computer criticism versus technocentric thinking. *Educational Research, 16*(1), 22 - 30.

Pastore, R. (1999). Stranger in a Strange land. *CIO Magazine, 15 June,* 1-12.

PCWeek Magazine (1997). Managing IT: Partnering with service providers to capture competitive advantage. *PCWeek Magazine, 28 April.*

Pearl, A., Pollack, M. E., Riskin, E., Thomas, B., Wolf, E., & Wu, A. (1990). Becoming a computer scientist. *Communications of the ACM, 33*(11), 47-58.

Pedersen, M. L. & Rubenstrunk, K. (1999). The IT leadership vacuum. *CIO Magazine,* 15 September.

Preston, N. (1992). Computing and teaching: A socially critical review. *Journal of Computer Assisted Learning, 8* (1), 49-56.

Riel, M., & Becker, H. (2000, 26 April). *The beliefs, practices, and computer use of teacher leaders.* Paper presented at the American Educational Research Association. New Orleans.

Ritchie, D., & Wiburg, K. (1993). Integrating technologies into the curriculum: Why has it been so slow, and how can we speed it up? In D. Carey, R. Carey, D. A. Willis & J. Willis (Eds.), *Technology and teacher education annual* (pp. 263-272). Charlottesville, VA: Association for the Advancement of Computing in Education.

Robertson, J. (1997). Does permeation work? Promoting the use of Information Technology in teacher education. *Journal of Information Technology for Teacher Education, 6*(2), 169-183.

Roden, J. (1997). Training school leaders to be technology leaders: A modest proposal. In M. Handler & L. Schrum (Eds.), *SITE Annuali* (pp. 5-7).

Roger, W. (2000, June). Man Alone. *North & South*, pp. 32 - 40.

Rogerson, S. (1995). But is IT ethical? *IDPM Journal, 5*(1).

Ryba, K. A. & Anderson, B. (1990). *Learning with computers: Effective teaching strategies,* Eugene, OR: ISTE.

Ryba, K. A. & Chapman, J. W. (1983). Toward improving personal adjustment and learning strategies with computers. *The Computing Teacher, 11*(1), 48 - 53.

Schneider, P. (1999, 1 July). Sense and sensibility. *CIO Magazine*, 1-11.

Scottish Office Education Department (1991). *Effective learning and teaching in Scottish primary schools: the use of the microcomputer.* Edinburgh, Scotland: HMSO.

Selby, L., Ryba, K., & Young, A. (1998). Women in computing: What does the data show? *Journal of Applied Computing and Information technology, 2*(1), 74-81.

Selwood, S. J. (1994). *Information Technology in education : A survey of Hutt Valley teachers.* A survey and report prepared for the Department of Information Technology, Faculty of Commerce Upper Hutt, New Zealand: Central Institute of Technology.

Senge, P. M. (1998, Summer). The practice of innovation. *Leader to Leader.*

Sergiovanni, T. J. (1992). *Moral leadership: Getting to the heart of school leadership* San Francisco: Jossey-Bass.

Shade, L. (1993, 17-19 August). *Gender issues in computer networking.* Community Networking: the International Free-Net Conference. Ottawa, Canada.

Sheingold, K., & Hadley, M. (1990). *Accomplished teachers: Integrating computers into classroom practice.* (Report No. IR 014 677). New York, NY: Center for Technology in Education, Bank Street College of Education. (ERIC Document Reproduction Service No. Ed 322 900).

Spertus, E. (1991). *Why are there so few female computer scientists?* (MIT Artificial Intelligence Laboratory No. 1315). Cambridge, MA: MIT Artificial Intelligence Laboratory.

Starratt, R. J. (1991, May). Building an ethical school: A theory for practise in educational *Leadership Educational Administration Quarterly, 27*(2), 185-202.

Strudler, N. B., & Gall, M. D. (1988). Overcoming impediments to microcomputer implementation in the classroom. Paper presented to the Annual Meeting of the American Educational Research Association. New Orleans. ED 298 938.

Strudler, N. B., & Powell, R. J. (1993). Preparing teacher leaders and change agents for technology in education. In D. Carey, R. Carey, D. A. Willis & J. Willis (Eds.), *Technology and Teacher Education Annual* (pp. 321-326). Charlottesville, VA: Association for the Advancement of Computing in Education.

Stuart, A. (1995). The new IS role models. *CIO Magazine,* 15 May.

Sullivan, C., Allan, J., & Paul, N. (1998). *IT in schools 1998.* Wellington, New Zealand: ITAG.

Tagg, B. (Ed.) (1995). *Developing a whole school IT policy.* London: Pitman.

Turoff, M. (1995, 7-10/3). Designing a virtual classroom. Paper presented to the 1995 International Conference on Computer Assisted Instruction ICCAI'95. Hsinchu, Taiwan.

Vockell, E., & Sweeney, J. (1994). How do teachers who use computers competently differ from other teachers? *Journal of Computing in Teacher Education, 10*(2), 24-31.

Wallingford, P. M. (2000, 1 April). Making change: The man with the plan. *CIO Magazine,* 1-5.

Watson, G. (1997). Pre-service teachers' views on their Information Technology education. *Journal of Information Technology for Teacher Education, 6*(3), 255-270.

Wells, A. (1999a). Capital schools NZ's 'most wired', *NZInfotech Weekly,* 15 February.

Wells, A. (1999b). "It's a fun opportunity for communities, schools and businesses to work together to enhance computer systems in New Zealand's schools." Telecom to sponsor NetDay, *NZInfotech Weekly,* 19 April.

Wenmouth, D. (1996). Learning in the distributed classroom. *Set, 2,* 1-4.

Wheatley, M. J. (1999). When complex systems fail: New roles for leaders. *Leader to Leader,* No. 11.

Zirgami, P., Betz, L. & Jensen, D. (1977). Teachers' preferences in and perceptions of inservice. *Educational Leadership, 37,* 374-378.

GLOSSARY

Accreditation The accreditation process checks that an establishment is capable of operating its own quality management system and meeting its obligations to NZQA and relevant industry groups e.g. meeting moderation requirements. NQF accreditation checks whether an establishment, through its systems for the management of quality, has the capability to assess against unit standards within specified fields.

