THE COMPUTER AS AN AGENT OF INCLUSION:

A Study of Current Practice

A thesis submitted as partial fulfilment of the requirements for the degree of Master of Education (Special Education)

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DECLARATION

I declare that this thesis represents my own work, except where due acknowledgement is made. It has not been previously included in a thesis, dissertation or report submitted to this University or any other institution for a degree, diploma or any other qualification.

Alison C. Kearney

ABSTRACT

This thesis investigates the nature and extent of computer use for learners with special needs and the context in which they are used. It investigates and documents the practices and beliefs of teachers who believe the computer to be an effective tool for including learners with special needs in regular class settings. The research addresses a number of problems associated with the use of computers in this field. First the lack of critical debate over the use of computers to facilitate the inclusion of learners with special needs in New Zealand schools. Second, while the computer has the potential to overcome many barriers faced by these learners, arguably, this is not always happening and in some cases, the computer can erect other barriers to inclusion. Finally, while it is known *what* the computer can do for learners with special needs, clarification is still needed on *how* to do it. The research explores these issues through the perceptions of the teacher who has a vital role to play in the successful use of computers for learners with special needs.

The research is designed over two phases. It involves a purposive sample of teachers who have a learner in their class with a Ministry of Education funded computer for reasons of special need. Phase one uses a survey method in which a questionnaire is the vehicle of data collection. Phase one is divided into two parts: (a) the nature and extent of computer use by learners with special needs and the beliefs and practices of the teachers. (b) a comparison of the beliefs and practices of those teachers who believe the computer to be an effective or very effective tool for the inclusion of learners with special needs into regular classes with those teachers who do not believe computers to be effective in this role.

Phase two employs a form of ethnographic research where semi structured interviews are used to collect data from six teachers who believe the computer to be an effective tool for inclusion.

A analysis of the nature and extent of computer use reveals that most teachers feel confident and competent in implementing computer technology for the learner in their class, and believe that the computer has many advantages. It is less clear however, whether these advantages are being utilised. Most learners were funded through the Ongoing Resourcing Scheme, and the majority had more than 21 teacher-aide hours per week. They used their computers for less than once hour per day and predominantly in the areas of English and Mathematics. Most learners had an IEP, and the computer was written into that plan.

The teachers who believed the computer to be an effective tool for including learners with special needs in regular classes identified a number of common beliefs and practices. A belief and commitment to the concept of inclusion, and the importance of integrating the computer into the regular curriculum, (including assessment and the Individual Education Process,) as well as the computer philosophy of the school were significant findings of the research.

In sum, the research provides:

- an overview of the nature and extent of computer use by learners with special needs,
- identifies the beliefs and practices of teachers who belief the computer to be an effective tool for the inclusion of learners with special needs and
- highlights ways in which the teacher, the computer and the environment in which it operates might best accommodate the needs of learners with special needs in inclusive ways.

ACKNOWLEDGEMENTS

I am extremely grateful to all the teachers who participated in this study. I truly hope that the time you have given to this research will pay rewards in improved practice and further research, in computer use for learners with special needs.

Thank you to my supervisors, Mark Brown and Ken Ryba. Your wisdom, time and patience contributed so much to this piece of research.

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CHAPTER ONE

INTRODUCTION

INTRODUCTION

The number of learners with special needs in regular classrooms is growing steadily every year in New Zealand (Ministry of Education, 1996). Similarly, an increasing number of these learners are being supported in classrooms by computers and adapted computer hardware and software. The New Zealand Ministry of Education (1997) states that assistive technology can play a key part in removing barriers to educational achievement and they have given a commitment to provide learners with appropriate technology where it is needed to improve learning opportunities.

Under the new policy, *Special Education 2000*, the specific funding has been allocated to meet the needs of those learners who require assistive technology to overcome barriers to educational achievement (Ministry of Education, 1996). Currently, *Specialist Education Services* (who are contracted by the Ministry of Education to manage equipment related services) are preparing guidelines for schools in the funding of assistive equipment for students with special education needs. At the time of writing, these guidelines are in draft form and are expected in schools during the year 2000.

Special Education 2000 has also provided a clear indication of the Government's commitment to inclusive education. It is not accidental that assistive technology is part of this commitment. It has been well documented that computers do have the potential to overcome barriers to learning, (Au, 1995; Ryba, & Selby, 1995). However, the use of technology in and of itself is not guaranteed to promote inclusion, in fact there is the potential to erect unforeseen barriers (Carey & Sale, 1995). Despite the current trend towards increased use of computers by learners with special needs, there is lack of critical debate over their use especially as a tool to promote the inclusion of learners with special needs in regular class settings.

INCLUSION

Inclusion as a movement and as a philosophy can be traced back to the 1960's Inclusion is now the focus of special education provision in New Zealand with the major aim of the recent special education policy, *Special Education 2000* to create a world class inclusive education system over the next decade (Ministry of Education, 1996).

Inclusion is based on the following principals:

- All students, regardless of their race, linguistic ability, economic status, gender, age, learning ability, learning style, ethnicity, cultural background, religion, family structure and sexual orientation, should be educated in the mainstream of general education.
- All students are valued individuals who are capable of learning and contributing to society.

- All students are entitled to equal access to quality services that allow them to be successful in school and life.
- All students have access to individualisation in terms of services, curriculum accessibility, instructional strategies, assistive technology devices and physical modifications .
- All students have opportunities to work and play together.
- All services that students need are delivered within the general education settings.
- All students are taught to appreciate and value human differences and similarities.
- All schools should involve families and community members in the education process.
- All schools must provide the support, training, and resources to restructure their schools to address the diverse needs of all students, parents and educators.

(Flynn & Kowalczyk-McPhee, 1989; O'Neill, 1994; Sapon-Shevin, 1995; Stainback & Stainback, 1992, cited in Salend, 1998)

THE ROLE OF THE TEACHER

One of the critical conditions necessary for the successful use of computers with learners with special needs is the teacher (Carey & Sale, 1994). Similarly, the teacher has a vital role to play in the success or otherwise of the inclusion of learners with special needs in regular class settings (Cole & Chan, 1990). Teacher's beliefs, competencies, knowledge, past experience, all contribute to their practices in the classroom. Also, as it is teachers who make many of the day to day decisions regarding what happens in the learning environment, the role they play in the successful utilisation of computer technology cannot be overlooked. It is from this

premise that the research places a focus on the beliefs and practices of teachers in the use of computers to support the inclusion of learners with special needs in regular class settings.

STATEMENT OF PURPOSE

This thesis investigates the nature and extent of computer use for learners with special needs and the context in which they are used. It also investigates and documents the practices and beliefs of teachers who believe the computer to be an effective tool for including learners with special needs in regular class settings. Both quantitative and qualitative methods are used to gather data from a multi-dimensional research paradigm. The research involves two phases completed over fourteen months. The aim of the research was not to make definitive judgements regarding what is good practice for using the computer in an inclusive way, or as a tool of inclusion. Rather, the aim is to research the beliefs, principles and practices of teachers, and in particular, learn from those teachers who believe it to be effective in including learners with special needs in regular class settings. Through this process, it is intended to highlight ways in which the computer, and the environment in which it operates, might best accommodate the needs of learners with special needs in inclusive ways.

ORGANISATION OF THE THESIS

The thesis is presented and adheres to the guidelines as set out by the American Psychological Association (1994) guidelines. Chapter One introduces the topic and outlines the purposes of the study and organisation of the thesis. . Chapter Two outlines the background to the study and describes the context of special education in which the research took place. It provides an historical summary of events that have shaped the provision of learners with special needs in New Zealand and cumulates in a statement of the research problem, and the aims and objectives of the study. Chapter Three is a review of the literature on the concept of inclusion and the use of computers by learners with special needs. It cumulates with the iteration of the research problem. Chapters Four and Five focus on the methodology of the study, both in theory and in practice. Chapters Six, Seven and Eight outline the results and discussion from phase one and phase two of the study. Chapter Nine concludes with a summary of themes that have emerged, and revisits the research objectives, and evaluates the research against them. It concludes with some recommendations for future research and practice.

CHAPTER TWO

BACKGROUND TO THE STUDY

INTRODUCTION

This chapter provides a context from which one can more fully understand the use of computers for learners with special needs. An overview of special education in New Zealand is presented, from early influences to the present day as well as a description of assistive technology policies and practices as outlined by the Ministry of Education.

BACKGROUND TO THE TOPIC

The movement towards the inclusion of learners with special needs in regular school settings has begun in New Zealand schools. The impetus for this movement can be traced back to a number of key events in both the history of special education in New Zealand, and of other countries. Mitchell (1987) describes five major factors that have, singly, or in combination, played important roles in shaping the current philosophies and practices for learners with special needs in New Zealand schools. These are: (a) influences exerted by the legislation and practices in other western countries, (b) the socio-political circumstances that pertain at any particular time, (c) the advocacy by organisations acting on behalf of exceptional children and (d) the knowledge base of causation and treatment and its dissemination.

Influences Exerted by the Legislation and Practices in Other Western Countries

Arguably the most significant piece of legislation to influence special education practices in the western world was the American 1975 *Education of All Handicapped Children Act (PL 94 143).* This was a federal law that guaranteed all handicapped children between the ages of 3-21 years the right to a free appropriate public education that was specifically designed to meet their individual needs. Summarised, the Act stated:

- All students with disabilities, regardless of the nature and severity of their disability, must be provided with a free, appropriate public education. This is a carefully designed programme of special education and related services to meet the unique needs of students with disabilities.
- Each student with a disability will have an IEP based on, and tailored to the child's unique learning needs.
- Students with disabilities will be educated in the least restrictive environment with their peers who are not disabled to the maximum extent appropriate.
- Students with disabilities and their families are guaranteed rights with respect to nondiscriminatory testing, confidentiality, and due process.

(Salend, 1998 p. 17).

This legislation has since been updated with *The Individuals with Disabilities Education Act of 1990 (IDEA).* This Act was renamed to reflect 'people first'

language and all references to the term handicapped were replaced by the term disabilities. *IDEA* continued the basic provisions outlined in *PL 94 142* but added other statements regarding transition, expansion of rehabilitation, counselling and social work services, early intervention, and training and materials on special education for parents (Salend, 1998).

In Britain the influential *Warnock Report* (Department of Education and Science, 1978) and the subsequent Education Act of 1981, which adopted many of the recommendations of the Warnock Committee, had a strong influence upon special education policies and practices in New Zealand. *The Warnock Report* recommended an abolition of categories of handicap and proposed that the definition of special needs should include children previously described as handicapped as well as those with learning difficulties (Fish & Evans, 1995). *The Warnock Report* also recommended that local education authorities should plan a range of special educational provision for a range of special educational needs and recognised the crucial role of parents in the education of their children. They argued for an all-round assessment of needs, involving learning, social and psychological factors as well as medical considerations (Wade & Moore, 1992). The legislation of the *Education Act* (1981)generally followed the recommendations of *the Warnock Report.*

The Influence of Wider Socio-political Circumstances

From the American civil and human rights movement of the 1950's and 1960's, a "powerful political and philosophical counterforce to segregation developed" (Reynolds & Birch, 1988, p.12). This included segregation on the basis of race or gender *as well as* segregation on the basis on ability or disability. This movement had significant implications for special education in New Zealand and around the world. From it, came a concept or philosophy that was to shape the practices of special education globally, that was the concept of 'normalisation'. Normalisation refers to the "utilisation of means which are as culturally normative as possible, in order to establish and/or maintain personal behaviours and characteristics which are as culturally normative as possible" (Wolfensberger, 1972, p.28). The Normalisation movement sought to parallel life experiences of those without disabilities with those with disabilities, this included aspects of housing, employment, leisure activities as well as education. The principle of normalisation was not about making disabled people normal, but rather offering them normal opportunities and experiences as close as possible to the opportunities and experiences of people without disabilities.

While normalisation had the biggest effect upon those in institutions, (and led to what has been called deinstitutionalisation), it also had an affect upon education. The concept of mainstreaming grew out of the normalisation movement and has in fact been described as the educational equivalent of normalisation. Mainstreaming

involved the physical placement of students with special needs from segregated settings to mainstream settings. The mainstreaming movement was based primarily upon the notion of social justice and equity (Chapman, 1988).

The Advocacy by Organisations Acting on Behalf of Exceptional Children

Another significant factor contributing to current philosophies and practices for learners with special needs in New Zealand schools was the advocacy by organisations acting on behalf of children with special needs, and their families. Agencies and associations such as the Intellectually Handicapped Children's Society (IHC) and Crippled Children's Society (CCS) encouraged services for disabled children to be brought into the mainstream.

The Knowledge Base of Causation and Treatment and its Dissemination

Special education has been influenced by the way in which disability was thought about or interpreted. In times where disability was viewed from a medical model of thinking, the disability was seen as a deficit belonging to the individual and requiring individuals to make changes and adaptations to fit into rigid structures such as schools. When this was not possible, these individuals were segregated into separate schools. This way of thinking acted to absolve schools from making any adaptations in order to cater for learners with special needs. As thinking moved away from medical models to more ecological perspectives, disability was viewed from a more holistic view. From this view, schools were

more likely to consider making changes or adaptations to their structures in order to more meet the needs of a diverse range of learners.

Advances in medical interventions and technology have also seen a greater number of learners able to access the school curriculum. Developments such as hearing aids, electronic wheelchairs, communication devices and computers have all contributed to greater access to education for learners with disabilities.

RETURN TO NEW ZEALAND

In 1985, the then Department of Education initiated a review of special education which was said to be "the most comprehensive since the inception of special education in New Zealand" (Milne & Brown, 1987, p.54). From this review came *The Draft Review of Special Education* which was released in 1987 (Department of Education, 1987). The Review stated that the education provisions for students with special needs will be as normalising as possible and that, as quickly as possible, all students would be included in the regular education stream except where this is clearly not in their best interests. The Draft Review outlined three stages of mainstreaming, locational, social and functional mainstreaming. Locational mainstreaming referred to special units on regular school sites. Social mainstreaming referred to special classes within the same buildings as regular classes and functional mainstreaming was were students spent all or part of their day in a regular class. *The Draft Review of Special Education* also recommended that resources be allocated to students on the basis of their needs rather than on the

basis of category of disability. It was recommended that parents become more involved in decision making regarding the education of their children.

Although the *Draft Review of Special Education* did not move past a 'draft', many of its recommendations were adopted, including the concept of mainstreaming. Mainstreaming however, was to be short lived for while it was based on beliefs of human rights, and research evidence that showed the segregation of students with special needs provided no benefit and even inferior academic and social outcomes, it failed to take into account other vital factors necessary if learners with special needs were to be successfully integrated into regular education. Chapman (1988) believed that the mainstreaming provisions in New Zealand overlooked the issues of human and physical resources, teacher training, specialist service provisions, consultation and administration and generally overlooked the psychological and educational implications of mainstreaming. Criticism also came from other educators. Ballard (1989) a well known proponent for the rights of learners with special needs in New Zealand described the mainstreaming initiative as continuing to segregate learners. He described special units and classes as not mainstreaming, and being allowed to visit ordinary classrooms for part of a day as not mainstreaming. Biklen (1985) described the model of social and locational mainstreaming as 'islands in the mainstream', that is as long as some learners were segregated on an island (i.e. special class or special unit) they would be unable to integrate with the other learners and other learners are

unable to integrate with them. Research literature also showed that social and locational arrangements do not work as mainstreaming as teachers do not make the changes to the curriculum and classroom organisation that allows all children to participate in the "social and intellectual life of regular classes" (Wang & Birch, 1984. Cited in Ballard, 1990).

The New Zealand Education Act (1989) mandated the rights of children with special education needs to enrol and receive education at state schools. The Act stated that "people who have special educational needs (whether because of disability or otherwise) have the same rights to enrol and receive education at state schools as people who do not..." (Section 8). Under the Act, people with special needs were entitled to special education or help from a special school, class, clinic or service until they turn 21.

In 1991, the National Government published a *Statement of Intent for Special Education in New Zealand* (Ministry of Education, 1991). There was a very intensive period of consultation through the Special Education Policy Implementation Team (SEPIT) who travelled around the country, talking to groups and individuals with an interest in special education. This process of consultation culminated in a report which was never officially released by the Minister of Education (Brown, 1997).

In 1995, the National Advisory Committee on Special Education was established by the Minister of Education. The purpose of this committee was to

provide independent comment across the sector on the policies being developed on special education and to develop special education guidelines (Davies, 1999). The 1995 Special Education Policy Guidelines were duly developed and disseminated, and the evolution of the policy Special Education 2000 had begun.

SPECIAL EDUCATION 2000

The *Special Education 2000* policy was first announced in the 1996 budget. Its overall aim was to achieve, over the next decade, a world class inclusive education system that provides learning opportunities of equal quality to all students (Ministry of Education, 1996). The following outline the specific aims of *Special Education 2000*.

Young children and school students with special education needs will:

- Achieve better learning outcomes
- Be welcome at their local school
- Benefit from early childhood centres and schools having more flexibility in provision of programmes
- Receive equitable levels of resourcing according to level of need, whatever their learning environment
- Have decisions on their resourcing needs made by those closest to them
- Be able to attend the type of facility of their family's choice, where there are enough enrolments.

(Ministry of Education, 1999, p. 3)

Special Education 2000 has six main components, these are

1. Special Education Grant
2. Resource Teachers Learning and Behaviour

3. Speech-Language Initiative
4. Ongoing Resourcing Scheme
5. Severe Behaviour Initiative
6. Early Childhood

These components are supported by overall initiatives including:

- Professional development, training and information for boards of trustees, principals, teachers and parents of children with special needs.
- Research, monitoring and evaluation.

The Speech and Language Initiative, the Ongoing Resourcing Scheme and the Severe Behaviour Initiative are all to support learners with high and very high needs. The Special Education Grant and The Resource Teachers Learning and Behaviour are initiatives to support students with moderate needs.

Figure 2.1 (Davies, 1999, p.6), provides an overview of the policy.

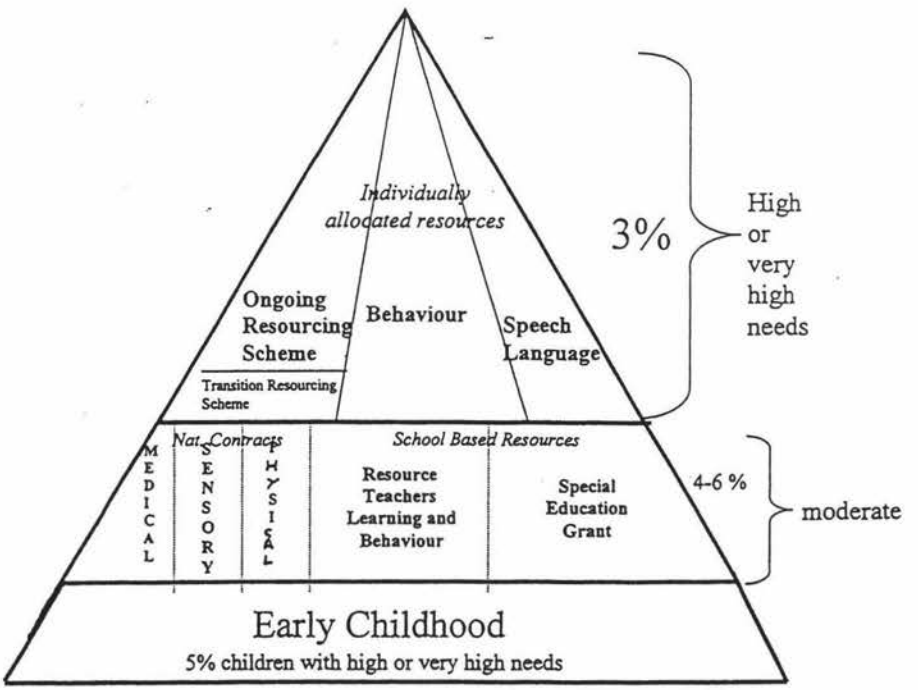

Figure 2.1 Special Education 2000 Framework

Special Education 2000 also provided a clear indication of the Government's commitment to provide learners with assistive technology where it was needed to improve learning opportunities when, in 1997, an additional $325,000. was allocated for providing students with equipment. This funding was to cater for:

- increasing numbers of students who required access to special equipment
- the increasing costs of more technologically advanced and specialist equipment for students with disabilities
- the need to provide for training on the use of equipment

In 1999, the Ministry of Education commissioned the writing of assistive equipment guidelines. At the time of writing this report, these guidelines are still in draft form but contain information and advice on assessment, funding and the effective use of assistive equipment in schools (Ministry of Education, 1999). In the assistive equipment guidelines, the Ministry of Education (1999, p.7) have outlined several key elements in the New Zealand education system that affect and govern the use of assistive equipment. These are:

- *The National Education Guidelines,* Ministry of Education (1993), "All students should have the opportunity to undertake study in essential areas of learning and to develop essential skills."
- The *Special Education 2000* policy which provides a clear, consistent and predictable framework for supporting students with special education needs, regardless of school setting or geographical location.

- The Individual Education Planning (IEP) process helps with the planning necessary to implement the New Zealand Curriculum through programmes of learning support.
- The Information Communication Technologies (ICT) strategy (Ministry of Education, 1998a) and the direction of the Literacy Taskforce (Ministry of Education, 1998b). Many applications for assistive equipment in schools are to support the process of written communication and information handling.
- The Operational Protocol between Health and Education clarifies the funding responsibility for assistive equipment for school students. Similar agreements are under development with other agencies and specialist service providers, such as ACC.

School students with special learning needs are eligible to be considered for assistive equipment funding if they are supported through any of the *Special Education 2000* initiatives. It is interesting to note that approximately 70% of students receiving Ministry of Education-funded equipment are in the Ongoing Resourcing Scheme and 30% are supported by other *Special Education 2000* initiatives (Ministry of Education, 1999). It is suggested that the use of assistive equipment have two main uses, (a) to provide or support a way of adapting the curriculum for the student and (b) to provide or help students with access to learning activities.

The following is a summary of the steps involved in matching assistive equipment to identified student needs:

1. Agree of goals, based on Individual Education Plan
2. Identify barriers to achieving those goals (where do we want to go? What do we need to overcome?)
3. Assess the reason(s) for the barrier(s)
4. Develop ideas for overcoming, reducing or removing the barriers
5. [1]Try alternatives (no-tech) and options (tech)2
6. Apply for funding of accredited specialised assessment team if a specialised assessment is needed
7. Trial of assistive equipment identified by specialist team
8. Select the most cost-effective alternative(s) and option(s)
9. Apply for funding for assistive equipment from the Ministry of Education
10. Train the support team to use the equipment in the classroom
11. Review regularly (at transition times, at each IEP, when key people change)

(Ministry of Education, 1999, p. 10)

SUMMARY

The movement towards the inclusion of learners with special needs in regular school settings has begun in New Zealand schools. The impetus for this movement can be traced back to a number of key events in the history of special education in New Zealand, and in other countries. New Zealand now has its first special education policy, *Special Education 2000.* Within this policy the Ministry of

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An alternative is another way of achieving the identified goal - in the school context this usually refers to an adaptation to the curriculum

an option is an identified possible solution. In the context of assistive equipment, this usually refers to a choice of different technologies (Ministry of Education, 1999. p.10)[1]

Education has outlined its belief that assistive technology can play a key part in removing barriers to educational achievement and have given a commitment to provide learners with assistive technology where it is needed to improve learning opportunities (Ministry of Education, 1997).

The following chapter provides a review of the research literature on the use of computers for learners with special needs and the role of the teacher in their successful use.

CHAPTER THREE

LITERATURE REVIEW

INTRODUCTION

This chapter reviews the research literature on the use of computer use for learners with special needs and the role of the teacher in its successful use. When reviewing recent literature, several common themes appear. These are:

- The rationale for computer use for learners with special needs.
- The context in which computers are used by learners with special needs.
- The roles that computers can play in meeting the needs of learners with special needs.
- The benefits of computer use by learners with special needs.
- The drawbacks of computer use by learners with special needs
- The issues involved in computer use with learners with special needs.
- The role of the teacher in the use of computers for learners with special needs.

Each of these themes will be reviewed leading on to an identification of the research problem.

RATIONALE FOR COMPUTER USE

Why use computers for learners with special needs? A review of the literature provides numerous reasons to justify the use of computers by learners with special needs. The most compelling of these reasons appears to be the role that computer

technology can play in overcoming barriers often experienced by learners with special needs. These include physical, social cognitive and motivational barriers (Au, 1996; Cole & Chan, 1990; Gallagher, 1997; Male,1997; Ryba, 1995). Curzon, Selby and Ryba (in press) believe that the wise use of computers and other assistive technologies can overcome or significantly reduce the impact of disability at three levels,(a) the impairment, (b) the activity and (c) the participation. For example an adapted keyboard will provide full access for a person with one arm (overcoming impairment) a student with illegible letter formation can use a lightweight electronic note taker to take notes (overcoming barriers to activity), and E mail can significantly help in participation for some disabled persons. The roles that the computer can play in overcoming barriers will be discussed in more depth later in the chapter.

The use of computer technology has also been shown to prepare learners for life in an information and technology based society (Au, 1996). Au believes that for this reason, computers are a necessity, not a luxury, pointing out that participation in tomorrow's society will depend on the use of computer technology and learners with special needs who cannot use computer technology will experience additional barriers.

A further rationale for computer use by learners with special needs is that they focus attention on student's abilities rather than their disabilities. They also provide a truly student centred learning environment that is fun and motivating for students

who often have experienced failure in other conventional teaching situations (Ryba & Selby, 1995).

One of the most common and powerful reasons for the use of computes to come out of the literature is their usefulness as an agent of normalisation. Au (1996) argues that the use of computer technology to assist students with special needs adheres to the spirit of normalisation. That is, rights to as normal a lifestyle and set of living conditions as possible, as close as possible to those enjoyed by the rest of the population (Wolfensberger, 1972). Au (1996) believes that the use of computer technology to assist learners with special educational needs in the spirit of normalisation is "not only highly desirable, but essential" (p. 314). He believes that the principle of normalisation makes it imperative that all learners with special needs should have access to appropriate computer technology if it is needed to help provide them with the opportunities to achieve commensurate with their potential.

The computer as a tool for individualising instruction is a common theme. Gallagher (1997) states that technology can help make inclusion more of a reality by allowing for more individual pacing in the classroom. Male (1997) supports this view and describes a teacher's experiences in incorporating extensive use of computer technology into his inclusive classroom:

> Can you imagine a better way to integrate students with special needs into regular settings? When students can work at their own pace, there is no "norm". Each individual can work to his or her potential and contribute to

> others' learning...and there can be expanded flexibility to include specialists or therapists in small groups. A classroom can be a resource room for everyone.
>
> (Via, 1991 pp. 6-7, cited in Male, 1997)

The computer as a tool for inclusion is a strong reoccuring theme in the literature (MacArthur & Malouf,1991; Male, 1997; O'Brien, 1996; Okolo, Bahr & Rieth, 1993; Ryba & Selby, 1995). In keeping with the principles of inclusion where differences are valued and celebrated (Forest & Pearpoint, 1993), O'Brien (1996) believes that computers have the capability to do away with old educational messages such as

- Be quiet
- Don't make mistakes
- Do your own work
- Follow directions

And replace them with inclusive messages such as it is okay to

- Talk about your problems and ideas
- Explore and think it through yourself
- Help and share with one another
- Reflect on your thinking

(p. 36).

This rationale, that the computer is a tool for inclusion is one that will be explored in more depth later in this chapter.

THE CONTEXT OF COMPUTER USE

Most educators now agree that technology alone does not promote effective learning and that merely placing a computer in a classroom for use by a learner with special needs will not guarantee any advantage (Carey, 1994; Maddux ,1988; Okolo, Bahr & Rieth, 1993; Raskind, Herman, & Torgesen, 1995; Roder, 1996; Semmel & Lieber, 1986). Maddux (1988) noted the pervasive perception characterising many early uses of instructional technology was that 'all we need to do is place a computer and a child in the same room and wonderful things will happen" (p.8). Salomon (1992 cited in Okolo, Bahr & Rieth, 1993) states that computing solves no problems, if anything it creates new ones and research by Okolo, et al., (1993) suggests that computers can be, and in some cases, are, used in ways that augment pre-existing ineffective instructional practices.

The effectiveness of computers in schools depends on a variety of contextual variables, and the computer is only part of what Semmel and Lieber (1986) describe as a complex microeducational environment that includes many interacting variables. These variables include educational goals and activities and with the organisation patterns of schools (MacArthur & Malouf, 1991), the teacher, (Raskind, Herman, & Torgesen, 1995) and the individual's particular situation, desires, goals, challenges, interests and tasks to be performed at a given point in time (Raskind, Herman, & Torgesen, 1995). In particular, the student-computer-teacher interaction is critical (Okolo, Bahr & Rieth, 1993). Okolo, Bahr and Rieth,

(1993) believe that the lack of attention to these variables in deference to the search for simple solutions has impeded both the use of, and research about, computer based instruction.

This importance of context has also been highlighted when assessing learners for computers. Roder (1996) believes that the assessment process should take account of the student's total learning environment and all of the key players - the learner, parents, peers, teachers, teacher aides, principal, specialists and others who are involved. Roder also believes that considerable emphasis should be given to who the student sees himself or herself, how they actually learn within their social contexts, and what can be done to create and support the most natural and authentic learning conditions.

The changing nature of learning and teaching has also meant that technology utilisation must be considered relative to the individual's particular situation, desires, goals, challenges, interests and tasks to be performed at a given point in time (Raskind, Herman, & Torgesen, 1995). This means that a specific technology or technological intervention strategy that may be effective at a particular period may have little effect or may even be detrimental at another point in time.

It is clear from the literature that the utilisation of computers for learners with special needs must be viewed from an ecological perspective. This perspective (based on the model devised by Bronfenbrenner, 1979) views a child in a nested system, such as Russian dolls. This system or ecosystem (Bronfenbrenner, 1979)

include s a microsystem, mesosystem, exosystem and microsystem. The microsystem (and the smallest of the Russian dolls) is a specific social structure that occurs in a specific setting, for example a class visit to the park, an assembly line or a visit to the doctor. In fact, whenever people meet for a specific purpose, a microsystem is formed. The mesosystem is a collection of microsystems that a child interacts with and moves through. The main focus here is on the relationships between the microsystems. The exosystem incorporates social institutions in which the child doesn't directly participate, but which exert an indirect influence on them such as neighbourhood organisations and political structures. The macrosystem (and largest of the Russian dolls) consists of the overarching values, beliefs and ideologies which underpin any society. Bronfenbrenner believed that instead of focusing only on the individual child, relationships between each system must be analysed, not only in terms of the individuals adaptation to the environment but the impact of environmental forces upon the child (Cole & Chan, 1990). In terms of computer use by learners with special needs, it is not just the learner and the computer that needs to be considered, but the complete ecosystem of each particular learner.

WHO USES COMPUTERS

McGregor and Pachuski (1996) conducted a study of teachers with primary instructional responsibility for students with special needs who had received equipment. They found that the largest segment (37%) of the student population

using assistive technology was comprised of students with a physical disability who required some type of augmentative communication system. Students with multiple disabilities (21%) were the second largest group of users in this sample. This was despite the greater incidence of students with learning disabilities and mental retardation in the state's population of students with disabilities.

Green (1997) in a study of the nature and extent of computer use by learners with special needs in New Zealand found that learners with intellectual disabilities were the major users of computers. Although many of the students identified in the study had more than one need, teachers prioritised their intellectual need as the most important.

ROLES OF COMPUTERS IN THE CLASSROOM

Recent literature describes a number of roles that computers can play in the education of learners with special needs. These include the computer as a:

- Socialising tool
- Communication tool
- Prosthetic tool
- Motivational tool
- Teaching and learning tool
- Tool for developing self efficacy

Each of these roles will be reviewed through the literature.

The Computer as a Socialising Tool

When computers were first used in the classroom for learners with special needs, fears were held by some that they could be come an isolating agent (Ryba & Selby, 1995). Recent research however has provided evidence to the contrary. Ryba and Selby (1995) write of an early experiment using computers with a learner with an intellectual disability:

> Even though we tried to get them to work in an isolated room, they inevitably found a way of getting a friend to work with them on the computer. One young woman who was shy and lacking in confidence became a key player in the space invader competitions...for her, the computer provided a point of connection with other people (p.3).

Curzon, Selby and Ryba (in press) report on the computer as an effective tool for social interaction and communication. They see social development as not a separate mission for computer use, but one that can be linked directly to authentic curriculum based activities. Computers provide, what Curzon et al. call "an accepting, non-critical 'microworld' in which to explore ideas and consequences" (p.11). They report that for students who find social interactions difficult or overwhelming, the computer provides a safe and motivating environment. They believe that the clear boundaries of the screen, the predictable responses, and lack of time-constraints may be factors.

Mason (1996) reports that through computer mediated communication, possibilities for fostering better relationships are increased. She believes that deeper understanding of differences in cultures, lifestyles and views can be achieved through the making of links with other learners through electronic mail and the Internet. Through these relationships, people will develop a tolerance of the way of life of others, and an understanding of their beliefs in relation to their own experiences. Mason believes that for students with special needs, this idea has special significance. When disabled learners use computer mediated communication to describe their lives, it enables others to understand what a particular situation is like. It also allows for the break down of stereotypes and ignorance of difference on the one hand and the feelings of inadequacy that disabled people may have on the other.

While the literature points to the significant opportunities offered by the computer in the way of socialisation, a two-year longitudinal case study by Hutinger, Johanson and Stoneburner (1996) found that often, the computer was not used in a way that promoted this. They analysed how assistive technology was used in educational programmes for 14 children with disabilities and reported that group technology activities were the exception rather than the rule in the classrooms participating in the study.

The Computer as a Tool for Developing Cooperative Skills

Research suggests that small group, cooperative learning on the computer results in greater achievement gains and faster rates of learning compared to individual use (Okolo, Bahr & Rieth, 1993). Group use has also been associated with positive social behaviours (Lieber & Semmel, 1989; Male, 1988). Cosden et al., (1987) found that students in mainstream settings were more likely to use CBI in a small groups compared to students in resource rooms. Similar results have been found with younger children. Clements, Nastasi, and Swaminathan, (1993) have observed high levels of spoken communication and co-operation as young children interact at the computer compared to traditional activities.

Lieber and Semmel (1987) provide evidence to indicate that it is equally effective for students to work problem solving tasks on the computer cooperatively with a partner as it is for them to work on their own. Both task performance and engagement were similar for children working in dyads or individually, even though when working in dyads, each learner had only half as much time at the computer. They also found that working in dyads increases task related cooperative interchanges between students and provides the opportunity for students to observe their partners solving problems.

Male (1997) show that in classrooms in which computers are integrated effectively with cooperative learning strategies, teachers report an increase in student interest and motivation "Students enjoy showing each other what they are

doing with the computer; they are proud of written work that they have printed. Students huddle together as they master a new computer programme or solve a problem, focused intently on the action or situation in the computer environment" (p. 186). Male believes that the computer can be a powerful catalyst for communication and social skill development with appropriate software and carefully structured lessons.

While much of the literature emphasises the cooperative nature of the computer, it is likely that in some instances, the computer is not being used in a way that allows for the development of cooperative skills. Green (1997) found that both formal and informal groupings of students were not rated highly by the teachers in her study of computer using learners with special needs. Green reported that teachers still view the computer as a place where one or possibly two students work at completing a remedial task.

Au (1996) has proposed guidelines for teachers to effectively use the computer to facilitate cooperative learning. These are:

- Whenever appropriate, assign students to groups while doing computer work.
- Let the students choose their own roles initially but require them to take on different roles on a rotating basis.
- Encourage the discussion and sharing of the various ways students may solve the same problem at a computer, both within groups and between groups.

- Teachers should take on the role of facilitator of discussion rather then provider of answers.
- Encourage students to talk about what they did and why and how they did it.
- Emphasise the importance of self-evaluation so that students understand that they are responsible for the management of their own learning.
- Provide students with sufficient time to work out their solutions and test their solutions with the computer.
- Assign off-computer time so that students have time to reflect on what they have done with the computer, as well as having the opportunity to discuss with their peers the processes involved in solving problems (p.328).