ADITE *Advanced Diploma of Information Technology in Education. (AdvDipITEd)* A qualification offered by the Central Institute of Technology for teachers holding or aspiring to hold leadership positions in IT in schools.

Aotearoa Maori word for New Zealand.

APNZ The *Association of Polytechnics in New Zealand* (APNZ) is the organisation that acts as the collective voice for the 23 polytechnics and institutes of technology in New Zealand. It represents a partnership of both the chief executives and the councils of these institutions. It does not exercise any control or authority over them, but acts as the mouthpiece for promotional and political campaigns that benefit the sector as a whole. APNZ develops, confirms and promulgates policy on behalf of its members; ensures effective advocacy and academic quality; provides an effective communication framework and support service for its members; and helps establish and maintain relations with tertiary organisations and institutions from overseas.

Area School (see Composite School).

ASTE The *Association of Staff in Tertiary Education* (ASTE Te Hau Takitini o Aotearoa) is a professional and industrial association, which represents employees in all spheres of the

tertiary education sector throughout New Zealand.

bang for the buck, more Also, sometimes ***more bounce for the ounce.*** This expression means more value for one's money, or a greater return on an investment. The term apparently originated in the late 1960s in the military for expenditures for firepower and soon was extended to mean an increased financial return or better value. The variant originated in the mid-1900s as an advertising slogan for a carbonated soft drink. The phrase is commonly used in the Information Technology industry in relation to the purchase of computing equipment.

Boards of Trustees (BoT) Locally elected boards that govern state and state integrated schools. Boards establish a charter, which sets out the aims and objectives of the school

CD-ROM Pronounced *see-dee-rom,* abbreviation of ***Compact Disc-Read-Only Memory.*** A type of optical disk capable of storing large amounts of data -- up to 1GB, although the most common size is 650MB (megabytes). A single CD-ROM has the storage capacity of 700 floppy disks.

To read a CD, you need a CD-ROM player. All CD-ROMs conform to a standard size and format, so you can load any type of CD-ROM into any CD-ROM player. In addition, CD-ROM players are capable of playing audio CDs, which share the same technology.

CD-ROMs are particularly well suited to information that requires large storage capacity. This includes colour large software applications, graphics, sound, and especially video.

CEO ***Chief Executive Officer.*** The executive with the chief decision-making authority in an organisation or business. This person is typically responsible to a company's board of directors for carrying out its policies. Essentially, the CEO is the highest-ranking executive managing the firm on a day-to-day basis

CFO *Chief Finance Officer.* The executive with the main decision-making authority for financial matters within an organisation or business. The USA *CFO Act of 1990* legislated broad authority for each CFO to "...oversee all financial management activities relating to the programs and operations of the agency..." This encompasses the authority to ensure that all organisational components of the agency apply sound financial management practices and use modern automated financial systems and tools. It also introduces the expectation that all elements of the agency having any responsibility for financial management, regardless where they reside, be equal and contributing partners on the financial management team. This unified performance can be difficult to achieve, considering differences in mission, responsibility, budget, staff size, etc., among Federal agencies and the differences among individual agency components.

CIO *Chief Information Officer.* The Chief Information Officer (CIO) is accountable for directing the information and data integrity of the enterprise and its groups and for all Information Service functions of the enterprise, including all data centres, technical service centres, production scheduling functions, help desks, communication networks (voice and data), computer program development and computer systems operations. The CIO is responsible for maintaining the integrity of all the electronic and optical books and records of the enterprise. This includes the review of computerised and manual systems; information processing equipment and software for acquisition, storage and retrieval; and the definition of the strategic direction of all information processing and communication systems and operations. This person provides over all management and definition of all computer and communication activities within the enterprise

including responsibility for providing a leadership role in the day to day operations of the Information Services functions as well as providing direction as the enterprise grows through internal growth and external acquisition. It is the responsibility of the CIO to provide technology vision and leadership for developing and implementing IT initiatives that create and maintain leadership for the enterprise in a constantly changing and intensely competitive marketplace.

A CIO needs to have:

- Strong business orientation (broad experience in our industry sector managing IT or related activities a plus (i.e., consulting or vendor in our industry)
- Demonstrated ability to bring the benefits of IT to solve business issues while also managing costs and risk
- Skilled at identifying and evaluating new technological developments and gauging their appropriateness for the business
- Ability to communicate with and understand the needs of non-technical internal clients
- Strong organisational skills and manage central IS resource and applications as well as co-ordinate SBU/divisional resources and initiatives
- Ability to conceptualise, launch and deliver multiple IT projects on time and within budget.
- Ability to mesh well with the existing management team by being a good listener, a team builder and an articulate advocate of their IT vision. (Refer also to http://www.cio.com/forums/executive/psr_description.html for further information).

CIT — *Central Institute of Technology.* One of New Zealand's Polytechnics which has its main campus at Heretaunga in the Hutt River valley north of Wellington.

CKO — *Chief Knowledge Officer.* . The Chief Knowledge Officer (CIO) is relatively new management position and typically this person holds a senior position within an organisation and has the responsibility for managing the organisation's initiatives to transform organisational information into knowledge. Among some of the key tasks of CKOs include:

- Setting knowledge management strategic priorities.
- Establishing a knowledge database of best practice.
- Gaining the commitment of senior executives to support a learning environment.
- Teaching information seekers how to ask better and smarter questions of their intelligence resources.
- Putting in place processes for managing intellectual assets
- Obtaining customer satisfaction information in near real-time.

Colleges of Education — Main providers of teacher training

Composite Schools — Offer education to students at both the primary and secondary levels (Years 1-15).

Contributing Schools — Offer education to students up to the intermediate level of schooling (Years 1 - 6).

COO — *Chief Operating Officer.* The executive with the main decision-making authority for general operational matters within an organisation or business.

CTO — *Chief Technical Officer.* The executive with the main

decision-making authority for technical matters within an organisation or business. This would be a typical position within for example a telecommunications company.

DP Short for ***Deputy Principal*** and pronounced as separate letters. A position of responsibility in New Zealand schools. Typically this position is the next most senior after the Principal.

DVD Short for ***digital versatile disc*** or ***digital video disc*** and pronounced as separate letters, a new type of CD-ROM that holds a minimum of 4.7GB (gigabytes), enough for a full-length movie.