The Computer as a Tool for Promoting Self Efficacy

Curzon, Selby and Ryba (in press) believe that a sense of personal effectiveness as a learner (also known as self efficacy) can emerge through the use of computer technologies. They believe that personal effectiveness occurs when students perceive that they are capable problem solvers who can experience success in learning. "Experiencing success can enhance academic achievement and motivation which, in turn, helps to create a success cycle" (p. 22). Curzon Selby and Ryba (in press) state that this sense of self may be the single most important factor in learning with computer technologies because if students see themselves as capable learners they will be more motivated to learn. Okolo, Bahr and Rieth (1993) and Malouf (1987-88) have also found that students' motivation to learn and

their views of themselves as learners may be enhanced through the use of computers. Rather than be caught in a cycle of failure (which can often happen for students with special needs), they can develop the skills and knowledge that they need to succeed in life. Curzon et al. (in press) suggest eight important teaching practices they consider teachers as facilitators of learning can take advantage of to assist students develop a positive self system. These are:

1. Support students as they learn – show them what to do then let them explore for themselves. Develop a learning partnership in which you work alongside of your students, learning and exploring together.
2. Help students set goals for learning.
3. Encourage and allow time for reflection – students need time to think, explore and be creative.
4. Reinforce correct behaviour and provide informative feedback – provide enthusiastic and meaningful feedback.
5. Create a trusting and supportive learning environment – students need acceptance of who they are and a sense of belonging within the learning community.
6. Focus on social competence – give students freedom to move around and consult with one anther. Arrange the physical environment to maximise interactions between students.

7. Model behaviour for students – talk aloud about what you are doing and encourage them to think about their own thinking.
8. Celebrate learning achievements – recognition and support received in the computer situation can help to enhance self esteem, self confidence, and motivation, all of which are transferable to other learning situations.

(pp. 25-26).

The Computer as a Motivation Tool

Many studies have found the computer to be a powerful agent of motivation (Au, 1996; Keene & Davey, 1987; Male, 1997). Studies have found that students enjoy working on the computer and are willing to engage in tasks on the computer that they otherwise might resist (Keene & Davey, 1987)

Male (1997) has found that the recognition, celebration and sharing of computer achievements can have a powerful impact on student motivation and skill development. This can happen when peers and adults recognise the computer achievements of learners. Not only can motivation be enhanced, but also self-esteem and self-confidence and these can transfer to other situations.

Because of the games format of many CAI programmes, learners find this highly motivating. Moreover, the availability of multimedia and virtual reality technologies can often make these games even more stimulating, interesting and lifelike (Au, 1996). Students with learning difficulties often find it more motivating to work on these programmes than on traditional classroom activities. It has been

reported that for this motivation to be maintained, teachers need to provide a computer learning environment in which (a) a wide range of suitable software is used; (b) where possible, the learners are encouraged to make their own choices when choosing activities; and (c) there is a supportive and nurturing learning environment (Williams, 1987; Kirby & Williams, 1987; Martin, 1986; Thomson, 1986; Whitmore, 1986. Cited in Au, 1996.)

The Computer as an Instructional and Learning Tool

The role of the computer as a learning and instruction tool is widely reported in the literature. Okolo, Bahr and Rieth, (1993) have found that computer based instruction can have two kinds of effects on student's performance. First it can improve the quality and efficiency with which a lesson is delivered. Second, it can provide access to tools that overcome some of the difficulties of completing a task that learners with special needs often experience, and third any information or assistance that is needed is immediate.

Au (1996) believes that this role of computer technology is probably the most powerful in the learning and teaching situation, and he provides four important issues that lend support to this argument. First learners can exercise more control over their learning environment. Second, the application of new general-purpose software is not restricted to a particular subject and hence should facilitate the integration of computers across the entire curriculum irrespective of subject areas. Third computers can enhance learner access to information and learning. Fourth,

computers can be used by students as objects to think with, and thus can also help the students develop higher order thinking skills.

Other researchers have also reported on the use of the computer to develop higher order thinking skills such as memory, logic, perception and creative problem-solving (Burgess, 1986; Martin, 1986; Wood, 1986a cited in Au, 1996). This is the notion that computers could be used as *a learning how to learn tool*, not just *a learning tool.* Au (1996) cites some computer activities that have been considered as having the potential to promote higher order thinking skills in students with special needs. These include: Logo, adventure games and puzzles, simulation games, word processing, research and information-handling using database management programmes, desktop publishing, creative programmes (such as art and music programmes), and telecommunications. It has been argued that through learning programmes, metacognitive skills and general problem solving skills might be enhanced (Au, 1996).

Research also shows that lower order thinking skills such as reading, maths and spelling skills are also enhanced by the use of the computer. Meyers (1992, cited in Meyers, 1994) compared the effectiveness of: (a) computer-enhanced cooperative learning by heterogeneous teams of children with and without LD, (b) individual computer-enhanced language sessions, and (c) the standard practices being carried out in the children's resource classrooms. Preliminary results on standardised tests showed that the first group of children who completed this study made the most

progress in reading during the individual computer-enhanced sessions. They made the most progress in spelling and visual-motor skills during the cooperative computer-enhanced sessions. Even though some skills such as keyboarding, letter names and sounds of letters were never directly taught, these skills were learned as part of the computer-enhanced creative writing sessions. The resource classroom where these formal skills were directly taught, was not as effective a learning environment as the computer enhanced whole language writing sessions. Yates (1988) believe that the features of good computer software such as self-pacing, active participation and immediate feedback, over-learning and motivation allows them to provide students with the maximum opportunity to develop the lower order thinking skills to the degree of automaticity and mastery necessary for further learning.

The Computer as a Communication Tool

Computers have been reported as being effective and efficient communication aids for learners with limited or no other means of communication. This includes non-vocal and non-verbal learners as well as learners with hearing and visual losses (Cole & Chan, 1990). In a study of school age children with Down Syndrome who wrote on computers with speech output and text, Meyers (1994) found that they used significantly more age-appropriate utterances than when they used computers with text only. The students were able to select their own topic to write about. Meyers concluded that the key to effective computer use by children with language

disabilities is to implement the computer both as an access tool and as a personal meaning tool. That is, to use the technology to provide access to speech and text while linking it to their personal experiences. Meyers believes that this allowed them to participate in the natural process of language learning.

Curzon, Selby and Ryba (in press) believe the computer to be a powerful information and communication machine, freeing students from the drudgery of information processing, and allowing them to focus their energy on communicating with one another. Examples cited are spell-checkers, talking wordprocessors, overlay keyboards, on screen overlay keyboards that can be clicked on, word prediction packages and programmes designed to talk back written work.

The Computers as a Prosthetic Tool

The literature reports on the use of computers to compensate for the loss or impairment of normal body functions. Au (1996) argues that the issue of control is particularly important for students with disabilities and that there are now a large number of prosthetic devices that can be used to assist students with disabilities to participate in learning. These include such devices as switches photonic wands braille machines, scanners and speech synthesisers.

Curzon, Selby and Ryba (in press) report on the common phenomenon of learned helplessness. This phenomenon can often be associated with students with severe physical and/or multiple disabilities and brought about by the lives of these students being controlled by other people. Computers have the capacity to replace

or compensate for many of these disabilities and in particular, the use of switches has the potential to greatly increase the communication, play and learning opportunities for students with extremely limited motor control. This compensation for, and replacement of impaired body functions can lessen the tendency for learners with special needs to acquire learned helplessness.

The Computer as a Tool of Inclusion

The use of computers by learners with special needs has been reported in the literature as facilitating the inclusion of these learners into the regular class setting (Au (1996; Carey,1994; Curzon, Selby & Ryba, in press; Derer, Polsgrove and Rieth, 1996; Lee, 1987; Male,1997; O'Brien, 1996; Raskind, Herman & Torgesen, 1995).

Derer, Polsgrove and Rieth (1996) in a study of 279 teachers of learners using assistive technology found that teacher respondents identified the computer as facilitating inclusion of the student in natural settings. The computer did this by helping the student to overcome environmental or social barriers, thus allowing them to participate in school and interact with peers to a greater extent. Au, (1996) concurs and highlights the usefulness of the computer for meeting the needs of learners with special needs in terms of specific learning and social requirements.

However, despite the extent of the literature that reports on the computer as a tool for inclusion, isolated references do exist to support the notion that the computer may serve as a tool of exclusion. Raskind, Herman and Torgesen (1995)

report that in certain situations computers may provide a common interest point from which to promote peer relationships. However, they believe that it is just as feasible, under other circumstances, where computers might serve to enhance isolation and loneliness if used as a substitute for interpersonal relationships. They also reported that technology seemed to be viewed by school staff as an alternative way to develop isolated academic skills, rather than as a tool to integrate into daily activities. Technology applications were often used as individual activities that were not necessarily developmentally appropriate nor related to the ongoing day to day activities in the classroom or at home. Similarly, Todis (1996) found that sometimes the problems associated with a device (computer) impeded rather than promoted the independence and inclusion of the user.

Carey (1994) suggests the following technology features that appear to enhance inclusion. These are:

- training and support systems
- local and rapid repair and maintenance
- systematic assessment and persistence
- lightweight, portable technology
- off the shelf products in use by the general consumer population
- rechargeable batteries with at least 3-4 hours of battery life
- curricular accommodation that includes content objective and performance objective for technology utilisation.

While it appears that there is a wealth of information in the literature that outlines what the computer can do, there seems a lack of information of how the computer can be used.

HOW COMPUTERS ARE BEING USED?

McGregor and Pachuski (1996) in a study of teachers with primary instructional responsibility for students with special needs who had received equipment found that over 49% of teachers reported using the computer daily. Only 12% reported using the computer seldom or never. Green (1997) in a study of the nature and extent of computer use by learners with special needs in New Zealand found that over 70% of the students spent less than one hour per day on the computer. Approximately 20% spend one to two hours and three percent spend three to four hours per day working on the computer.

In the longitudinal study by Hutinger, Johanson and Stoneburner (1996) they found that children used technology from one-half hour to fourteen hours per week. Two to three hours per week was the most prevalent. In the same study by Hutinger, et al., one-to-one instruction was used most frequently to instruct participating children. Teachers reportedly individualised instruction for students on the computer by matching the level of a programme to the student's skills.

MacArthur and Malouf (1991) in a study of five primary school special education teachers found that the main use of computers was for word processing and drill and practice, which were both used to some extent by all teachers in their

study. They found drill and practice in most classrooms not well integrated with other instruction. All of the teachers in their study used drill and practice software in one or more areas, most often maths, spelling and keyboarding.

MacArthur and Malouf also found that while drill and practice was the most common form of software used, it was not monitored and evaluated as closely as paper and pencil seatwork and students often worked on inappropriate content. The reasons given by teachers for this was that monitoring student performance on computer drill is more cumbersome than monitoring paper and pencil seatwork. This is because the teachers believed that pen and paper work could be corrected at a glance during or after school, but computer work required watching the screen, using record-keeping programmes if available or training students to self record. Thus, in this context, the computer can actually reduce the teacher's awareness of student performance. Another explanation for not monitoring computer work that was presented by one teacher was that she know students' performance levels from their other work so she did not need to check each day's computer work. Another factor was that teachers thought that computers should be fun. MacArthur and Malouf concluded that computers could provide practice in a motivating in a non-threatening way, but this militated against grading and performance measures. Also, the idea that computer instruction should be motivating and fun was more important to the teachers in the study than the idea that computers could present systematic instruction.

Lewis (1997) in a comparative study of computer use in special education found that compared to the first study in 1987, teachers and students have greater access to technology and are more likely to use it in 1994. Lewis found that the computer was still used most frequently for word processing and database management tasks, however, e-mail had become a relatively common application for administrators although not for teachers.

SOFTWARE AND HARDWARE

Hutinger, Johanson and Stoneburner (1996) report that children use computers ranging from an Apple II + to a Macintosh LC II. Peripheral devices used included a variety of switches, the joystick, the touch window, the Powerpad, the Echo, the Muppet Learning Keys the Unicorn Expanded Keyboard and the Adaptive Firmware Card or Ke:nx. In terms of software, they found that the teachers with the most software at their disposal were the ones who were most knowledgeable about available resources and used them for multiple purposes. Teachers who had little software available used what they had regardless of whether it was appropriate for meeting individual children's goals. Of the 54 software titles that teachers used, twenty one of the programmes were used with switch input devices and they targeted skills ranging from cause and effect concepts to scanning. Twenty-three of the programmes required keyboard input and almost half of the keyboard programmes listed were drill and practice programmes. Nine programmes were designed for drill and practice on a specific skill such as math or reading. Software

programmes that allowed children to create their own product or make choices about the activity were used primarily by the older children. Generally, teachers used software that did not allow opportunities for children to make choices and control the software. Multimedia CD ROM software was not used.

In a similar New Zealand study, Green (1997) looked at the use of hardware and software by learners with special needs. Of the 39 learners using a computer for reasons of special need, 71% were using an Apple computer, 11% Acorn and 18% IBM. Of the 39 students, 60% were using no adaptations with the remaining 40% utilising concept keyboards, switches, scanning devices, and communication devices. In terms of software, word processing packages were the most widely used with drill and practice, multimedia, simulation and interactive fiction following in that order. The most common word processing software to be used was *Co-Writer, Clarisworks, Write Out Loud and Creative Writer*. Teachers in the survey were asked to indicate if specific programmes were purchased to meet the specific needs of the students, 72% indicated they were not. Of interest in this study, was that only one piece of software was produced in New Zealand and reflected the bicultural nature of the country. Green acknowledges that as the awareness of New Zealand's biculturalism has grown, there is an increasing demand for programmes using Te Reo Maori. This along with the fact that Maori students are over-represented in Special Education in New Zealand (Ministry of Education, 1996) is an issue that must be addressed.

MacArthur and Malouf (1991) in a study of five primary school special education teachers found that the main use of computers was for word processing and drill and practice, which were both used to some extent by all teachers in their study. They found drill and practice in most classrooms not well integrated with other instruction. All of the teachers in their study used drill and practice software in one or more areas, most often maths, spelling and keyboarding. In terms of word processing however, they found that it was relatively well integrated with overall writing instruction. Evidence suggests that not only is drill and practice software the most common type of software used by learners with special needs, but they these learners use this software even more often that their nondisabled counterparts (Okolo, Bahr & Rieth, 1993).

Hutinger, Johanson and Stoneburner (1996) also report that the bulk of computer use by learners with special needs is drill and that this practice limits the educational activities of both students and teachers to isolated skill development rather than concept development and probelm solving. They found very little interactive multimedia software available in schools.

In a study of proficient computer using teachers, Brown (1995) found the most common type of software used by teachers was word processing (97%) followed by educational games (90%). Brown cautions against making generalisations into such findings, pointing out that these findings may be deceptive. This is because such data gives very little insight into the

context of practice, and while it is interesting to know that the computer is predominantly used by teachers as a writing tool, this tells us very little. Brown cites the example of the pen as a writing tool pointing out that it would be absurd to quantify and draw conclusions from how often students use pens in the classroom.

Howell (1996) reports that the current pattern of computer use is now predominantly oriented to applications software, (word processing, data bases and graphics) with a steadioly diminishing percentage of time spent in drill and practice and tutorial computer software.

Curzon, Selby and Ryba (in press) report on multimedia as a good way to focus on the students' abilities instead of their disabilities. Computer using teachers have shown how much their students learn just by observing and interacting with one another. Multimedia can be related to just about every area of the curriculum and used with students across a range of ability levels. Another key feature of multimedia is that it offers opportunities to develop congruent learning opportunities for teacher and students. The teacher can develop skills through creating programmes and working with students. There are also lots of opportunities for creative problem solving. They believe that multimedia programmes are quite easy to use and very empowering for students.

Lack of suitable software has been an issue common in the literature. Okolo, Bahr & Rieth, (1993) have found that many programmes that teach targeted skills often require students to follow a complex set of choices and menus and exceed

student's reading skills. Age inappropriate activities, themes and graphics have also been as issue associated with software for learners with special needs. Hutinger, Johanson and Stoneburner, (1996) have also found that software used by learners in special education is often poorly suited to their needs.

MacArthur and Malouf (1991) in a study of five elementary special education educators found that these teachers identified getting access to software for review a planning problem. In addition to this problem of access, teachers mentioned the time required to preview software in preparation for using it in class. Observers in this study noted that teachers were not always familiar with the software they used.

THE TEACHER

A major variable to successful computer use by learners with special needs is the teacher (Au, 1996; Brown, 1995; Derer, Polsgrove & Rieth 1996; Langone, Wissick, Langone & Ross 1998). MacArthur and Malouf (1991) point out that the role of the teacher is especially important because decision making about computers in many school districts is decentraalised and teachers have considerable discretion in determining whether to use computers at all but also in formulating goals and cirricula. Also, any educational innovation is always filtered through teachers as they modify instructional activities to fit their beliefs and the instructional and management routines in their classrooms (MacArthur & Malouf, 1991).

Recent literature however, points to the fact that many teachers feel unprepared and lacking in knowledge to successfully implement computers into classrooms (Tyler-Wood, Putney & Cass, 1997). As Cicchelli and Baecher, (1985 cited in Au, 1996) has pointed out, the fast pace in which computers have become a feature of modern classrooms have found many teachers not only uninformed about them and how to make the most effective use of them in their classrooms, but has also generated a great deal of fear and confusion. This raises the important question of professional development.

Professional Development and Training

Boyd (1999), in a rare New Zealand study, found two recurring themes concerning professional development. Her study of twelve computer using students with special needs highlighted the lack of training provided for many of the educators and parents who were using the computer equipment with the children and for some, a corresponding lack of confidence in using the equipment. This lack of training was in two areas:

- operating the hardware and software, and
- supporting the children's learning using the software.

She found that this lack of training and confidence hampered the ability of educators and parents to support the children in the study.

In the research reported earlier by Derer, Polsgrove and Rieth (1996) 69% of teachers reported they had received some form of training in the assistive

technology. Respondents reported that some of their training needs had been met and 19% thought that most or all of their needs were met. In terms of the type of training that teachers thought was effective, it appeared that consultation alone did not appear effective but that teachers thought that in-service workshops were the most viable option for meeting their needs.

Hutinger, Johanson and Stoneburner, (1996) found that staff technology training is uneven as children's progress through school. In the best of situations, ongoing training and support for staff and families is built into the system. For those in their study, this was not the case. Staff reported receiving both formal and informal technology training. Formal training included college courses, technology workshops and technology consultations.