The DVD specifications support disks with capacities of from 4.7GB to 17GB and access rates of 600KBps to 1.3MBps. One of the best features of DVD drives is that they are backward-compatible with CD-ROMs. This means that DVD players can play old CD-ROMs, CD-I disks, and video CDs, as well as new DVD-ROMs. Newer DVD players can also read CD-R disks.

Education Review Office (ERO) Government agency responsible for reviewing and reporting regularly on the performance of NZ schools and early childhood centres

Effectiveness One of the two main criteria for measuring a manager's performance. Often referred to in terms of *Doing the right thing*, which involves an ability to choose appropriate objectives. (Drucker, 1964).

Efficiency One of the two main criteria for measuring a manager's performance. A means of measuring the cost of attaining a particular goal; often referred to in terms of *doing things right* (Drucker, 1964).

EFT Short for ***Equivalent Full Time*** and pronounced as separate letters. Abbreviation normally used as a means of measuring

	the funding entitlement of New Zealand tertiary education institutions that is based on the notion of an equivalent full time student.
Equivalent Full-time Students (EFTS)	An EFTS is a method of counting tertiary student numbers. The basis of the EFTS system is that a student taking a normal year's full-time study equals 1.0 EFTS unit and the courses taken by part-time students are fractions of one EFTS unit.
Everest Syndrome	This is a reference to George Leigh Mallory, one of the most prominent of the British pre-war Everest pioneers, and his famous explanation of why he wanted to climb Mount Everest. Apparently Mallory was on a lecture tour, after his 1922 Everest expedition, trying to raise money for the 1924 attempt. Everywhere he went, he was inundated with mundane questions such as, Was it cold? Where is Tibet? Why do you want to climb Everest? In exasperation, in a hurry, he spoke the words that will always be associated with Everest, "*Because It's There*". The Everest Syndrome therefore may be applied to something that is done merely because it is possible to do it – "Because it's there".
Full Primary Schools	Offer education to children up to Year 8 (see Year of Schooling).
Futz Factor	An expression used by the Gartner Group and other organisations the "futz factor," refers to the time employees waste fiddling with changing fonts and background colours, adding applications, and similar such activities that may have some intrinsic appeal to employees, but which do not usually contribute to productivity. It is one of the aspects that contributes to the notion of the *Total Cost of Ownership* (TCO) of computers.

Gartner Group Group of companies founded in 1979 and headquartered in Stamford, Connecticut, USA. The intention of this group is to help clients to achieve their business objectives through the intelligent and efficient use of technology and to help technology companies identify and maximize technology market opportunities. Gartner has 4,600 associates, including 1,400 research analysts and consultants, and is located in more than 80 locations worldwide.

GDITE *Graduate Diploma of Information Technology in Education* a qualification offered by The Waikato Polytechnic. Details about the programme leading to this qualification can be obtained from: http://www.twp.ac.nz/progregs/GDipITE.htm

HoD Short for *Head of Department* and pronounced as separate letters. A position of responsibility in New Zealand schools, especially secondary schools. Usually an HoD has responsibility for a team of teachers who deliver a particular area of the curriculum e.g. English or Science.

HTML Short for *HyperText Markup Language* and pronounced as separate letters, the authoring language used to create documents on the World Wide Web. HTML defines the structure and layout of a Web document by using a variety of tags and attributes.

ICT Short for *Information and Communication* Technology and pronounced as separate letters.. A term commonly used in New Zealand education that has a very similar meaning to Information Technology, which is customarily used to cover both the communication and information technologies.

Informatics	The formal study of information--its structure, functions, properties, and the technology used to record, organize, store, retrieve, and disseminate it
Information Management	Responsibility for organisation-wide information policy planning, the development and maintenance of integrated systems and services, the optimisation of information flows and the harnessing of leading edge technologies to the functional requirements of end-users, whatever their status or role within the organisation. An information manager will have a central role in designing, implementing, and when necessary monitoring and updating information systems, and the exploitation of information systems in appropriate decision-making.
Information Science	A branch of knowledge or the science that investigates the sources, development, dissemination, use, and management of information in all its forms and as such is concerned with the gathering, manipulation, classification, storage, and retrieval of recorded knowledge
Information Technology	The broad subject concerned with all aspects of managing and processing information, especially within a large organisation or company. Because computers are central to information management, computer departments within companies and universities are often called *IT Departments.* Information Technology includes the traditional data processing industries, as well as the telecommunications and broadcasting areas. This reflects the fact that these industries process information using technological means, and the increasingly blurred distinctions between these sectors.

In-service training Classes for teachers that help a school staff reach specific goals. (Compare to staff development). This form of training is distinct from pre-service training that refers to the training given to people who have not yet qualified to become teachers.

Intermediate A particular type of primary school in New Zealand that offers education to Year 7 and 8 students only.

Intranet A network operating like the World Wide Web but having access restricted to a limited group of authorised users such as employees of a company

IS Pronounced as separate letters, and short for ***Information Systems*** or ***Information Services***. For many companies, *IS* is the name of the department responsible for computers, networking and data management. Other companies refer to the department as *IT (Information Technology)* and *MIS (Management Information Services).*

In slightly different contexts may also refer to Information Security, International Standard, Information Security, Information Science, or Internet Service

ISP Pronounced as separate letters, and short for ***Internet Service Provider***. A company in the business of providing access to the Internet to computer users who do not have a direct connection. This link is usually via a telecommunication channel e.g. telephone line, in exchange for payment of a low monthly fee. **ISP**s also provide software for Internet users, which is often proprietary.

ISTE ***International Society for Technology in Education***. The society that was formed in 1989 by the merger of the International Council for Computers in Education (ICCE) and the International Association for Computing in Education. It is a professional organisation for educators who use computers and is dedicated to the improvement of

education through the use and integration of technology.

It publishes *The Computing Teacher* journal, *Update* newsletter, the *Journal of Research on Computing in Education*, the journals and newsletters of several Special Interest Groups, and ISTE books and courseware.

IT Short for *Information Technology,* and pronounced as separate letters. See also Information Technology.

ITAG *Information Technology Advisory Group*. Pronounced "*eye-tag*". Group of people appointed by the Minister for Information Technology to provide the Minister with advice on Information Technology matters.

ITANZ ITANZ pronounced "*eye-tanz*" is the Information Technology Association of New Zealand. It is the New Zealand national association of organisations involved in the development, production, marketing and support of goods and services related to the processing of information. ITANZ works to improve the business climate in the interests of all suppliers through its role, vision and mission. It's members are drawn from the following main groups:

- suppliers of equipment in computing and telecommunications;
- software developers and suppliers;
- providers of professional and educational IT services;
- network operators and suppliers of value added services

The Association's mission is:

To promote the New Zealand IT industry to encourage:

- the widest possible participation from New Zealanders in the use of IT;

- the provision of essential productivity and efficiency tools, on which all industries depend;
- the generation of innovation, investment and employment; the promotion of growth in exports of IT products and services through the use and integration of IT;
- the adoption of international standards and quality management practices; and to represent and focus on the interests of its members in the ongoing development of the industry.

Kindergarten An early childhood institution which provides sessional programmes for mainly three and four-year-old children.

LAN *Local Area Network.* A computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings. However, one LAN can be connected to other LANs over any distance via telephone lines and radio waves. A system of LANs connected in this way is called a wide-area network (WAN).

Most LANs connect workstations and personal computers. Each node (individual computer) in a LAN has its own CPU with which it executes programs, but it is also able to access data and devices anywhere on the LAN. This means that many users can share expensive devices, such as laser printers, as well as data. Users can also use the LAN to communicate with each other, by sending e-mail or engaging in chat sessions.

Militate From the Latin *militatus,* past participle of *militare* meaning to engage in warfare. Now more commonly meaning "to have weight or effect" <his boyish appearance *militated* against his getting an early promotion>.

Ministry of Economic Development

On 29 February 2000, the Ministry of Economic Development came into being. The Ministry plays an active role with government in fostering business and lifting the New Zealand economy. They will be aided in this by Industry New Zealand, a Crown Entity to deliver Industry and Regional Development Policy. A private sector board will manage Industry New Zealand, which is currently being established.

The Ministry of Economic Development facilitates, leads and implements the Coalition Government vision for economic development.

Ministry of Education

The New Zealand Ministry of Education was established by Act of Parliament in 1989 and replaced the former Department of Education. Also known as MoE.

MIS

Short for ***Management Information System*** or ***Management Information Services,*** and pronounced as separate letters. Typically it is an information system designed to provide financial and quantitative information to all the levels of management in an organisation. Most modern management information systems provide the data from an integrated computer database, which is constantly updated from all areas of the organisation in a structured way. Access to the data is usually restricted to the areas regarded as useful to particular managers, access to confidential information is limited to top management.

Within companies and large organisations, the department responsible for computer systems is sometimes called the MIS department. Other names for MIS include *IS*

(Information Services) and *IT (Information Technology).*

Companies often use MIS to achieve competitive advantage through the intelligent application of Information Technology (IT), including computer hardware and software. Other important information resources include people, procedures, data, information, and knowledge. The objective of MIS is to deliver the right information in the right form and format to the right people at the right time. Tertiary education MIS programmes typically include the study of database management, decision support systems, telecommunications, systems analysis and design, and other IT topics such as multimedia, expert systems, the web, electronic commerce, and so forth.

NACCQ

National Advisory Committee on Computing Qualifications. The Computing and Information Technology subject forum of the Association of Polytechnics in New Zealand Its objects include:

- To offer support and advice to APNZ and the polytechnic sector in relation to the field of Computing and Information Technology.
- To negotiate with the appropriate Government agencies on issues relating to the field of Computing and Information Technology.
- To co-ordinate information relating to the field of Computing and Information Technology.
- To promote the teaching, learning, research and development in the field of Computing and Information Technology
- To coordinate the partnership of industry and Polytechnics in the field of Computing and Information Technology.

- To take over the assets of the existing committee known as the National Advisory Committee on Computing Qualifications
- To maintain a high quality of Polytechnic graduates for industry in the field of Computing and Information Technology.
- To contribute (on behalf of Polytechnics/APNZ) to the development of prescriptions for vocational computing and information technology courses in New Zealand.
- To contribute (on behalf of Polytechnics) to the maintenance of the relevance of developed prescriptions to meet the changing requirements of the New Zealand Computer and Information Technology industry by suggesting timely changes to programme prescriptions in response to industry developments. A full review of such programmes to be carried out at least every two years, utilising appropriate external expertise to maintain the quality of programmes.
- To provide a central support for training providers offering these programmes.
- To liaise with the New Zealand Qualifications (NZQA) and other relevant national bodies (for example the New Zealand Computer Society) over national issues relating to these courses (for example course approval, accreditation, moderation, assessment, professional registration etc), in conjunction with APNZ.
- To support the availability of a full range of vertically integrated vocational computing qualifications for New Zealand.
- To ensure co-operation and effective communication between industry and training providers is achieved.

- To offer guidance and advice on programme management.
- To co-ordinate the development of teaching resources for the use of academic staff.
- To encourage national and international recognition of the qualifications.

nous Pronounced *nüs* also *naus*. A chiefly british expression meaning good sense or shrewdness.

NZ New Zealand.

NZ Curriculum Framework The foundation policy statement covering teaching, learning, and assessment for all students in NZ schools.

NZCS *New Zealand Computer Society.* The New Zealand Computer Society (NZCS) is the professional society for people working in the information technology industry. The vision of the Society is "Inspiring Computer People to Professional Excellence" and their aim is to support IT professionals and their organisations in their quest for success in the information technology industry.

NZEAS *New Zealand Educational Administration Society.* NZEAS is a professional body that provides support and professional development for educational leaders across all sectors. It is a national organisation with branches covering most parts of New Zealand and links with kindred organisations throughout the world.

NZEI *New Zealand Educational Institute* Te Riu Roa (NZEI) is a professional and industrial education union representing some 34 000 staff employed in primary, secondary and area schools, early childhood centres, Specialist Education Services and colleges of education.