McGregor and Pachuski (1996) in a study of teachers with primary instructional responsibility for students with special needs who had received equipment found that in terms of training, specifically focused group training sessions were rated more important to teachers than other forms of training. Manuals and training videos were rated as the least important training resource for teachers, yet print resources were the most available source of support reported by teachers. McGregor and Pachuski also found that general background and proficiency in the use of technology in the classroom for instructional purposes does not minimise the need for specifically focused training on the actual equipment used by a student in the classroom. Furthermore, there are some

equipment specific supports, such as set-up, programming, upgrading, maintenance and repair that represent potential barriers, seemingly due to unmet support needs in this area.

Derer, Polsgrove and Rieth (1996) found that teachers reported a variety of assistive technology training formats, the most prevalent being inservice workshops, yet, 31% of respondents who received training reported that few of their needs were met. This group, combined with 20% of respondents who received no assistive technology training represented a group of 41%.

A national survey of technology staff development in K-12 schools revealed that 8% or less of any given technology budget is allocated for staff development (Tyler-Wood et al., 1997). Siegel (1995 cited in Tyler-Wood et al., 1997) believe there is a lot of good intentions out there but more talk than action. They report that many of the workshops provided deal with specific software or hardware rather than focusing on how technology can be used as a tool to expand and enrich the curriculum.

Tyler-Wood et al. believe that teacher education programme personnel must realise that merely providing training on computers may not be enough to ensure that special education teachers achieve computer literacy computer training may not be effective if special education teachers have no adequate access to computers and that accessibility to computers should be ensured before computer-training activities begin.

Pre-Service Teacher Training

In a review of the literature, Howell (1996) found that teachers in both general and special education are still not receiving the preservice and inservice training they need. One study indicated that only about one-third of all teachers had received as much as 10 hours o hands-on computer training, and most of this training was using the computer as an object of instruction rather than as a tool for instruction (Office of Technology Assessment, 1988, cited in Howell, 1996).

Langone, Wissick, Langone and Ross (1998) researched the relationship between a graduate level programme to train special educators in technology skills and the attempts of six graduates. They found that pre service training appeared to affect graduates initially by increasing their use of special education technology and changing their attitudes about the effectiveness of technology. Programmes had little impact however in helping most of the graduates overcome several institutional barriers that seemed to impede their continued growth relating to technology use such as applying for funding. They also found that graduates also needed more competencies for linking computer-based instruction with more appropriate curricular options. Most of the graduates failed to link their choice of educational software or technological devices with short-term objectives on student IEP's.

Langone , Wissick, Langone and Ross (1998) also found that pre service programmes need to model appropriate technology use and provide teacher

trainees with frequent opportunities to practice using the technologies as learning tools and as teaching tools. The researchers believed that teacher preparation programmes need to find new methods to provide ongoing support to their graduates including reinforcement for technology use and information updates about technology applications such as electronic mail for communication and access to the superhighway. They also suggest that course work relating to special education technology should provide:

- Teachers with competencies for linking computer-based instruction with more appropriate curricular options (as they found that there was a lack of technology integration among the six graduates).
- More emphasis on the development of more effective and functional IEPS before more appropriate integration of special education technology can occur. This is because when analysing IEP's they found repeated use of drill and practice software and only a few instances of computer based instruction to reinforce higher order learning such as problem solving.
- Strategies for developing a technology plan and skills in improving public relations. These skills may allow teachers to sell needs for equipment purchases to administrators who are willing to allocate funds, but may have little knowledge about the technology needs of students with disabilities.

Derer, Polsgrove and Rieth (1996) suggest that it would be unrealistic to expect that any one training format or combination of formats will provide teachers with

all of the information and skill needed to use assistive technology in the classroom. The amount of information and situations in which technology is used are varied, complex, and changing too rapidly for a training program to meet all needs for all people. However, training can provide information on ATDs and available resources, as well as hands-on experience in device operation

Derer, Polsgrove and Rieth (1996) also suggest that a coordinated multi-faceted approach may facilitate the dissemination of information to teachers. Such an approach might include: (a) creating a telephone information hotline staffed by assistive technology specialists; (b) distributing an assistive technology newsletter to special educators; (c) compiling product reviews by educators and making them available to classroom teachers; (d) employing district-level specialists in assistive technology to serve as resources to classroom teachers; (e) networking at the district level through which teachers can share their assistive technology experiences; (f) school-level (or possibly classroom-level) access to computer bulletin boards addressing assistive technology (p. 78). Careful attention to dissemination strategies may influence both teachers' perceptions of the ease in obtaining equipment and the time factor in keeping abreast of new developments.

Au (1996) believes that as it is ultimately up to the teacher whether or not computer technology will be used effectively in the classroom and therefore there is an urgent need for teachers of children with special needs to take every opportunity for training in computer literacy so that they can: (a) become proficient at

computer usage, and be kept up to date with the rapid changes in computer technology, (b) become aware of the potential and the limitations of computers in enhancing the educational opportunities of special education students and in particular, the potential of the use of computers in the development of higher order thinking skills in students with special needs, (c) learn how to make the most effective use of computers in the classroom, (d) gain ideas for cross-curricula use of computers in the classroom, (e) become familiar with the special peripheral devices available for students with physical disabilities and/or sensory impairments, (f) be informed on a regular basis about the most effective software packages for children with special needs; and (g) become familiar with ways to adapt software packages to suit the special needs of students. Au suggests possible sources for this kind of training and they include:

- Pre-service training
- On going in-service courses
- Staff meetings
- Staff development days
- Regular support documents supplied by the various state Departments of Education and/or by local professional services centres
- Regional, state, or federal consultancy services
- External or internal courses from tertiary institutions.

Teacher Confidence and Competence

McInerney, McInerney and Sinclair (1990 cited in Tyler-Wood, Putney & Cass, 1997) found that computer ownership by first-year education students had a powerful effect on the levels of competence and anxiety in relation to computers. These researchers found that the only subjects who exhibited confidence in their computer skills were those who rated their competence as high and who owned computers. Such ownership allowed for more frequent experimentation and hands on experience.

Tyler-Wood, Putney and Cass (1997) surveyed 234 graduate students who were taking graduate courses in special education as well as teachers who taught in a public school classrooms that served students with a variety of disabilities. They found that teachers' perceived computer competence was significantly related to computer ownership and access to a computer. Tyler-Wood et al. report that computer aided instruction occurs more frequently in classrooms of teachers who are confident in their own computer skills and that teachers' confidence in their abilities to integrate computer technology into curriculum is directly enhanced by hands-on experience and personal ownership of computers. They have found that the only subjects in their study that exhibited confidence in their computer skills were those who rated their competence as high and who owned computers. Such ownership allowed for more frequent experimentation and hands on experience. They also found that the computer coursework is not significantly related to

teachers' perceived computer competence. There was also a lack of relationship between age and perceived competence.

In a study of nominated proficient computer using teachers, Brown (1995) found that the teachers were well-qualified with considerable practical teaching experience. These teachers incorporated a range of software applications into their classroom programmes. The predominant orientation among these teachers was towards a learner centred approach where the teacher was seen as a facilitator of learning and the computer was believed to support social development in the classroom. The age of proficient teachers ranged from 20 to 60+ but the largest group fell within the 40-49 year age group. Females were more represented as proficient computer using teachers than males.

The Role and Practices of the Teacher

Research suggests that when students use computer based instruction (CBI), teachers must adopt new and different roles. A common theme in the literature is that the teacher often serves as a facilitator of knowledge rather than the central source of information (Brown, 1995; Cosden & Semmel, 1987; Okolo, Bahr & Rieth, 1993). Because computer based learning can give students access to authentic experiences that are difficult to provide in traditional classroom settings, the types of activities that are possible are changing teaching practices and teacher roles. Okkolo, Bahr and Rieth (1993) give examples such as production of school newsletters, video-disc based access to scientific problems that are anchored in real-

world context and suggest that this change is having widespread effects on the nature of instruction in schools.

However, Brown (1995) found that teachers reported few changes to their teaching practice as a result of using computers in the classroom. Brown believes that there may be a number of reasons for this. First, teachers may not have been able to accurately recall the changes that took place. Secondly, teachers may not have been consciously aware of their prior beliefs and, therefore, were unable to reflect on any subsequent changes to their practice as a result of introducing the computer. Third, proficient computer-using teachers may already value a learner-centred philosophy, and their willingness to integrate the computer into the classroom is influenced by this belief. Brown believes that there are sound reasons to assume that computers are used by proficient teachers in innovative ways because they already harbour such a philosophy. MacArthur & Malouf, (1991) concur, and believe that teachers' beliefs about computers and about pedagogy are important factors in determining how computers are used.

Evidence suggests that at least initially computer based instruction makes classroom management more difficult as revealed in several observational studies comparing special education teacher behaviours in computer-use and non-computer use (Moore, 1990; Rieth et al., 1987. Cited in Okolo, Bahr & Rieth, 1993). These studies showed that in the computer using classrooms, teachers spend more time structuring and directing students, preparing materials, and consulting and less time

engaged in planned instruction, such as lecturing, demonstrating, and leading class. Research also suggests that computer use in classrooms required complex decisions by teachers (Okolo, Bahr & Rieth, 1993). Okolo et al. describe such decisions as establishing goals and objectives, selecting materials and planning activities, organising the classroom, monitoring and assessing student performance and evaluating lessons for further planning.

BENEFITS OF COMPUTERS USE BY LEARNERS WITH SPECIAL NEEDS

Teachers, parents and students have identified a range of benefits brought about by the use of computers by learners with special needs. These are summarised as follows:

- Students can work at their own pace.
- Immediate feedback can be provided to learners.
- The use of computers can improve their self-concept.
- Instruction can be varied.
- Students can exert control over their own environment.
- Computers can provide individual instruction.
- Instruction can be personalised and self paced.
- Computers provide immediate feedback.
- The computer can be tailed to met individual learning needs.
- Students can work at their own pace.

- The computer can provide for over learning.
- The computer can free up the teacher.
- The computer can provide access to a wide range of CAI programmes that allow learning to take place in a true multisensory mode.
- A number of peripherals such as sound cards, speakers and microphones are available with most of the multimedia computers.

(Au, 1996; Boyd, 1999; Cole & Chan, 1990; Curzon, Selby & Ryba, in press; Derer, Polsgrove & Rieth, 1996; Hutinger, Johanson & Stoneburner, 1996; Lewis, 1997; MacArthur & Malouf, 1991; Viadero, 1997; Wehmeyer, 1999).

Viadero (1997) sums up the theme of the literature when he states:

> While mainstream educators continue to debate the merits of buying expensive educational technology for schools, special educators engage in no such argument. Technology has literally helped open schoolhouse doors for disabled students and given impetus to the 'full inclusion movement, which calls for teaching disabled students in regular classroom s whenever possible.

Viadero also believes that the main benefit of computers is that they are able to enhance a child's communication by helping them to write clearly and therefore be understood more readily, to keep pace with other class members and to produce more presentable work.

Derer, Polsgrove and Rieth (1996) identified four major benefits identified by teacher respondents. These were (a) environmental or those related to changes in students' social and instructional ecology. (b)) interdependence - those involving a

reliance on the machine to improve functioning in various settings. (c) Student - those that are perceived to enhance intrinsic skills of students such as coping, independence, productivity and self-concept and (d) Esoteric, intangible issues involving a vision of an idealised outcome using assistive technology.

Respondents said that the assistive technology offered new experiences for children with a disability and that it also had a positive effect on non-disabled learners in the same classroom. Many Respondents also mentioned assistive technology's role in individualising instruction, providing immediate feedback or enhancing the teacher's ability to programme for the child. Many respondents also felt the computer had a positive personal and professional effect upon the teacher of the child using the computer. The most frequently mentioned student related benefit involved the perception that assistive technology enhanced the user's independence and self-determination. Respondents felt that the computer had the ability to circumvent or minimise the impact of the disability and also allowed them enhanced capacity to communicate.

In a study by Boyd (1999), 92% of parents thought their children with special needs were generally benefiting from the use of computers. The benefits most reported were enhancements in:

- written, oral or visual language skills,
- motor skills,
- computer operation skills,
- concentration,

- communication skills,
- self management and independence,
- motivation and self-esteem and
- work completion skills.

The congress of the United States in the findings and purposes section of the Technology-Related Assistance for *Individuals with Disabilities Act* of 1988 stated that the provision of assistive technology devices and services to individuals with disabilities enables "individuals to: (a) have greater control over their own lives; (b) participate in and contribute more fully to activities in their home, school and work environments, and in their communities; (c) interact to a greater extent with non-disabled individuals and (d) otherwise benefit from opportunities that are taken for granted by individuals who do not have disabilities" (p. 1044, cited in Wehmeyer, 1999).

In a two year longitudinal case study that analysed how assistive technology was used in educational programmes for 14 children with disabilities, Hutinger, Johanson and Stoneburner, (1996) reported that both parents and staff felt the greatest impact of assistive technology were in the areas of emotional outcomes. This included things such as independence, social interaction, cooperation and enhanced self- esteem. Both parents and teachers reported the greatest benefits to children were in the areas of social and emotional behaviours. Benefits were also were reported by families and teachers in the areas of cognitive development, communication, and motor development (in descending order). Many parents in

the study felt the whole family had benefited from their child's use of technology for communication. A number of teachers in the study thought that because the children were able to make decisions for themselves, pressure had come off them as the teacher, as they did not have to do everything for the child. Johanson and Stoneburner, (1996) also found that "long term use of assistive technologies may head learned helplessness off at the pass as children grow older, more capable and more confident" (p 35).

It is interesting to note that in a study of five special educators, MacArthur and Malouf (1991) found that these teachers emphasised global affective outcomes, such as increased motivation and self-esteem, rather than specific academic outcomes. In contrast, MacArthur and Malouf believe that the research and development community hold different beliefs regarding the positive impact of computers. They believe that the benefits of computer learning is due to effective instructional design or to taking advantage of the capabilities of computer tools to develop specific cognitive skills. MacArthur and Malouf (1991) also state that future training of teachers should focus on instructional design and the specific ways that computers can support effective instruction.

DIFFIICULTIES/BARRIERS/CRITICISMS

Au (1996) has reviewed the common criticisms of computer use by learners with special needs. The first criticism is that CAI has the potential to isolate students from human interaction hence it may dehumanise the education process.

The thinking is that the learner will interact only with the computer and not the teacher or other students. Au believes that this view seems to stem from a lack of understanding of use of computers in education rather than from any empirical evidence. He believes that research evidence to date does not suggest that computer assisted instruction alienates the students from social interaction and that the extent of social interaction depends on what programmes are used and how they are used. Au believes that the fact that the screens of the computers tend to make student work more public, supports the argument that CAI would promote more social interaction rather than reduce it. Also the nature and extent of student-teacher interaction depends on the extent to which teachers encourage and provide scope for it. Finally, some computer programmes lend themselves to social interaction requiring extensive cooperation and collaboration among students.

Ryba and Selby (1995) write of an early experiment using computers with a learner with an intellectual disability that also dispels this criticism:

> Even though we tried to get them to work in an isolated room, they inevitably found a way of getting a friend to work with them on the computer. One young woman who was shy and lacking in confidence became a key player in the space invader competitions...for her, the computer provided a point of connection with other people (p.3).

A second criticism identified by Au is that many computer programmes have unsound educational values. He identifies two aspects to this criticism: (i) that

knowledge is not always reducible to facts that may be programmed into computer; and (ii) that software tends to control the learners. Au believes that there is some validity to their criticisms, but many recent developments have tended to overcome them somewhat for instance the development of Intelligent Computer Assisted Instruction where students are no longer required to respond to pre-programmed answers.

A third criticism is that there is lack of good quality CAI software. Au believes that although there is a substantial amount of computer software available, much of it is not designed with sound educational rationale and principles and therefore educators must be selective when choosing appropriate software.

Derer, Polsgrove and Rieth (1996) in a study of 279 teachers of learners using assistive technology identified six barriers that were frequently and consistently identified by teachers. By category, these areas are:

- equipment - obtainability
- management - time
- monetary - funds
- Teacher - knowledge
- Teacher - training

A further criticism to be levelled at computer use by learners with special needs is that they are not integrated into the curriculum. Hollingsworth (1996) believes that computers are not being used as part of an integrated practice – that is within the general context of education. He believes the primary reason that this is

happening is simply a lack of teacher knowledge of computers or how to incorporate computers into their instructional area. Okolo, Bahr and Rieth (1993) have found that those applications with the most educational promise (open-ended, student centred and cut across curriculum areas) are not being incorporated into the curriculum. He believes that tis is because most school schedules remain wedded to discrete time blocks of separate subject areas and these are hardly conducive for incorporating these applications.

The time needed to plan and effectively implement computer technology into the curriculum is a barrier and criticism often highlighted in the literature. Okolo, Bahr and Rieth (1993) have found that teachers rarely have the time necessary to plan even modest variations in the classroom routine that would allow the most effective use of computers for learners. Cosden (1988) also reports that time is often cited by teachers as a major factor barrier to more effective practice with computers.

Associated closely with this is the complexity of the equipment, which has been shown as a barrier associated with computer use. McGregor and Pachuski (1996) found that barriers associated with the complexity of the equipment as the most critical concerns reported by teachers in their study. Over 40% reported that time required to become proficient with the equipment presented a substantial barrier to implementation. Similarly, time required to programme the equipment

and the lack of "loaner" equipment were reported as a barrier by over 30% of the teachers. Teachers also reported complexity of use for the student.

Funding is a major barrier identified by both parents of learners with special needs and their teachers. In a survey of teachers in three states in which schools were known to be providing assistive technology services, Derer, Polsgrove and Rieth (1996) found money issues frequently cited as barriers to assistive device use. They believed that administrators may need to pursue alternative funding sources including Medicare, private insurance, corporate grants, and fraternal organisations with service commitments as funding was shrinking. Lewis (1997) believes that adequate funding is one of the most persistent barriers to realising the potential of technology for students with disabilities describing technology as an expensive resource with limited shelf life.

Other barriers identified by teachers include lack of portability of the equipment, lack of technical support, giving up early in the implementation process, the prohibitive cost of equipment, IEPS that lack curricular objectives related to learning or using the technology, lack of information and students who use technology to interrupt or act out (Au, 1996; Carey, 1994; Hollingsworth, 1996; McGregor & Pachuski 1996; Okolo, Bahr & Rieth, 1993; Wehmeyer, 1999).

To overcome some of these barriers, Hollingsworth (1996) believes that teachers should:

1. Learn to use the primary computing tools,

2. Explore methods of integrating computing tools into their teaching as a means of addressing higher order thinking skills and problem solving,
3. Explore ways of using computing tools to offer greater equity within their classroom,
4. Seek out an Internet account,
5. Patiently approach the learning of computers as a "lifelong learning experience",
6. Purchase an affordable computer,
7. Become familiar with a variety of computing resources.

(p. 264-265).

A survey my Wehmeyer (1999) found that assistive technology devices are under-utilised by students with mental retardation. In four of the five use-specific areas, the percentage of students who could potentially benefit from assistive devices but did not currently have access to such devices was greater than the percentage of students who currently used such devices

However, Lewis (1997) found that computer use has increased. In their 1987 study, 60% of teachers reported that students spend at least 30 minutes per week using a computer in school; in 1994, 69% of teachers reported that their students spent at least 30 minutes a week interacting with computers.

In a recent New Zealand study, Green (1997) reported that 70% of students were interacting with computers less than one hour per day, 20% one to two hours per day and less than five percent, three to four hours per day.

COMPUTERS AND THE IEP

The relationship between computer use for learners with special needs and their IEP's has been shown in the literature to be tenuous. Boyd (1999) found that of the twelve children in the study, only one child's observed improvements all matched his IEP goals - this child had the most comprehensive IEP in the study. All the other children made progress in areas not covered by the IEP goals. Many of these achievements were in the areas of communication, self-management and self-esteem, and computer skills. She also found that in some IEPs the use of computers was integrated into the short-term goals, in others it was specified in a separate section, and in some it was barely mentioned or not included. Children for whom computer use was an integrated part of their IEP goals and strategies appeared to have more focused use of their computers both at school and at home.

Hutinger, Johanson and Stoneburner (1996) reported that all but one child had technology applications written into their IEPs by the end of the end of the study. They also found that independent of the child's technology goal on his or her IEP, teachers reported instructional objectives for technology users in the developmental domains of cognition, motor skills, communication, and social and emotional development. Cognitive development including skills related to colour, money, weather, and time was the most frequently cited instructional objective for students.

Green (1997) reported that 79% of students had an IEP. Of those students, 43% has computer goals stipulated in the IEP. Most of the goals were for using the

computer as a word processor and highlighted keyboard skills. Green believes that for many students, the computer was used as a way of teaching a specific skill rather that as a teaching tool but that it is vital that teachers integrate student goals into the classroom programme rather than as a separate programme running parallel to the rest of the class.

MAXIMISING THE POTENTIAL OF THE COMPUTER

Boyd (1999) found that positive coaching strategies was one way to assist children to maximise the potential of the computer. She found the following strategies assisted the children:

- modelling new tasks to the child
- repeating tasks until they were mastered
- using frequent praise and positive encouragement and reinforcement
- actively, rather than passively engaging with the child to encourage mastery of existing skills and development of new skills
- Dividing tasks into manageable chunks relative to the child's skill level
- selecting tasks which encouraged the child's creativity
- encouraging independence and self empowerment by ensuring that the child was not prompted or assisted unnecessarily.

THE RESEARCH PROBLEM

From reviewing the literature, it appears that there is a lack of critical debate over the use of computers to facilitate the inclusion of learners with special needs in New Zealand schools. While it appears the computer has the potential to overcome many barriers faced by learners with special needs, a review of the literature shows that this is not always happening, and in some cases, the computer can erect other barriers especially as they relate to the inclusion of learners with special needs into regular class environments. Also, while we know *what* the computer can do for learners with special needs, clarification is still needed on *how* to do it.

The role of teacher also appears vitally important, but little is known of their beliefs, values, past experiences and practices, especially useful would be a knowledge of these factors from teachers who perceived the computer to be an effective tool for the inclusion of learners with special needs. In short there is still much to learn about the effective use of computers for learners with special needs.

SUMMARY

The research literature on the use of computers by learners with special needs has been reviewed, with a focus on the importance of an ecological perspective. A number of issues were raised in the literature, including the role of the teacher, training and development in the use of computers and the use of computers to facilitate the inclusion of learners with special needs in regular class settings. While it appears the computer has the potential to overcome many barriers faced by

learners with special needs, a review of the literature shows that this is not always happening, and in some cases, the computer can erect other barriers especially as they relate to the inclusion of learners with special needs into regular class environments. Also, while we know *what* the computer can do for learners with special needs, clarification is still needed on *how* to do it.

The following chapter outlines methodological theory that informed this research. The major competing paradigms will be discussed, and an outline of their epistemological, ontological and methodological assumptions. A brief history of special education research will also be provided.

CHAPTER FOUR

METHODOLOGY IN THEORY

INTRODUCTION

This chapter outlines the methodological theory that informed this research. The major competing paradigms will be discussed, outlining their epistemological, ontological and methodological assumptions. A brief history of special education research will also be provided. Criticism of past special education research practices will be discussed along with some counter arguments to this criticism. A discussion of alternative approaches to doing research in the field of special education will be provided along with a rationale for their use. It will be argued that a multi-dimensional approach that employs both quantitative and qualitative methods of data collection is the most appropriate for this research project. This allows us to keep those methodologies that have proved useful in the field of special education as well as heeding the recent calls for the use of more interpretive research methodologies in special education research.

THE MAIN RESEARCH PARADIGMS

As Guba and Lincoln (1994) assert, no researcher should go about their work without being clear about what paradigm informs and guides their approach. Paradigms are basic belief systems based on ontological, epistemological and

methodological assumptions. Ontology is concerned with what exists, what is the nature of the world, what is reality. Epistemology is concerned with what distinguishes different kinds of knowledge claims, what is 'knowledge' and what is 'non-knowledge'. Methodology is concerned with how a person can go about finding out what they want to know (Guba & Lincoln, 1994).

There are a number of paradigms that have guided research over the years, traditionally this was of a scientific nature, but as assumptions based on this paradigm began to be questioned, new ways of thinking about the nature of the world and knowing began to surface. The following discussion outlines the nature of the competing paradigms, and highlights the philosophical assumptions underpinning each one.

Positivism

The positivist paradigm grew out of the enlightenment's dismantling of tradition as the source of knowledge and replacing it with science as the source of knowing. (Crotty, 1998). It is based on the view that there are discoverable, regular patterns of natural phenomena that can be explained in a mathematical or logical way (McPhail, 1995). Positivism is based on a number of epistemological and ontology assumptions, Usher (1996) provides a useful summary of these assumptions:

- The world is objective and is made up of events or phenomena which are lawful and orderly. It is possible to discover this lawfulness and to explain, predict and control events and phenomena.

- There is a clear distinction between the 'subjective' knower and the 'objective' world. The subjective must not interfere with the discovery of 'objective' truth.
- Different observers exposed to the same data should be able to come to the same conclusions.
- The social world is very much like the natural world in that there is order, reason and things do not just happen randomly and arbitrarily. The goal of research is to develop universal laws that explain this world. These universal laws would be common to both the natural and the social sciences.
- The natural sciences and the social sciences share a common logic and methodology of enquiry.
- Epistemological enquiry about the research process is a futile exercise. If the correct methodological procedures have been properly applied, questions of reflexivity do not need to be considered.

(p. 12-13)

Positivism emphasises that there is a truth to be known and it is independent of the social context with which it resides.

Post Positivism

Post Positivism grew from a dissatisfaction with the absoluteness and dogmatism of positivist science (Crotty, 1998). Although it still employed quantitative data gathering methods, it saw a change from the *verification* of hypotheses to a *falsification* of them. Rather than making a guess and proving it right, post positivism saw researchers making a guess and then trying to prove it wrong. Clark (1997) simplifies the post positivist approach as a process of:

Problem - bold falsifiable conjecture – test - eliminated - new hypothesis – test (p.24).

Therefore it is only when propositions deduced from scientific theory have survived every attempt to refute them that the theory can be provisionally accepted as true (Crotty, 1998). Crotty points out that the operative word here is 'provisionally' as, at the heart of post positivism is the conviction that no theory can ever be definitively accepted as true. As Karl Popper (1902-1994), considered the 'father' of post positivist theory, stated "every scientific statement must remain tentative for ever" (1959, p.280. Cited in Crotty, 1998).

Interpretivism

Interpretivism emerged as a reaction to positivism and considered the logic of scientific research as inappropriate to the social world. Interpretivism assumes that, in the social world, knowledge is concerned not with generalisation, prediction and control (as thought of in the natural science world) but rather with interpretation, meaning and illumination (Usher, 1996). The interpretivist approach advocates that to understand human behaviour, researchers need to focus on interpreting the meanings that individuals give to their experiences, that is to discover the motives, desires, beliefs and attitudes of the individuals performing an action. To do this is to understand an individuals 'subjective meaning' (Clark, 1997, p.38). From an interpretivist paradigm, this can only happen within the context of social practices as all human behaviour is meaningful and purposeful. Furthermore, Gadamer (1975) argues that it is impossible for the researcher to separate themselves from

the historical and cultural context that they are in and thus, the 'subject' and 'object of research cannot be separated.

Critical Theory

Critical theory rejects the notion that there can be objective knowledge. It can be described as a combination of science (positivism) and philosophy (interpretivism) in order to resolve the divisions between facts and values (Reid, Robinson & Bunsen, 1995). Critical Theory is based on research that changes the world in the direction of freedom, justice and democracy (Usher, 1996). The knowledge interest involved in Critical theory is emancipatory – where ideologies that have maintained the status quo and restricted the access of groups of people to the means of gaining knowledge are uncovered and action is taken to change these situations (Usher, 1996).

Constructivism

Constructivism describes the individual human subject engaging with objects in the world and making sense of them (Crotty, 1998). Constructivists believe that knowledge and truth are created, not discovered and are the result of perspective. They believe that reality is pluralistic in that reality is expressible in a variety of symbol and language systems. They also believe that reality is plastic because it can be stretched and shaped to fit the purposeful acts of people (Schwandt, 1994). The constructivist philosophy purports that what is real is constructed in the minds of people and this means that there is often multiple realities of which all are

potentially meaningful (Guba & Lincoln, 1994). Research in a constructivist paradigm begins with issues and concerns of the participants and unfolds through a "dialectic of iteration, analysis, critique, reiteration, reanalysis and so on that leads eventually to a joint (among inquirer and respondents) construction of a case/findings or outcomes" (Schwandt, 1994, p. 129).

SUMMARY/COMPARISONS OF MAIN RESEARCH PARADIGMS

Guba and Lincoln (1994) suggest that the basic beliefs that define paradigms can be summarised by the answers given by proponents of any given paradigm to three questions. These are:

- What is the form and nature of reality and therefore what can be known about it? (the ontological question)
- What is the nature of the relationship between the knower or would-be-knower and what can be known? (the epistemological question)
- How can the inquirer go about finding out whatever he is she believes can be known? (the methodological question)

In terms of the responses that proponents of each paradigm might make, Guba and Lincoln (1994) have summarised in the following:

Table 4.1

Research Paradigms

Item	Positivism	Postpositivism	Critical theory	Constructivism/ Interpretivism
Ontology	Real reality but apprehendable	Real reality but Imperfectly apprehendable	Reality shaped by social, policial, cultural, Economic and gender values	Local and specific constructed realities
Epistemology	Objective. Findings are truth	Objectivist. Findings are probably true	Subjective. Value mediated findings	Subjective. Created findings
Methodology	Experimental Verification of hypothesis. Mainly quantitative methods	Modified experimental. Falsification of hypothesis	Dialogic/dialecti-cal	Hermeneutical/ dialectical

RESEARCH IN SPECIAL EDUCATION

The foundation of knowledge base in special education is rooted in the positivistic tradition of the natural sciences (McPhail, 1995). This is not just an historical phenomenon, even up until quite recently, special education research has

been predominantly based in positivist thinking. Reid, Robinson and Bunsen (1995) sampled 10 major journals in the field of special education from 1988 to 1993. They found that the vast majority of articles were hypothesis-testing, studies that employed traditional statistical tests. The purpose of such research has been to gain principles that could be generalised and used to guide practice in special education, similar to the way that scientists succeeded in exerting mastery over the physical world (Gallagher, 1998). Special Education has come in for much criticism for this paradigm dominance (Anderson & Barrera, 1995; Bogdan & Lutfiyya, 1992; Carnine, 1999; Ferguson, 1993; Gallagher, 1998; Reid, Robinson & Bunsen, 1995; Skrtic, 1991). The nature of this criticism has generally been two fold.

First, law like generalisations cannot be applied to education. For example, the idea that when a particular piece of technology is used for a student, learning will improve cannot be made in education as there are too many variables. The success of the programme might depend on the teacher, the environment, the type of technology, the other students in the class, the student themselves, and the relationships and reactions between all these. What Gallagher (1998) believes lies at the heart of this is that human affairs are inherently unpredictable, and even though we can gather much information about how people act under certain conditions, we can never predict in a definitive how they will act at any given time. She believes we cannot predict this for two reasons. First, people differ from each

other in an endless number of ways, and second, we can never know how an individual will act at any given time and we cannot know how one persons act will affect the actions of others, and how their acts will affect others and so on.

The second criticism of the positivist nature of special education research has been that scientific knowledge has not been able to resolve problems in special education (Gallagher, 1998). For example problems such as identifying who is gifted, or behaviourally disordered, is an inclusive environment the best environment for a learner with special needs and so forth (debates that have long raged in Special Education literature). If scientific knowledge served Special Education so well, these problems would have long been put to rest.

The researcher would add one further criticism. Positivist research in special education has, in the process of generalising its findings, tended to label and assign roles to learners with special education needs. For example research which may find that learners with Down Syndrome in a particular research sample are not able to read tended to generalise these findings to all learners with Down Syndrome, thus labelling them as incapable of reading. The implications for this sort of labelling is well documented in Special Education literature (Ysseldyde & Algozzine, 1990).

Of course, this does not mean that objective/positivist research is all irrelevant for Special Education. Tunmer (1999) argues that if we accepted the interpretivist claim that educational research can only provide findings that are firmly embedded

in social contexts, we would be left nowhere. Tunmer states that "if research doesn't relate to anything we currently know (i.e. if it isn't theory driven), if it doesn't address a question of interest posed by the researcher (i.e. if it isn't hypothesis testing), or if it doesn't produce knowledge that others can use because it is bound to a particular setting (i.e. if it isn't generalizable), then how can it even be called research" (p.2)

Therefore, while some researchers may claim that a shift in paradigms is necessary and in fact occurring in Special Education (Guba & Lincoln, 1989; Peck & Furman, 1992) others are calling for a more balanced approach in which education issues can be looked at from many perspectives, including positivist and interpretivist (Gaylord-Ross, 1990-1992; Reid, Robinson & Bunsen, 1995).

FURTHER CRITICISM IN SPECIAL EDUCATION RESEARCH

Linking Theory to Practice

Vulliamy and Webb (1992) have suggested that one of the main concerns of special needs researchers has been to address the problem of the perceived gap between theory and practice, which was identified in two major reviews of special needs research (Cave & Madison, 1978 and Wedell & Roberts, 1981 cited in Vulliamy and Webb, 1992). They suggest that the broadening of research approaches as discussed previously is one way of increasing the relevance of research to practice and also trying to bring researchers and teachers in closer partnership with each other. Basey (1981; 1983 cited in Vulliamy & Webb, 1992) argue that much

traditional educational research carried out by specialists and couched in their language, was rejected by practising teachers as of little use to them in solving practical problems. They suggest that pedagogic research as one way of linking theory to practice. Pedagogic research has it main aim as the improvement of practice and employs research techniques, ways of presenting findings and publication outlets that are eclectic and readily accessible to teachers.

Qualitative versus Quantitative Research

There have been some researchers who have viewed quantitative and qualitative research as being incompatible, a position that Tunmer (1999) refers to as 'incompatibility thesis'. Traditionally the positivist paradigm has claimed to support quantitative methods and more interpretive paradigms to support qualitative methods. Tunmer (1999) believes that this incompatibility thesis should be rejected as there are no strong pragmatic or epistemological reasons for viewing quantitative and qualitative approaches as mutually exclusive. He believes that they can be compatible and supportive and suggests that the integration of both methods is possible and highly desirable.

Crotty (1998) confers, he believes that if it suits their purposes, any of the theoretical perspectives could make use of any of the methodologies, and any of the methodologies could make use of any of the methods. He does point out that there are typical methods and methodologies attached to certain paradigms, but that *typical* does not mean *mandatory.*

Vulliamy and Webb (1992) also have been heard calling for a judicious blending of quantitative and qualitative approaches in Special Education research. Given the strong legacy of positivist research in the field, but also the recent recognition of the need for alternative approaches, they believe these calls are not surprising. Mittler (1985, cited in Vulliamy and Webb, 1992), suggest that one of the most fruitful areas for such a combination of approaches is in the evaluation of policy changes and innovations. Mittler (1985) believes that "this approach provides rich possibilities for concentrating on process variables without neglecting product outcomes" (p. 174).

METHODOLOGICAL ASSUMPTIONS OF THIS STUDY

When considering the arguments of the competing paradigms, the qualitative versus quantitative debate and the arguments for more pedagogical research in special education, the views of Reid, Robinson and Bunsen (1995) appear highly relevant.

> What is needed for the survival of our field is a dialogue in which communicative ethics are allowed to promote an openness to, and an incorporation of, new ideas and different perspectives. Only if we learn to value diversity and to work together as special educators will we be able to adapt to the needs of a changing world, to protect what is useful in our field, and to invent new policies and interventions that address needs and interests

> that incorporate the best from the scientific, interpretive, and critical traditions (p. 139).

It is from this stance that this research project is based, that is, upon a multi-dimensional paradigm, employing both quantitative and qualitative research methods. The multi-dimensional approach allows for the multiple perspectives of teachers participating in the study to be heard and represented, and thus, is more valuable in understanding the research problem.

SUMMARY

This chapter has outlined the methodological theory that informed this research. The major competing paradigms were discussed, and their epistemological, ontological and methodological assumptions outlined. A brief history of special education research was also provided. Criticism of past special education research practices, along with some counter arguments to the criticism was provided. It was argued that a multi-dimensional approach that employs both quantitative and qualitative methods of data collection is the most appropriate for this research project, as it allows us to keep what has proved useful in the field of special education as well as providing for the multiple perspective's of the teacher s who participated in the study.

The next chapter discusses the methodology in practice including reiterating the research problem, and outlining the aims of the study. Details of the methods,

procedures and techniques employed are thoroughly discussed as well as ethical issues and methodological limitations.