NZPF *The New Zealand Principals' Federation Incorporated.* An association open to all New Zealand school principals but which is supported more by primary school principals. The objects of NZPF are to:

- Uphold the status of the Principal as the School Manager
- Examine the developing needs of its members individually and collectively, and respond appropriately
- Promote the development of its members professional leadership and management skills
- Ensure recognition as a professional organisation actively representing the
- special interests of its members
- Maintain a liaison with the kindred organisations
- Respect and recognise the Principles of the Treaty of Waitangi in the context of the objects of the Federation

NZPPC *New Zealand Polytechnics Programmes Committee* (NZPPC), although part of APNZ operates independently of APNZ and has its own secretariat. NZPPC provides accreditation and programme approval services to polytechnics and institutes of technology. The accreditation process is administered by the New Zealand Qualifications Authority and its agents. Agents for the Qualifications Authority include the New Zealand Polytechnic Programmes Committee (NZPPC) who are responsible for accreditation in polytechnics. The Colleges of Education have their own accreditation body, the Colleges of Education Accreditation Committee (CEAC).

NZQA *New Zealand Qualifications Authority.* The New Zealand Qualification Authority is an independent body that co-ordinates qualifications in secondary schools and in post-school education and training, maintains national standards,

ensures recognition of overseas qualifications and administers national secondary and tertiary examinations. The New Zealand Qualifications Authority is a Crown Entity established under the Education Act 1989. The Authority is appointed by the Minister of Education, and is accountable through the Minister to Parliament.

NZSTA *New Zealand School Trustees Association.* Refer also STA.

PC Short for ***Personal Computer*** or IBM PC. The first personal computer produced by IBM was called the *PC*, and increasingly the term PC came to mean IBM or IBM-compatible personal computers, to the exclusion of other types of personal computers, such as Macintoshes.

In recent years, the term *PC* has become more and more difficult to pin down. In general, though, it applies to any personal computer based on an Intel microprocessor, or on an Intel-compatible microprocessor. For nearly every other component, including the operating system, there are several options, all of which fall under the rubric of PC

Playcentre An early childhood institution that is collectively supervised and managed by parents for children aged between 0 and 5 years

Polytechnic Polytechnic is the generic name for the tertiary education sector that comprises the 23 (as June 2000) Polytechnics and Institutes of Technology in New Zealand. Polytechnics and Institutes of Technology deliver technical, vocational and professional education. They offer programmes at all levels - community interest courses, certificates, diplomas, degrees and some post-graduate opportunities. Some also deliver the first one or two years of selected university degree programmes.

Post-primary	The area of schooling in New Zealand that follows primary schools. Also known as Secondary schooling. In New Zealand education is often referred to as covering four main areas: pre-school, primary, secondary and tertiary.
PPTA	The ***Post Primary Teachers' Association*** Te Wehengarua is the professional body which represents teachers in secondary, area and intermediate schools, technicraft centres, community education and itinerant music positions.
PricewaterhouseCoopers	An international company offering six main lines of service: Audit, Assurance and Business Advisory Services; Global Human Resource Solutions; Management Consulting Services; Business Processing outsourcing; Global Tax services; Corporate Finance and Recovery Services.
Program	An organised list of instructions that, when executed, causes the computer to behave in a predetermined manner. Without programs, computers are useless. A program is like a recipe. It contains a list of ingredients (called variables) and a list of directions (called statements) that tell the computer what to do with the variables. The variables can represent numeric data, text, or graphical images.
Programme	A series of papers or course normally leading to a formal recognised academic qualification.

Schmoozing	From the Yiddish *shmuesn,* from *schmues* talk, from Hebrew *shemu'Oth meaning* news, or rumour. Now typically meaning "to converse informally or chat". Often associated with social networking and generally keeping in touch with what is going on, especially within an organisation or sphere of activity or interest.
Socio-Economic Decile	The Ministry of Education gives all schools in New Zealand a Targeted Funding Educational Achievement (TFEA) decile number, depending on the socio-economic status of the area they serve. Schools with lower decile numbers are allocated higher funds to help children from low socio-economic areas to achieve better.
Socio-Economic Decile Band	All schools in New Zealand are given a Targeted Funding Educational Achievement (TFEA) decile number, depending on the socio-economic status of the area they serve. Schools with lower decile numbers are allocated higher funds to help children from low socio-economic areas to achieve better..
Software	Computer instructions or data. Anything that can be stored electronically is software. The storage devices and display devices are hardware. The distinction between software and hardware is sometimes confusing because they are so integrally linked. Clearly, when you purchase a program, you are buying software. But to buy the software, you need to buy the disk (hardware) on which the software is recorded.

SPANZ *Secondary Principals' Association of New Zealand Inc.*

SPANZ is an autonomous national association for secondary school principals, that wishes to advance education through professional leadership, support and advocacy.

The goals of the Association are:

To promote the development of competent, well-informed and confident secondary principals by:

- Providing a range of educational conferences, seminars and other forums for professional exchange
- Developing a comprehensive information-sharing network
- Promoting the development of skills and qualifications for principals and prospective principals
- Maintaining links with international principals' groups

To support the professional and personal well-being of members by

- Advocating remuneration and conditions of service appropriate to the responsibilities that principals carry
- Promoting effective Principal/Board working relationships
- Providing professional and legal advice to members
- Fostering a collegial support network for members
- To initiate and participate in educational debate and policy development by
- Consulting effectively with members
- Representing principals in educational and public

forums

- Maintaining wide, regular contact with education groups and agencies
- Building linkages with relevant groups

STA

School Trustees Association. More correctly it is the New Zealand School Trustees Association (NZSTA), which is a national organisation that represents the views of, and provides services to, member boards of trustees. Membership is voluntary and most of the eligible primary and secondary boards are members.

The key areas of activity of the Association are:

- representation to central government and other agencies of the views of member boards of trustees
- production of a monthly magazine [*STAnews*], and other written material, including the NZSTA *Trustee Handbook,* An Introduction to Trusteeship *[A Guide for School Trustees]* and various employment related publications
- the provision of an expert personnel/industrial relations advisory service to boards of trustees
- provision of 0800 helpdesk facilities, on all aspects of trusteeship
- provision of "added value" services for member boards of trustees
- the provision of training for boards of trustees.