CHAPTER FIVE

The Methodology in Practice

INTRODUCTION

This chapter reiterates the research problem, outlines the research aims and discusses the methodological approach used in this study. It presents the research questions, outlines the two phases of the study and details the methods, procedures and techniques employed. A discussion of ethical issues and methodological limitations are also presented.

RESEARCH PROBLEM

A review of the literature shows a lack of critical debate over the use of computers to facilitate the inclusion of learners with special needs in New Zealand Schools. While it appears the computer has the potential to overcome many barriers faced by learners with special needs, the literature also shows that this is not always happening, and in some cases, the computer can erect other barriers especially as they relate to the inclusion of learners with special needs into regular class environments. Also, while we know *what* the computer can do for learners with special needs, clarification is still needed on *how* to do it. .

The role of teacher is also appears vitally important, but little is known of their beliefs, values, past experiences and practices, especially useful would be a

knowledge of these factors from teachers who perceived the computer to be an effective tool for the inclusion of learners with special needs.

RESEARCH OBJECTIVE

To examine how computers are used to cater for the needs of learners with special needs, and in particular, the beliefs, experiences and practices of teachers who believe the computer to be an effective tool for including learners with special needs in regular class settings.

RESEARCH AIMS

The aims of the research are to:

1. Gather information regarding teachers' beliefs about the inclusion of learners with special needs in regular classes.
2. Provide background statistical information on the present use of computers with learners with special needs.
3. Document the beliefs that teachers have about the use of computers to include learners with special needs.
4. Identify those teachers who believe the computer to be a useful tool for the inclusion of learners with special needs, and gather information on, and document, their beliefs, experiences and practices.

RESEARCH POPULATION

The target population for the research were teachers in primary or intermediate schools, who had a learner or learners in their class allocated a Ministry of Education funded computer for reasons of special need .

Research Sample

The research sample was drawn from a Ministry of Education database of schools in New Zealand who had a learner (or learners) with a Ministry of Education funded computer for reasons of special need. From this database, schools in the Lower Hutt and Wanganui regions were selected to be sent a questionnaire. This amounted to 59 schools and 67 teachers and learners (Note: The Wanganui region included Palmerston North and surrounding districts including Wanganui city).

Justification for Sample

The areas of Lower Hutt and Wanganui were chosen for a number of reasons. Historically, there has been strong support for the use of computers in the Palmerston North area and the University situated there (Massey University) has sponsored a number of computers in education courses (Brown, 1995). The use of computers for learners with special needs also makes up part of the compulsory special education course in the training of teachers at Massey University and this has seen a number of teachers graduate recently with a knowledge of the use of computers in this field. There is also a recognised strong knowledge base at the

Specialist Education Services Office in the central area and the Lower Hutt region and Specialist Education Services have the contract from the Ministry of Education to provide and manage services in the area of assistive technology. This includes determining eligibility, assessments, purchase and management of the equipment.

RESEARCH ADVISORY COMMITTEE

To assist with the selection of participants in phase two of the study, the researcher invited three people, each with expertise in an area of the research to participate on a Research Advisory Committee (See Appendix A). The members were: (a) a teacher representative with special interest and qualifications in special education, (b) a senior lecturer at Massey University who teaches in undergraduate and postgraduate special education courses and has had previous experience in special education research, and (c) a lecturer at Massey University who teaches at undergraduate level in educational computing. These three people and the researcher constituted the Research Advisory Committee.

Justification for Advisory Committee

The research Committee provided an informed and trustworthy way of selecting participants for phase two of the study. The committee was chosen on the basis of their expertise and the varied perspective's they could bring to the sample selection process.

PHASE ONE

The purpose of phase one was to collect data on:

- the nature and extent of computer use by learners with special needs;
- the background, perceptions and beliefs of their teachers regarding inclusion and the use of computers by learners with special needs;
- factors unique to those teachers who believe the computer to be an effective tool to support the inclusion of learners with special needs in regular class settings;
- the beliefs, perceptions and practices of teachers who believed the computer to be an effective tool to support the inclusion of learners with special needs in regular class settings.

Research Questions

Phase One of the research was based on the following questions:

1. How are computers being used in regular classrooms for learners with special needs?
2. What are teacher's beliefs regarding the inclusion of learners with special needs in regular classes?
3. What are teacher's beliefs regarding the effectiveness of the computer for including learners with special needs in regular settings?
4. What factors do teachers perceive influence the effective use of computers to include learners with special needs in regular settings?

5. What are the perceptions, beliefs and practices of teachers who believe the computer to be an effective tool for including learners with special needs in regular class settings?

Sample Selection Procedure

Sources in the Ministry of Education were contacted to supply a copy of the database listing all schools who had been supplied with a computer for a learner/s with special needs. From this database, all schools in the Lower Hutt and Wanganui regions were sampled. This involved 59 schools, and 67 teachers/learners.

METHODOLOGY

In light of the methodological assumptions discussed in chapter four, a survey method was adopted as the most appropriate method of addressing the research questions and a confidential written questionnaire was used to collect data.

Survey

Survey research involves selecting a sample of respondents and collecting information on variables of interest. The data that are gathered are used to describe characteristics of a certain population and are used to learn about people's attitudes,values, beliefs, practices, demographics and so forth (McMillan & Schumacher, 1997). The usual forms of data collection in survey type research in the questionnaire and the interview.

Questionnaire

A confidential questionnaire was devised to gather information on the five research questions of phase one, and was sent to schools in the month of July. Respondents were asked to return the questionnaires by a date approximately three weeks from when they received them.

The questionnaire employed a variety of types of questions, including category, ranking, scale and quantity type questions as well a open questions were teachers were able to respond in an extended comment (Refer to Appendix B).

Justification for Data Collection Method

The questionnaire was considered the best method for phase one of the study as it allowed a confidential way of eliciting information from a reasonably large group of teachers regarding their experiences and practices with computers for learners with special needs. As each respondent had the same set of questions, comparisons could be made and selection criteria established for selection of interviewees for phase two. Questionnaires also allowed the research to reach a wide geographical range of teachers that could not have been accessed using other methods of data collection.

Pilot Questionnaire

A draft questionnaire was piloted with three teachers who would not be part of the sample. Teachers were asked to comment on length of time it took to answer the questions, the clarity of instructions, the clarity of questions and whether any

questions were objectionable . The teachers were also asked to comment on the coverage of important topics in the field, and the layout of the questionnaire. Responses from the piloting exercise allowed refining of the final questionnaire that was used in phase one of the study.

Description of the Questionnaire

The questionnaire was developed based on the current literature in the field of computer use by learners with special needs. It was made up of 42 questions, and elicited information in a variety of ways including list, category, ranking and scale questions as well as more open ended questions. The questionnaire was divided into two main sections, a) teacher information and b) learner information. For each of these main sections, there were sub-sections. Teacher information was divided into four subsections, these were: (i) background information, (ii) training and professional development, (iii) teacher's perceptions regarding the benefits and drawbacks of computer use for learners with special needs and (iv) teacher's perceptions regarding the use of computers to help facilitate the inclusion of learners with special needs in regular class settings.

Questions regarding the learner elicited information on five themes. These were: (i) background information , (ii) funding and support, (iii) curriculum, (iv) software and hardware and (v) the individual education plan.

Teacher respondents were also asked if they would be prepared to take part in a follow up interview in phase two of the study. If they were willing to do this, they

filled in their name and contact details at the end of the questionnaire (see Appendix B)

Procedure

A letter was sent to all principals of the 57 schools (see Appendix B) outlining the nature of the research and inviting them to pass on the enclosed questionnaire to the teacher or teachers on their staff who had a learner in their class with a Ministry of Education funded computer for reasons of special need. Teachers were invited to complete the questionnaire and return it using a stamped addressed envelope provided for this purpose. Attached to the questionnaire was an information sheet for teacher participants. This set out the rationale and aims of the study, participant rights as outlined in the Massey University Code of Ethical Conduct, and the names and addresses of the researcher and supervisors (see Appendix B).

Return Rate of the Questionnaire

A total of 67 questionnaires were sent to 57 schools. There were 43 questionnaires returned completed, five were returned as there was no longer a child with a computer at a particular school, and 17 were not returned at all. One questionnaires which was returned, but did not make up the sample as it was deemed invalid as it had been filled in by a teacher aide, and not the class teacher. Table 5.1 summarises this information.

Table 5.1

Questionnaires Sent and Received

Categories	**No**	*%*
Questionnaires sent	67	100
Questionnaires returned completed	43	64
Questionnaires returned not completed	5	7
Questionnaires returned but invalid	1	1
Questionnaires not returned	17	25
TOTAL	67	100

Data Analysis

Data from the questionnaires was entered into the computer using the software SPSS (Statistical Packages in the Social Sciences). Data was analysed and presented in relation to the research questions.

PHASE TWO

The purpose of phase two of the research was to gather information from teachers who believed that the computer was an effective or very effective tool for including learners with special needs in regular class settings.

Research Questions

For teachers who perceive the computer to be an effective tool of inclusion:

1. What are their beliefs regarding the inclusion of learners with special needs in regular classes?
2. What are their beliefs regarding the teaching and learning process?
3. What past experiences do teachers perceive have shaped their beliefs and practices?
4. How do they use computers to support the inclusion of learners with special needs?
5. What are their perceptions as to variables that affect the successful use of computers to support the inclusion of learners with special needs?

Sample Selection

The sample for phase two of the study was chosen by the Research Advisory Committee on the basis of the responses to the questionnaire. The first criteria was those respondents who indicated their willingness to participate in a follow-up interview. This amounted to 20 teacher respondents. From this group, the research committee agreed upon further criteria, that was all those teachers who believed that the computer was very effective in allowing the inclusion of learners with special needs in regular settings, this amounted to five teacher respondents. One further criteria was agreed upon by the Research Committee, that was those teachers who agreed with the philosophy of inclusion. This amounted to a further

three teachers. This selection process netted eight teachers, of whom six would be invited to be interviewed, the five from the initial selection process, and one person from the three selected by using a second criteria. As the Research Committee had agreed upon six teachers as a desirable number to participate in phase two of the research, the final criteria had selected two more than necessary. Because the three teachers were all similar in fitting the criteria for selection, the one teacher closest to the researcher was chosen for ease of access. The other two teachers were kept in reserve if any of the chosen six were no longer able or prepared to be interviewed.

Justification for Selection

One of the aims of this study was to examine the use of computers to support the inclusion of learners with special needs in regular class settings. In order to do this, it was necessary to explore the beliefs, perceptions and practices of teachers who considered that the computer *was* effective as a tool for including learners. The selection process was deemed valid by the research advisory committee in identifying these teachers.

METHODOLOGY

In light of the methodological assumptions discussed in chapter four, a form of ethnographic method was adopted as the most appropriate method of addressing the research questions. Semi structured interviews were used to uncover meanings and

perceptions on the part of six teachers who considered the computer an effective tool for including learning with special needs in regular class settings

Ethnographic Research

Ethnographic research seeks to uncover meanings and perceptions on the part of the people participating in the research. These meanings are viewed against the backdrop of the participants overall worldview or culture. The research strives to see things from the perspective of the participants (Crotty, 1998). In a broad sense, ethnography is the study of a group of people for the purpose of describing their socio-cultural activities and patterns (Burns, 1994). The most common form of data collection method in ethnographic research is observation, but unstructured and semi structured interviews are also a useful tool and often used in this type of research.

Data Collection

The technique chosen for data collection in phase two was the semi-structured interview. The six teacher participants were interviewed in the months of September or October 1999 in the school of the participant. The interview was conducted in a "semi-structured" way with the interviewer having some themes to pursue and some general questions to guide the discussion.

Justification for Data Collection Method

Anderson (1990, p. 222) describes the interview as "a specialised form of communication between people for a specific purpose associated with some agreed

subject matter. This technique was chosen for a number or reasons, first it provided a way of gathering *in-depth* information regarding the beliefs and practices of teachers who consider the computer an effective tool for including learners with special needs in regular class settings. The semi structured interview allows this by being a tool that more easily engages respondents and thus there are fewer problems with people failing to respond. Also the interviewer can clarify questions and probe answers allowing for more complete information (Anderson, 1990). Semi structured interviews also allows for the interview to be driven by the interviewee, creating a focus on the perspective of the participant rather than that of the researcher (Burns, 1991; Anderson, 1990).

Pilot Interview

A pilot interview was trialed with two teachers who were known to the researcher, and had a learner with a computer for reasons of special need in their class the previous year. This allowed the researcher to evaluate the interview in terms of:

- relevance of themes
- usefulness of questions to elicit responses related to the research questions
- use of prompts
- length of interview

The piloting of the questionnaire also allowed the researcher to practice using the audio equipment. After the piloting of the interview, refinements were made to the sequence of the questions and the use of prompts to elicit information.

Description of the Interview

The interview schedule consisted of five main themes, these were: are (a)computers and inclusion; (b) computers and teacher practices; (c) computers and the curriculum; ; (d) teacher support (e) the potential of the computer and (f) computers and school philosophy and climate.

A number of questions and probes were developed to help the researcher gain information on these five themes, but the respondent had freedom to talk about what was important to him or her around each theme and give their views freely in their own time (refer to Appendix C for the interview schedule).

Procedure

Approximately two weeks before the interviews, all respondents from phase one who had indicated that they would be willing to participate in a follow-up interview were sent a letter thanking them for their cooperation in phase one and their willingness to participate in phase two. The letter indicated that those teachers who the researcher wished to follow up would be contacted in the next week (see Appendix C). Duly, a letter was sent to the six teachers selected by the Research Advisory Committee, asking them if they were still willing to participate in an interview, outlining the aims and objectives of phase two and informing them that

the researcher would be contacting them by phone in the next week (see Appendix C).

During the next week, all six teachers were contacted by phone. All were still willing to be interviewed, and interview dates were arranged. All interviews were conducted between the 8 September and the 8 October. Without exception, all interviews took place in the school of the teacher concerned and permission was gained by phone from the Principal of each school.

At the beginning of the interview, participants were given an information sheet outlining the aims of the study and in particular, phase two of the study. The participants were also informed of their rights as outlined in the Massey University Code of Ethical Conduct Handbook (see Appendix C). Participants were given a consent form to sign, granting permission for the interview to take place and confirming that they had had the details of the study explained to them and that they understood their rights (see Appendix C). Most interviews took approximately 45 minutes and no longer than one hour. Each interview was audiotaped. Due to equipment failure, the interview with teacher six was unable to be transcribed, and it proved not possible to carry out a repeat interview. Because of this, only information from five teachers was reported upon.

Data Analysis

Each interview tape was transcribed using word processing software. Data were categorised and coded into the five main themes of the interviews, then

analysed and categorised into subthemes related to issues, topics or concepts. This was done by hand, highlighting themes and subthemes with coloured pens. This information was then "cut and pasted" using the computer. The coded data was finally analysed with reference to the phase two research questions.

ETHICAL CONSIDERATIONS

The design of the study and procedures followed were guided by the Massey University Code of Ethical Conduct . The major principals considered were: (a) informed consent, (b) confidentiality, (c) minimising of harm, (d) truthfulness and (e) social sensitivity.

Informed Consent

In phase one of the study, Principals were sent a letter outlining the research and asking if they could pass on the enclosed questionnaire to the teacher in their school who had a learner with a Ministry of Education funded computer for reasons of special need (see appendix B). It was assumed that by handing over the questionnaire to the particular teacher, the principal was giving their consent for the teacher to participate. The teacher was given an information sheet attached to the questionnaire. This clearly outlined the nature and purpose of the study, the participants' rights including the right to decline to participate or to withdraw from the activity at any time, their right to confidentiality and their right to receive information about the outcome of the study. Information was also provided as to what would happen to the data on completion of the project. The names of the

researchers supervisors, and their contact addresses were also made available to the participants. Participants were told that it was to be assumed that filling in the questionnaire implied consent.

Participants from phase one who volunteered to participate in phase two of the research were invited, first by letter, (see Appendix C) then by phone to participate in an interview. They were informed as to the selection process. Just prior to the interview commencing, participants were given an information sheet outlining the nature and purpose of this phase of the study (see Appendix C). The following rights were also outlined to participants:

- the right to decline to participate
- the right to refuse to answer any questions
- the right to withdraw from the activity at any time,
- the right to confidentiality
- the right to turn the audio tape off at any time they wished
- the right to receive information about the outcome of the study.

Information was also provided as to what would happen to the data on completion of the project, this included the destruction or return to participants of the audio tapes. Informed consent was obtained in writing with the use of a consent form (see Appendix C).

Confidentiality

In phase one and two of the study, the teachers and their schools were guaranteed that all measures would be taken to maintain confidentiality and anonymity. Care was taken to protect these in a number of ways, first by using school/teacher codes on the questionnaires, and ensuring that the Advisory Committee only had access to these codes, not names or any identifying features. Questionnaires and school names and addresses were stored in a safe storage in the researchers office, which was inaccessible to anyone else.

In phase two of the study, the transcriber signed a confidentiality agreement and tapes were either destroyed or returned to participants at the conclusion of the study. Teachers were asked not to identify the name of the learner or the name of the school during the interview, but if this was done inadvertently, the transcriber was asked to replace the name of the learner with the term "the learner". Tapes and transcripts were stored in a safe storage space, accessible only to the researcher. Transcripts were not included in the appendices of the study to minimise the risk of teachers and schools being identified.

Minimising of Harm

The researcher was aware of any potential harm to participants that could result in their participation in this research project. While in a study of this kind, the potential for this is minimal, issues such as identification of individuals or schools needed to be considered as well as appropriate settlement of issues of authority and

control over the direction, process and outcomes of the research. The researcher was sensitive to the emergence of unforeseen hazards, and was prepared to modify or terminate any procedures if anyone was placed at any risk.

Misuse of data

To minimise the risk of misuse of data, the researcher put in place safeguards to protect not only the misuse of data to the detriment of participants, but also to any other individuals or organisations directly or indirectly reported in this research. This included:

- the protection of anonymity of both individuals participating and their schools by masking their identity and assigning numerical codes .
- participants in phase two received a copy of the interview transcript prior to publication so that they could concur and make any changes they felt necessary
- ensuring that participants were aware of their rights as outlined in the Massey University Code of Ethical conduct (specifically those related to the right to discontinue)

Truthfulness

At all times the researcher was honest and open as to the purpose and aims of the study as well as what would be required of the participants. Full and truthful information was given to participants at all stages of the research process both in written form and in all discussions.

METHODOLOGICAL LIMITATIONS

Phase One

The data gathering technique used in Phase One of the study was the questionnaire. This technique depend up on honesty of respondents, and there was no way of the researcher knowing if all responses were truthful. Also, respondents may have been unable to give as detailed answers as they may have wanted to and may also have been limited in their freedom of expression of opinion s. Although every care was taken, as with any questionnaire, there was a possibility of misinterpretation of the questions by the respondents. The researcher could not follow up ambiguous or incomplete information provided by respondents in the questionnaires. Finally, the small nature of the 'not effective' group in part two of phase one may have made comparisons less meaningful.

Phase Two

In phase two of the study, the research may have been limited by the fact that teachers may not have given a true representation of their beliefs and practices, rather what they thought was the correct answer, or what they thought the interviewer wanted to hear. The use of a tape recorder may also have constrained some teachers from speaking honestly, knowing that there answers could be listened to again, and reported verbatim. Also, as this was the first research interviewing that the researcher had engaged in, the inexperience of the interviewer might have affected results. Finally, coding of the interviews was open to the

interviewers interpretation and may not have been a true interpretation of the story of the teacher.

SUMMARY

This chapter has outlined the methodological approach used in this study. It has presented the research questions, outlined the two phases of the study and detailed the methods, procedures and techniques employed. A discussion of ethical issues and methodological limitations were also presented. The following chapter reports of the results of phase one of the study.

CHAPTER SIX

RESULTS PHASE ONE

INTRODUCTION

This chapter outlines the results for the first phase of the research and is divided into two parts. Part one reports upon the overall findings from the questionnaire. It provides an overview into the nature and extent of computer use by learners with special needs and the perceptions and opinions of teachers who have a learner in their class with a Ministry of Education funded computer for reasons of special need. The results from part one are divided into four sections. Section one outlines the background information on the teacher respondents. Section two, the background information on the learner. Section three provides information on the use being made of the computer for the learner with special needs and section four outlines teachers' perceptions regarding the effectiveness of the computer for including learners with special needs.

Part two of phase one results compares the findings of those teachers who believe the computer to be an effective or very effective tool for including learners with special needs and those teachers who believe it to be either neutral in it's effectiveness, ineffective or very ineffective.

PART ONE

Part one reports on the overall findings of the questionnaire.

BACKGROUND TEACHER INFORMATION

Forty-three teachers completed the questionnaire in phase one of the study. Table 6.1 shows the age range of the sample.

Table 6.1

Age Range of Respondents

Age	Age 20-30	Age 31-40	Age 41-50	Age 51-60	Age 61+
%	29	17	34	17	2

Figure 6.1 shows the number of years teaching experience of the teacher respondents. The majority of teacher respondents (29%) had less than five years teaching experience, but, with this as the exception, the sample consisted of a reasonably equal representation of teachers from a range of years experience.

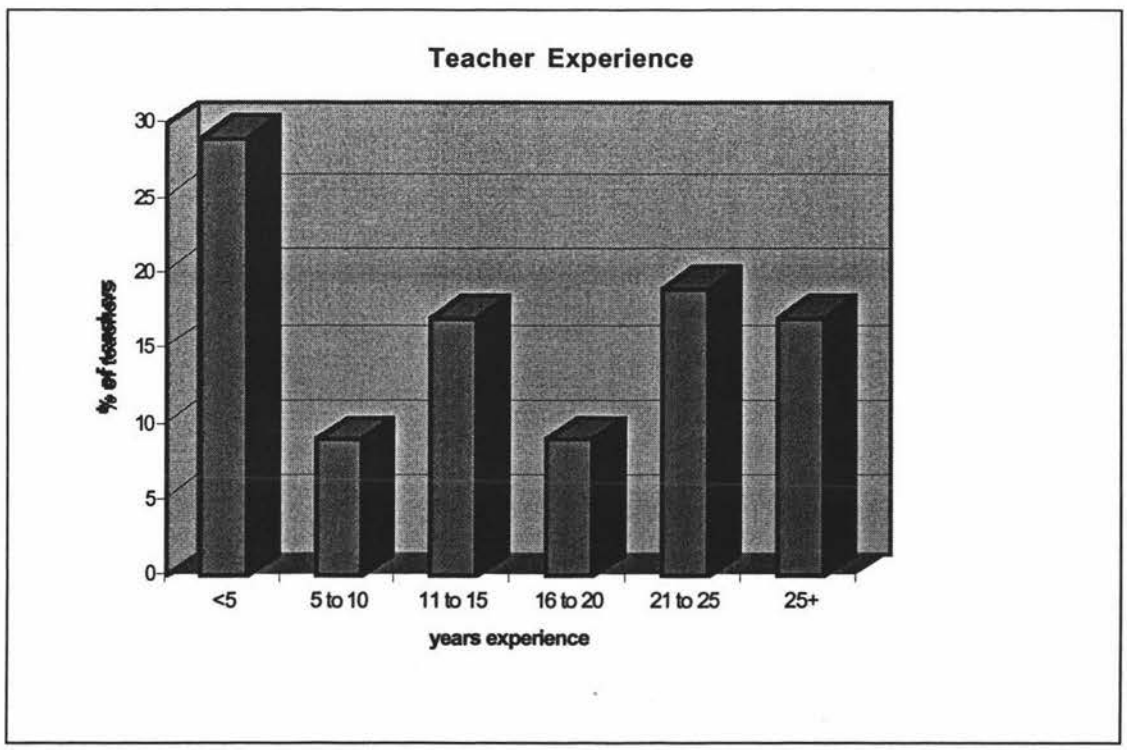

Figure 6.1 Years of Teaching Experience of Participants

Figure 6.2 reports on respondents perceptions of their competence in using the computer for learners with special needs. 66% of teacher respondents rated themselves as either very competent (15%) or competent (51%) as opposed to 34 % as either neutral in their competence (32%) or incompetent (2%).

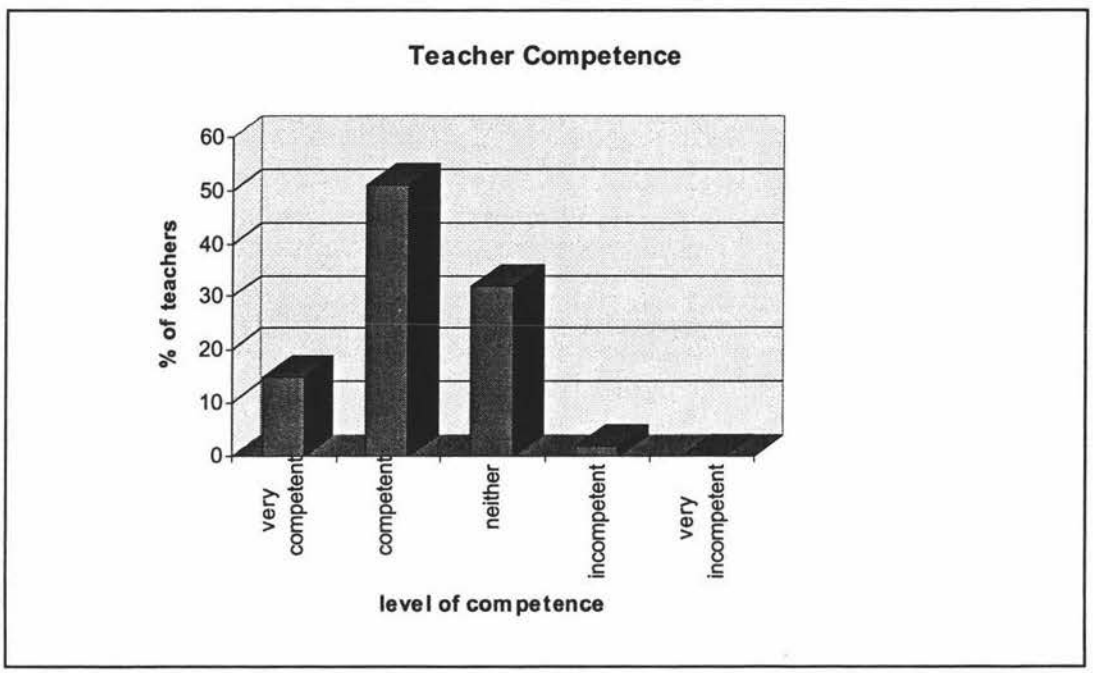

Figure 6.2 Teacher Perceptions of Computer Competence

Figure 6.3 outlines the reported levels of confidence in using the computer for learners with special needs. The majority of teachers (69%) felt either very confident or confident in using computers with learners with special needs. Only 32% of respondents were unconfident or neutral in their confidence.

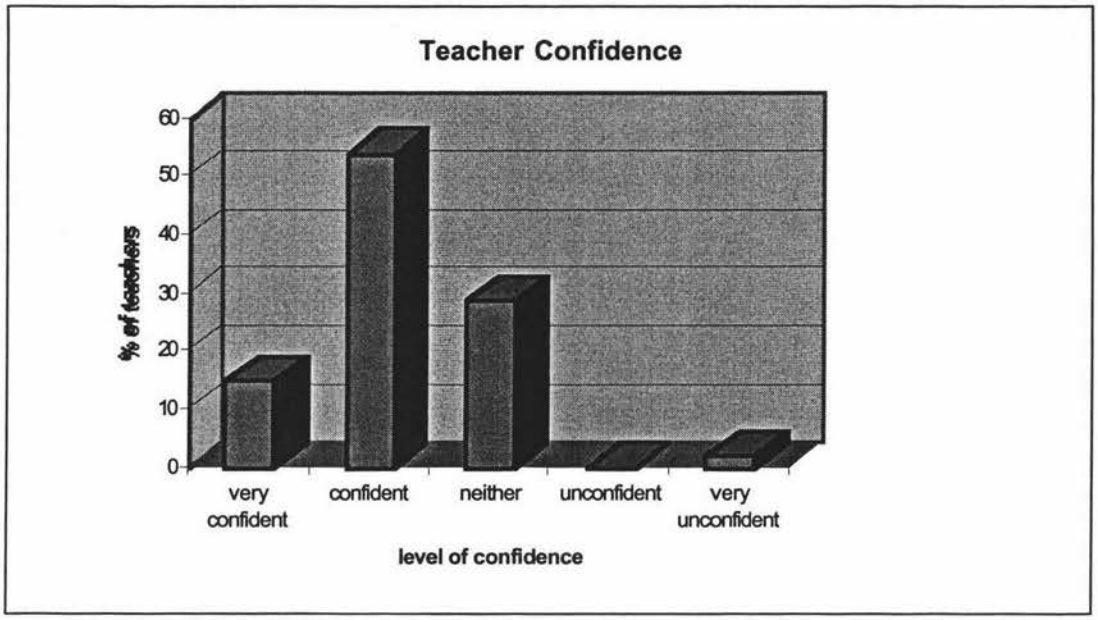

Figure 6.3 Teacher Confidence in Computer Use.

The majority of teacher respondents had received no training in the use of the computer that had been allocated to the learner with special needs (63%), but had received training or in-service in general computer use at some stage of their teaching career (70%). Figure 6.4 outlines these results.

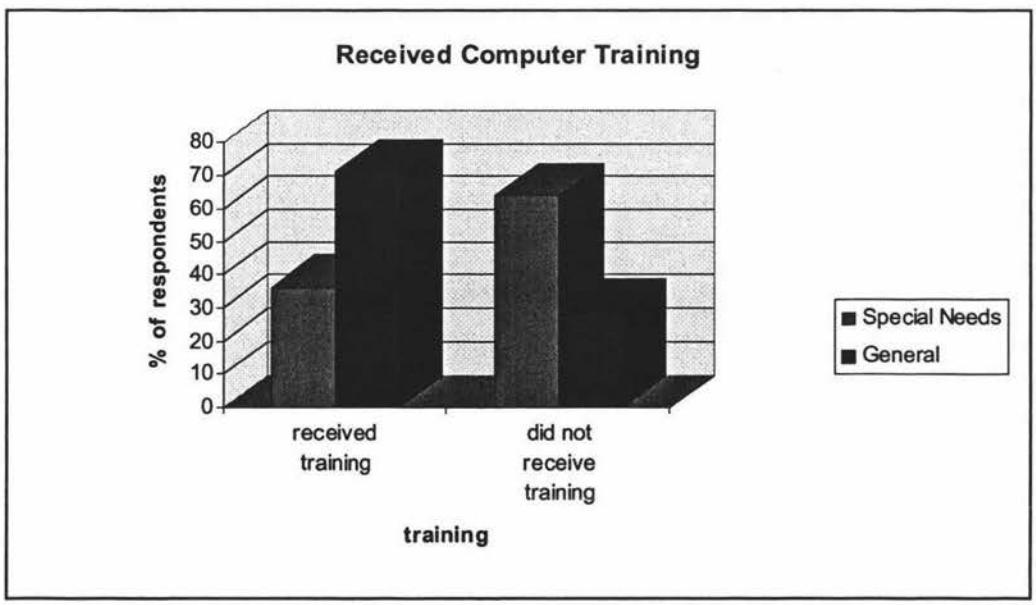

Figure 6.4 Teachers Who Received Training

For teachers who received training in the use of the computer for the learner with special needs, the training was provided predominantly provided by personnel from Specialist Education Services. Other providers included private consultants, computer company representatives and special needs teachers. Table 6.2 outlines these findings.

Table 6.2

Providers of Training for Computer Use

Training Provider	*%*
Specialist Education Services	38
Computer Company Representative	27
Resource Teacher, Learning & Behaviour	12
Private Consultant	15

BACKGROUND LEARNER INFORMATION

This section reports on the background information regarding the forty three learners each of whom has a computer allocated by the Ministry of Education for reasons of special need. Table s6.3and 6.4 report on the gender and ethnicity profiles of the learners.

Table 6.3

Gender of Learners With Computers

Gender	% of Learners
Male	57
Female	43

Table 6.4

Ethnicity of Learners With Computers

Ethnicity	% of learners
NZ Caucasian	84
NZ Maori	16
Polynesian	0
Other	0

The age of learners ranged from six years old to fourteen, with the mean age being 8.5. The complete age range of learners is shown in Table 6.5

Table 6.5

Age Range of Learners With Computers

Age of Learners	6	7	8	9	10	11	12	13	14	Missing data
% of Learners	5	14	7	14	12	10	19	5	2	12

Students classified under Special Education 2000 as having high needs or very high needs (approximately 3% of the school population in New Zealand) are funded under the On-going Resourcing Scheme (see chapter two for a description of this scheme). The majority of learners had been verified as having high or very high needs, and thus were resourced on the Ongoing Resourcing Scheme (88%). Of this 88%, 42% were very high needs, and 50% high needs.

Teachers were asked to rate the level of support they felt the learner required to be successfully included in the classroom. Over 70% of teachers felt that the learner had either high or very high needs. Figure 6.5 outlines these findings.

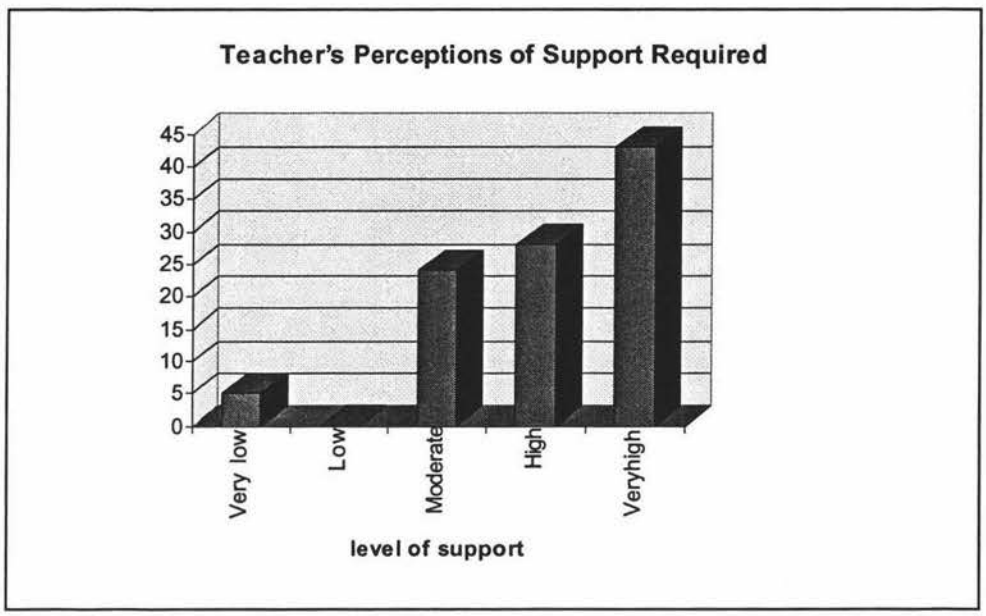

Figure 6.5 Teacher's Perceptions of Level of Support Required to Successfully Include Learners

The majority of learners with computers had teacher aide hours allocated to them (93%) and of those, over 41% had more than 21 hours. The average number of teacher aide hours allocated to learners per week was between 11 and 15. Figures 6.6 and 6.7 show these results.