TCO Abbreviation of ***Total Cost of Ownership,*** a very popular buzzword representing how much it actually costs to own a PC. The TCO includes:

- Original cost of the computer and software
- Hardware and software upgrades
- Maintenance
- Technical support
- Training

Most estimates place the TCO at about 3 to 4 times the actual purchase cost of the PC. The TCO has become a rallying cry for companies supporting network computers. They claim that not only are network computers less expensive to purchase, but the TCO is also much less because network computers can be centrally administered and upgraded. Backers of conventional PCs, especially Microsoft and Intel, have countered with Zero Administration for Windows (ZAW), which they claim will also significantly reduce TCO.

TEF ***Telecom Education Foundation.*** Telecom (New Zealand) set up the Telecom Education Foundation in 1993 in an endeavour to make sure that children learn how to use the new technologies to prepare them for life and work in the online age. Telecom regards the money it spends through TEF as part of its commitment to helping schools provide quality education through the use of Information Technology. Each year, the Telecom Education Foundation offers teachers a framework for classroom activities using technologies such as the Internet, e-mail, faxing and audioconferencing.

Tertiary Education The third level of education, that which follows secondary and primary education. In New Zealand tertiary education includes education provided by Universities, Institutes of Technology, Polytechnics and Colleges of Education.

Tertiary Educational Institutions (TEI) A university, college of education, polytechnic or wananga as defined by the Education Act 1989. The term excludes other post-secondary institutions, such as private training establishments

TIC *Teacher In-Charge.* A title for position of responsibility. Customarily this would mean that the teacher concerned has a particular responsibility but not for a department of syndicate.

Treaty of Waitangi (Tiriti O Waitangi) The Treaty of Waitangi (Tiriti O Waitangi) is seen as the founding document of the nation of New Zealand. Representatives of the British Crown and Mäori chiefs signed the Treaty in 1840.

TUANZ *TUANZ* – Pronounced *"two-anz". The Telecommunications Users Association of New Zealand Incorporated* - is a non profit incorporated society which was formed in 1986 with over 450 members including major NZ corporations, small to large businesses, government departments, educational institutions and interested individuals

The Association's purpose is to lead informed, sophisticated usage of technology-based communications by business

Their mission is to realise this purpose by:

- Providing quality written information to business users Giving them opportunities for informal communication
- Being a strong, effective advocate to government and industry for them
- Encouraging and supporting the activities of special interest groups

The Association's vision focuses on ensuring that:

- The user has real choice and receives real
- The New Zealand telecommunications environment is a source of competitive advantage to New Zealand business Social obligations are met, and the industry has a purpose beyond short term profit

University A tertiary institute awarding academic degrees and undertaking research and postgraduate training.

Wananga Provide programmes at the post-secondary level especially for Maori with an emphasis on the application of knowledge regarding *ahuatanga Maori* (Maori tradition) according to *tikanga Maori* (Maori custom).

Web Shortened form of World Wide Web (WWW).

World Wide Web A system of Internet servers that support specially formatted documents. The documents are formatted in a language called HTML (***HyperText Markup Language***) that supports links to other documents, as well as graphics, audio, and video files. This means you can jump from one document to another simply by clicking on hot spots. Not all Internet servers are part of the World Wide Web.

WWW Abbreviation for ***World Wide Web***.

Year of Schooling Measures the number of years of schooling a student has received and provides the Ministry of Education with a method of counting students for funding and staffing purposes. There are 15 years of schooling in New Zealand. Years 1-8 represents primary schooling and Years 9-15 represents secondary schooling.

Appendix A

Part A Questions	% Response in Each category					Weighted Values (Obtained by Multiplying each category of Response by a weighting factor: 1 * 400; 2 * 300; 3 * 200; 4 * 100)				Sum of Weighted Values (Sum of Calculated Weighted Values)	Question
	1	2	3	4	No answer	1	2	3	4		
1	81.8%	18.2%	0.0%	0.0%	0.0%	327.2727	54.54545	0	0	381.8182	Efficiently implementing ICT
2	24.2%	48.5%	24.2%	0.0%	3.0%	96.9697	145.4545	48.48485	0	290.9091	Building a top-notch ICT staff
3	33.3%	48.5%	18.2%	0.0%	0.0%	133.3333	145.4545	36.36364	0	315.1515	Developing leaders within the ICT staff
4	33.3%	36.4%	15.2%	12.1%	3.0%	133.3333	109.0909	30.30303	12.12121	284.8485	Building the ICT department's reputation for value and service
5	42.4%	45.5%	9.1%	3.0%	0.0%	169.697	136.3636	18.18182	3.030303	327.2727	Prioritising the investment in equipment, software, infrastructure...
6	54.5%	36.4%	9.1%	0.0%	0.0%	218.1818	109.0909	18.18182	0	345.4545	Aligning ICT with school/education goals
7	51.5%	36.4%	9.1%	0.0%	3.0%	206.0606	109.0909	18.18182	0	333.3333	Satisfying internal customers' needs
8	12.1%	39.4%	27.3%	18.2%	3.0%	48.48485	118.1818	54.54545	18.18182	239.3939	Networking/schmoozing with other senior staff
9	72.7%	21.2%	6.1%	0.0%	0.0%	290.9091	63.63636	12.12121	0	366.6667	Educating staff about ICT and its possibilities
10	15.2%	48.5%	36.4%	0.0%	0.0%	60.60606	145.4545	72.72727	0	278.7879	Networking in the educational or HOD - ICT community
11	0.0%	27.3%	36.4%	33.3%	3.0%	0	81.81818	72.72727	33.33333	187.8788	Studying the competition and its us of ICT
12	69.7%	21.2%	6.1%	0.0%	3.0%	278.7879	63.63636	12.12121	0	354.5455	Developing and implementing a strategic plan
13	39.4%	51.5%	9.1%	0.0%	0.0%	157.5758	154.5455	18.18182	0	330.303	Identifying new opportunities made possible by ICT
14	3.0%	33.3%	36.4%	21.2%	6.1%	12.12121	100	72.72727	21.21212	206.0606	Identifying competitive threats and disrupters
15	36.4%	42.4%	15.2%	3.0%	3.0%	145.4545	127.2727	30.30303	3.030303	306.0606	Reacting to change
16	3.0%	18.2%	39.4%	36.4%	3.0%	12.12121	54.54545	78.78788	36.36364	181.8182	Influencing and anticipating the moves of the technology vendors
17	6.1%	48.5%	30.3%	12.1%	3.0%	24.24242	145.4545	60.60606	12.12121	242.4242	Building strategic partnerships with ICT vendors
18	42.4%	9.4%	15.2%	0.0%	3.0%	169.697	118.1818	30.30303	0	318.1818	Keeping tight rein on expenses
19	18.2%	0.0%	0.0%	3.0%	78.8%	72.72727	0	0	3.030303	75.75758	

Appendix B

Part A Questions	Number of Responses in Each Category					% of Responses in Each Category				
	1	2	3	4	No answer	1	2	3	4	No answer
1	27	6	0	0	0	81.82%	18.18%	0.00%	0.00%	0.00%
2	8	16	8	0	1	24.24%	48.48%	24.24%	0.00%	3.03%
3	11	16	6	0	0	33.33%	48.48%	18.18%	0.00%	0.00%
4	11	12	5	4	1	33.33%	36.36%	15.15%	12.12%	3.03%
5	14	15	3	1	0	42.42%	45.45%	9.09%	3.03%	0.00%
6	18	12	3	0	0	54.55%	36.36%	9.09%	0.00%	0.00%
7	17	12	3	0	1	51.52%	36.36%	9.09%	0.00%	3.03%
8	4	13	9	6	1	12.12%	39.39%	27.27%	18.18%	3.03%
9	24	7	2	0	0	72.73%	21.21%	6.06%	0.00%	0.00%
10	5	16	12	0	0	15.15%	48.48%	36.36%	0.00%	0.00%
11	0	9	12	11	1	0.00%	27.27%	36.36%	33.33%	3.03%
12	23	7	2	0	1	69.70%	21.21%	6.06%	0.00%	3.03%
13	13	17	3	0	0	39.39%	51.52%	9.09%	0.00%	0.00%
14	1	11	12	7	2	3.03%	33.33%	36.36%	21.21%	6.06%
15	12	14	5	1	1	36.36%	42.42%	15.15%	3.03%	3.03%
16	1	6	13	12	1	3.03%	18.18%	39.39%	36.36%	3.03%
17	2	16	10	4	1	6.06%	48.48%	30.30%	12.12%	3.03%
18	14	13	5	0	1	42.42%	39.39%	15.15%	0.00%	3.03%
19	6	0	0	1	26	18.18%	0.00%	0.00%	3.03%	78.79%

Appendix C

Main Research Questions

Research Question 1

What form of qualification and training is most appropriate for teachers with responsibilities for ICT in schools?

Research Question 2

What are the leadership and management needs of schools in the area of Information and Communications Technology?

Research Question 3

What sort of management culture might be most appropriate for schools to adopt so that they can optimise the effectiveness of their ICT investment?

Research Question 4

What are the perceptions of Principals about the qualities needed in the people with IT management responsibilities in Schools?

Research Question 5

What are the perceptions of CIOs about the qualities needed in the people with IT management responsibilities in business and how does the management of IT in business compare with the way it is managed in schools?

Appendix D

Interview Questions for Principals

(These are the main questions though some additional questions may be asked to extend or clarify a response)

A Leadership Qualities

1 What are the most important personal qualities and skills that the person having the primary responsibility for Information Technology in a school should possess and why do you rate them so highly? How might these qualities be similar or different to those of other senior staff members?

2 What are the key tasks of the person with primary responsibility for Information Technology in your school?

3 With regard to the successful implementation of Information Technology throughout your school what tensions do you see emerging from the respective roles of manager, leader, teacher and technologist in the IT area and how do you see them being resolved?

4 To what extent do you consider it necessary for the people responsible for leading the use of Information Technology in schools to gain a higher level of professionalism and integrity? (This question is designed to address the general issue rather than the current circumstances that may prevail in your school). If you were to produce a Code of Conduct for such people what would be the key points it would contain?

B Governance

1 What do you regard as to the appropriate division of responsibility for Information Technology amongst the various groups that comprise your school community? (Board of Trustees, Principal, IT manager, senior teaching staff, teaching staff, ancillary or support staff, and students).

2 In the area of Information Technology in Education what tensions or issues can you identify that emerge out of the prevailing government rhetoric and the day-to-day reality for your school?

C Role of Principal

1 How would you describe the nature of the **ideal** relationship between the Principal and the person with primary responsibility for Information Technology in a school? In what respects does the reality in many schools fall short of this situation?

2 To what extent would you agree with the following statement and what qualities are needed in each of these two people to ensure that effective progress can be made?

> *The Principal has a very important role as an instructional leader in the school and has considerable power to legitimise and resource innovation. There is therefore presumably a need for a very close working relationship between the Principal and the school's IT leader / manager / co-ordinator.*

D Credentials and Qualifications

1 To what extent is there a need for special training in the leadership, management and administration of Information Technology in Education? What should be the aims, form, level and content of any such training?

2 How useful would an academic qualification in the leadership and management of Information Technology in Education be? To what extent would such a qualification assist you in selecting and appointing an appropriate person, and help a teacher gain a suitable position of responsibility or promotion?

E Management Issues

1 In an **ideal world** what would you regard as the staffing requirements (management, teaching and support) for Information Technology in a school such as yours?

2 What are the current issues in the management and administration of IT in your school?

3 What responsibilities other than computers are assigned to the person with the designated responsibility for computers in your school? (eg Curriculum, Departmental, audio-visual, photocopiers, telecommunications...)

4 What degree of tension, if any, might there be within Information Technology operations generally in its various roles such as: a particular curriculum subject (eg Computer Studies, Information and Communication Technology), cross-curricular support activity, school administration and management function, marketing function, staff training...?

F Curriculum

1 Would you outline and explain the level of importance you place on a familiarity and understanding of the pedagogical issues relating to computers and IT as a quality in the person responsible for IT in your school? (In comparison for example with understanding other issues that might be associated with the: technical aspects of hardware and software, administrative uses of computers, delivery of training, use of software packages, management of computer resources and infrastructure...)

2 Do you consider that it is important to integrate the use of Information Technology across the curriculum and if so why? What are the critical factors in maximising the success of this process?

G General Leadership

1 What do you regard as the key qualities in a successful educational leader and why do you regard them as being so important? To what extent do you consider that these qualities can be taught and learned e.g. through inservice training, advanced courses ...?

2 To what extent would you agree with the following analysis and how can the problem it describes realistically be resolved?

> There is an irony in our "can-do culture" that produces dilemmas, especially in the area of Information Technology, that so often are addressed with highly touted solutions which then frequently result in a debris of disappointment, disillusionment and even cynicism among even experienced and well-intentioned educators.

Appendix E

Interview Questions for IT Managers/CIOs

(These are the main questions though some additional questions may be asked to extend or clarify a response)

A Leadership Qualities

1 What are the most important personal qualities and skills that an IT Manager/CIO should possess and why do you rate them so highly? How might these qualities be similar or different to those of other senior managers?

2 What are the key tasks of the Information Technology Manager/CIO?

3 With regard to the successful implementation of Information Technology throughout your business what tensions do you see emerging from the respective roles of manager, leader, trainer and technologist in the IT area and how do you see them being resolved?

4 To what extent do you consider it necessary for Information Technology managers to gain a higher level of professionalism and integrity? If you were to produce a Code of Conduct for such people what would be the key points it would contain?

B Governance

1 What do you regard as to the appropriate division of responsibility for Information Technology amongst the various groups that comprise your organisation?

2 In the area of Information Technology in your organisation what tensions or issues can you identify that emerge out of the prevailing business rhetoric and the day-to-day reality for your organisation

C Role of CEO

1 How would you describe the nature of the **ideal** relationship between the CEO and the CIO in your organisation? In what respects does the reality fall short of this situation?

2 To what extent is the relationship between the CIO and the CEO different to the relationship between the CEO and other Managers?

D Credentials and Qualifications

1 What special training in the leadership, management and administration of Information Technology is available? What are the aims, form, level and content of any such training?

2 How useful is an academic qualification in the leadership and management of Information Technology? To what extent would such a qualification assist a person wanting to further their career in the management of Information Technology?

E Management Issues

1 What would you regard as the staffing requirements (management, training, technical, user support...) for Information Technology? What would you regard as acceptable resource ratios in the IT area? (e.g. IT staff to computers, IT staff to users, budget allocation $/PC/month...)

2 What are the current issues in the management and administration of IT in your organisation?

3 What responsibilities other than computers are assigned to the IT Manager in your organisation?

4 What degree of tension, if any, might there be within Information Technology operations generally in its various roles? (e.g. financial, general operations, production, user support, training, communications...)

F IT in Education

1 What if any concerns do you have about the general implementation of Information Technology in schools?

2 In what ways do you consider the management and leadership of Information Technology in schools might be improved?

G General Leadership

1 What do you regard as the key qualities in a successful IT leader and why do you regard them as being so important? To what extent do you consider that these qualities can be taught and learned eg through inservice training, advanced courses ...?

2 To what extent would you agree with the following analysis and how can the problem it describes be realistically resolved?

> *There is an irony in our "can-do culture" that produces dilemmas, especially in the area of Information Technology, that so often are addressed with highly touted solutions that then frequently result in a debris of disappointment, disillusionment and even cynicism among even experienced and well-intentioned managers.*

Appendix F

Self-Assessment Survey — Leaders of ICT in Schools

The person who has the main responsibility for leading and managing ICT in a school should complete this survey.

(Part A) Please respond from your perspective and check two boxes for each question (*Importance Rating* **and** *Time Spent*)

	Rate the Importanc				Rate the Amount of Time You Spend on the Activity		
	Section 1				Section 2		
Check 2 boxes, one in each section, for each of the questions below.	1 Most Important	2	3	4 Least Important	Too Much	Enough	Not Enough
		←→					
1. **Efficiently implementing ICT**							
2. **Building a top-notch ICT staff**							
3. **Developing leaders within the ICT staff**							
4. **Building the ICT department's reputation for value and service**							
5. **Prioritising the investment in equipment, software, infrastructure…**							
6. **Aligning ICT with school/education goals**							
7. **Satisfying internal customers' needs**							
8. **Networking/schmoozing with other senior staff**							
9. **Educating staff about ICT and its possibilities**							
10. **Networking in the educational or HOD - ICT community**							
11. **Studying the competition and its use of ICT**							
12. **Developing and implementing a strategic plan**							

	Rate the Importanc				Rate the Amount of Time You Spend on the Activity		
	Section 1				Section 2		
Check 2 boxes, one in each section, for each of the questions below.	1 Most Important	2 ↔	3	4 Least Important	Too Much	Enough	Not Enough
plan							
13. Identifying new opportunities made possible by ICT							
14. Identifying competitive threats and disrupters							
15. Reacting to change							
16. Influencing and anticipating the moves of the technology vendors							
17. Building strategic partnerships with ICT vendors							
18. Keeping tight rein on expenses							
19. Other (Please identify in the next box and complete ratings)							

(Part B) What do you see as your biggest hurdles to becoming a more effective leader? Please check all the responses that apply

	Please check all that apply
1. Don't know the skills	
2. Not politically minded	
3. Not enough credibility with other senior staff	
4. Difficulty communicating effectively with other senior staff	

	Please check all that apply
5. **Too many tactical distractions/not enough time**	
6. **Not part of the leadership group**	
7. **Don't really want the responsibility**	
8. **No role models/mentors**	
9. **Change happens too fast to get in front of it**	
10. **Other**	

(Part C) Leadership Role Model or Mentor (Check one box for each question)

	YES	NO
1. Do you have a leadership role model or mentor?		
2. Would you like help in finding a leadership mentor?		

(Part D) Please check one box for each question

Who do you think would be the most credible advisor on effective leadership?	1 = most credible and 4 = least credible			
	1	2	3	4
1. **Academics specialising in educational leadership**				
2. **Successful veteran School HOD -IT, School ICT Manager...**				
3. **Successful "Next generation" School HOD -ICT, School ICT Manager...**				
4. **School Principals**				
5. **Distinguished politicians**				

(Part E) Leadership Training Programs

	YES	NO
1. **Have you participated in any leadership training programs in the past two years?**		

(Part F) Demographic Information

1. **What title best fits with your current IT responsibilities? (eg HOD IT, ICT Manager, Director IT...)**	

Thank you very much for your help. Please email the completed survey to Stuart Selwood at:

stuart.selwood@chilton.school.nz

Or by fax to:

04 569 5223