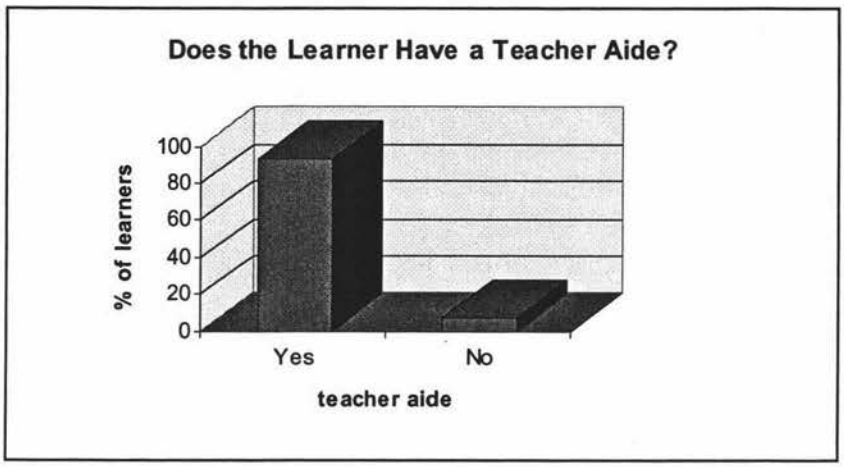

Figure 6.6 Percentage of Learners Who Have a Teacher Aide

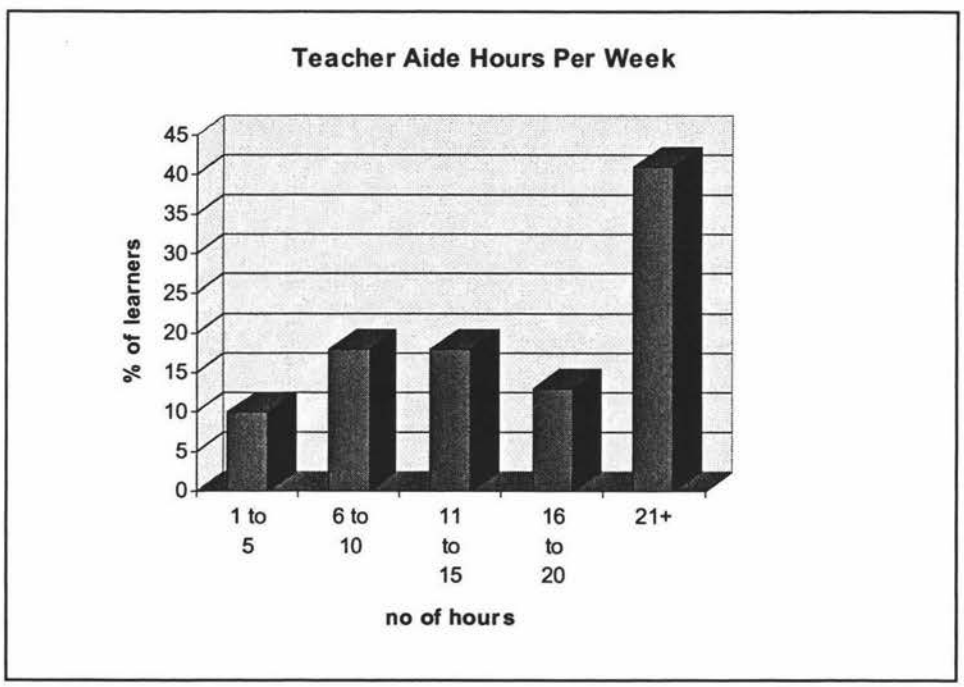

Figure 6.7 Number of Teacher Aide Hours Allocated to Learners

Figure 6.8 presents the areas of disability of the computer using learners. Many of the learners were classified by their teacher as having more than one area of disability, therefore results do not add up to 100%. Many learners with

computers had some physical disability (79%). Intellectual, learning and visual disabilities were the next most common area of disability.

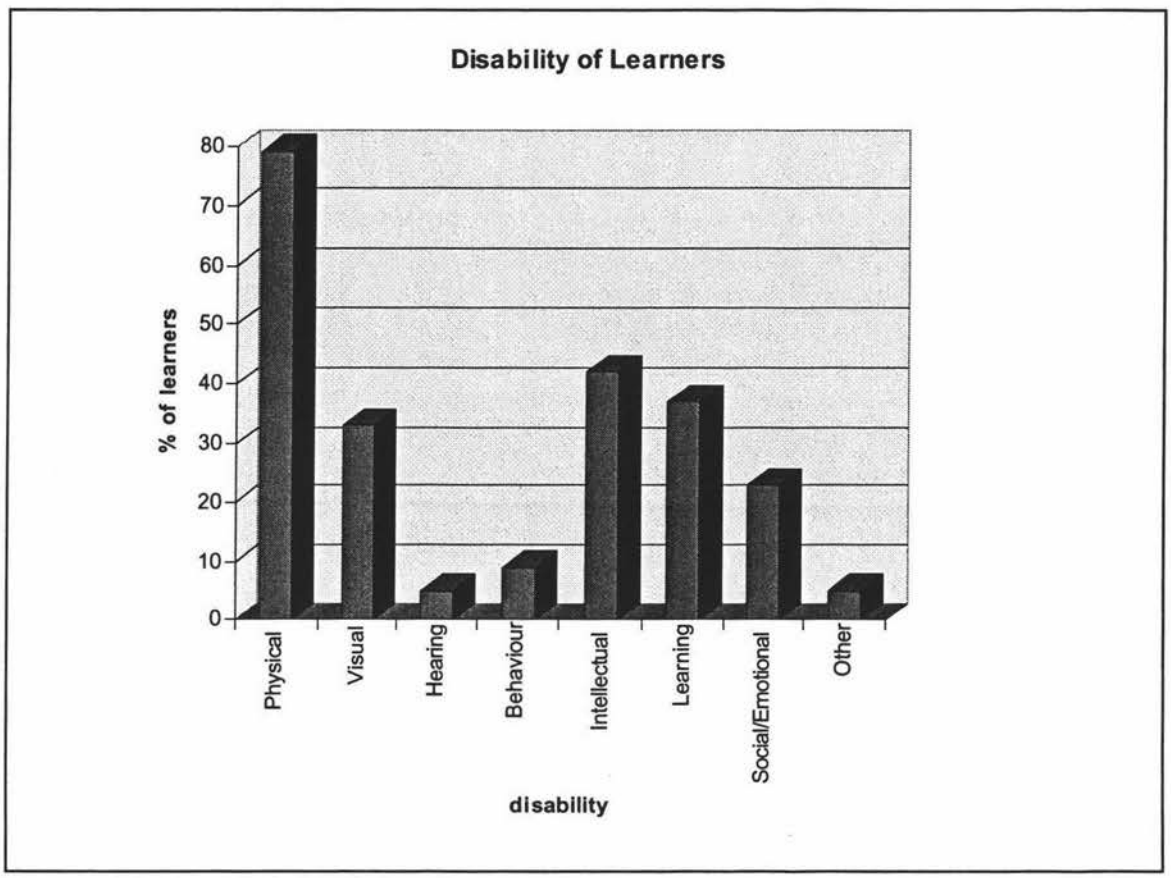

Figure 6.8 Area/s of Disability of Learners

USE OF THE COMPUTER

The time learners spend on the computer each day ranged from less than 30 minutes to more than three hours. Figure 6.9 outlines these findings.

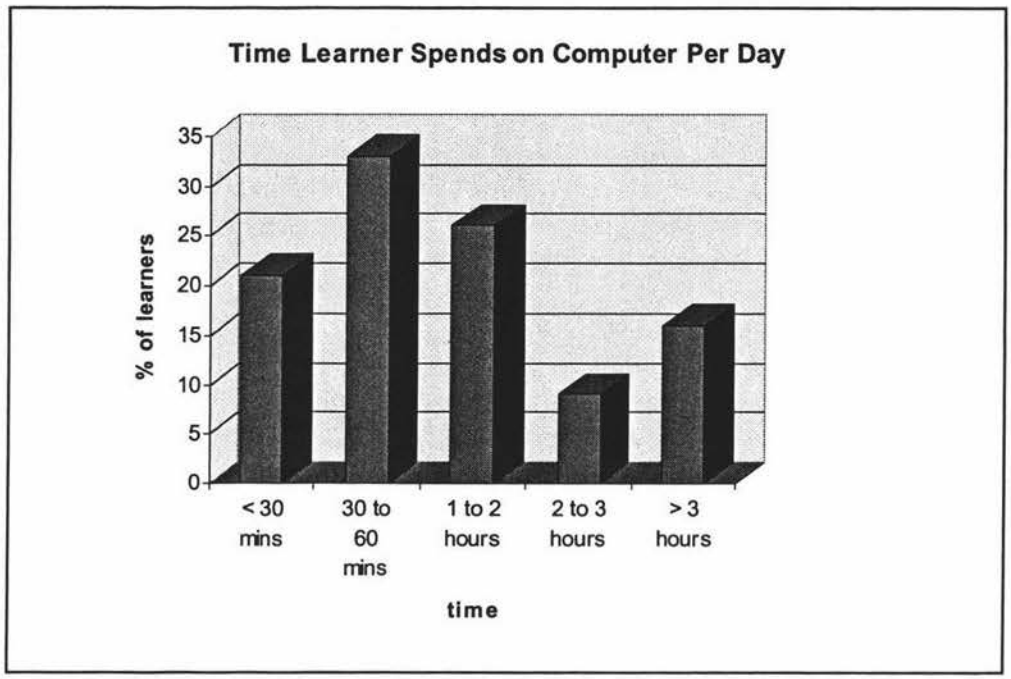

Figure 6.9. Average Number of Hours Learner Spends on the Computer Per Day.

The majority of teacher respondents reported that, on average, the learner would be with someone else when working on the computer. In the majority of cases, this was the teacher aide. Figures 6.10 and 6.11 report on these findings.

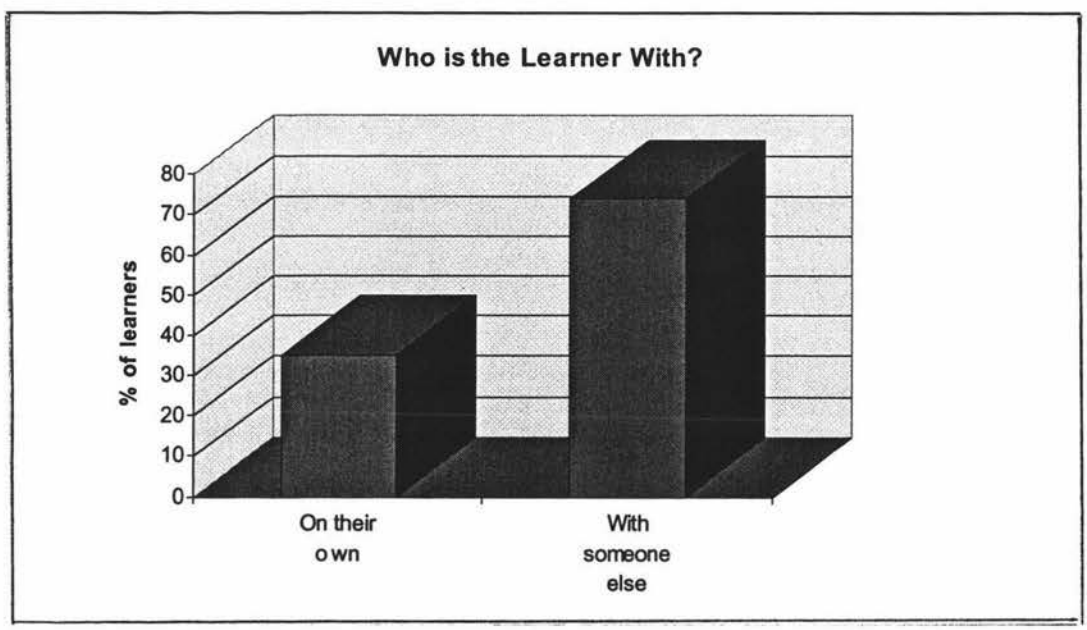

Figure 6.10 Learners Who Work on Their Own or With Someone Else

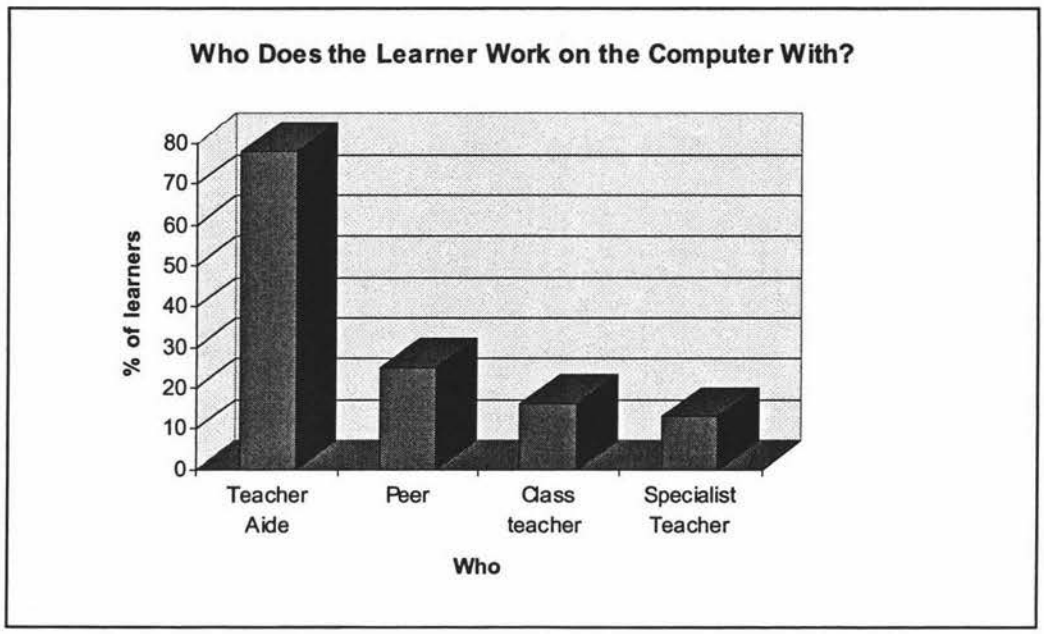

Figure 6.11 Who The Learner Works on the Computer With.

Teacher respondents were questioned as to the placement of the computer in relation to others in the classroom. The majority of teachers reported the computer being in the classroom, but in a withdrawal situation (40%). The least likely place for the computer to be positioned was in a withdrawal place outside the classroom.

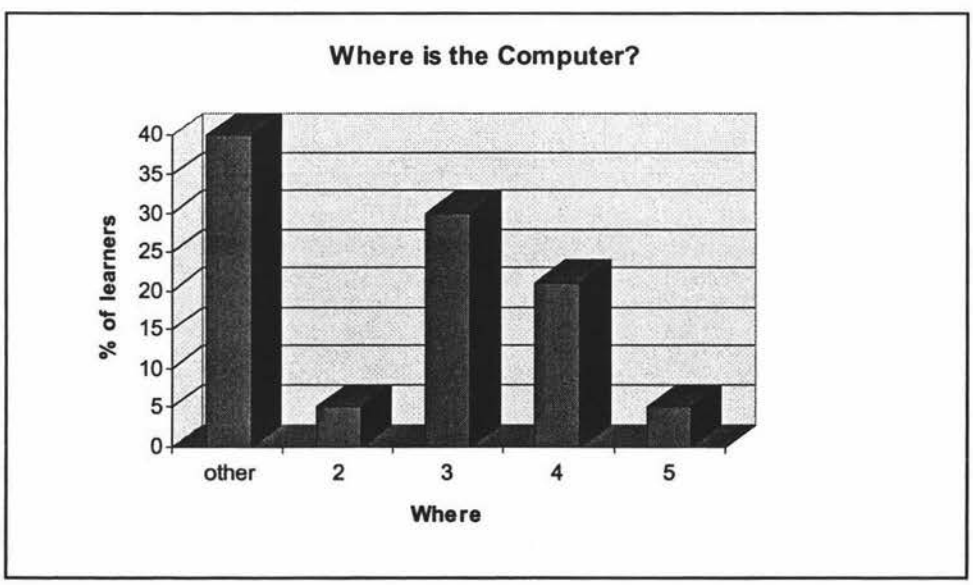

Figure 6.12 Location of the Computer

Teachers were questioned as to the curriculum areas the computer was used for. Teachers were able to select more than one curriculum area. Nearly all respondents selected English as a curriculum area where the computer was used (98%). Mathematics (72%), social studies (56%)science (47%) and technology (42%) were also common areas identified by teachers. Figure 6.13 outlines these findings.

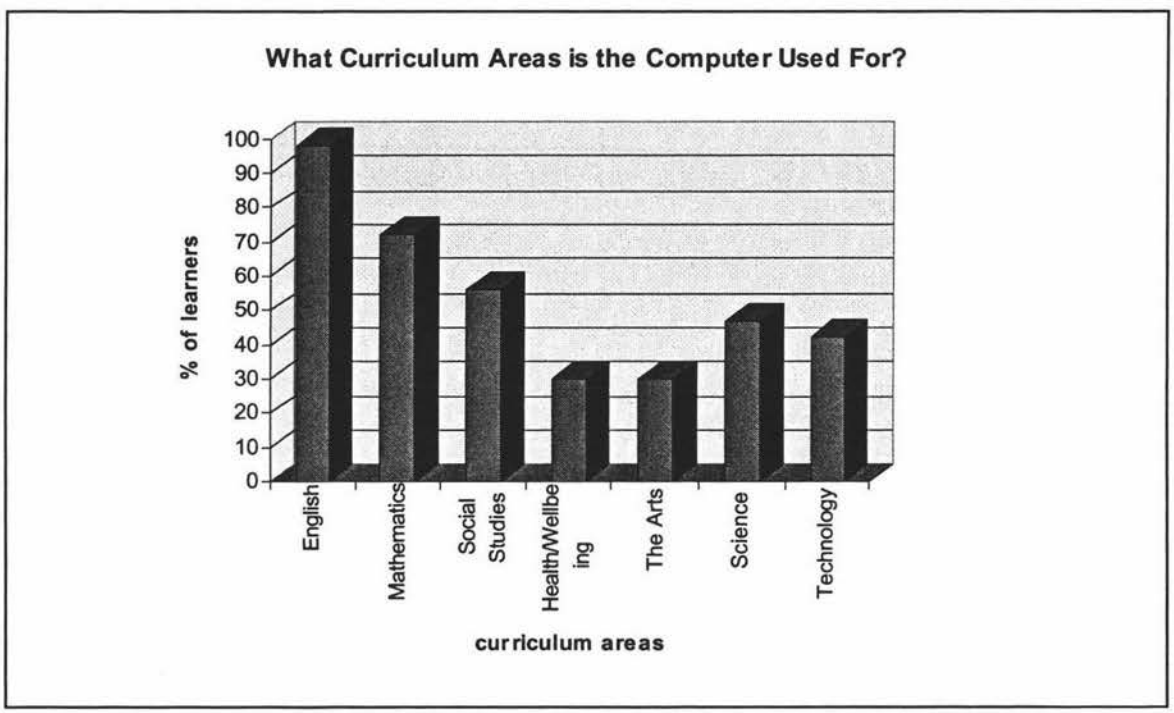

Figure 6.13 Curriculum Areas the Computer is Used For

Teachers were also asked to identify the curriculum area that they used the computer for the *most.* English was overwhelming the curriculum area were computers were used in the most. with 84% of teachers identifying this area. It was well ahead of the next most common curriculum area, mathematics (21%) with social studies (12%) science (5%) and health and well being (5%) following in that order. Figure6.14 outlines these findings.

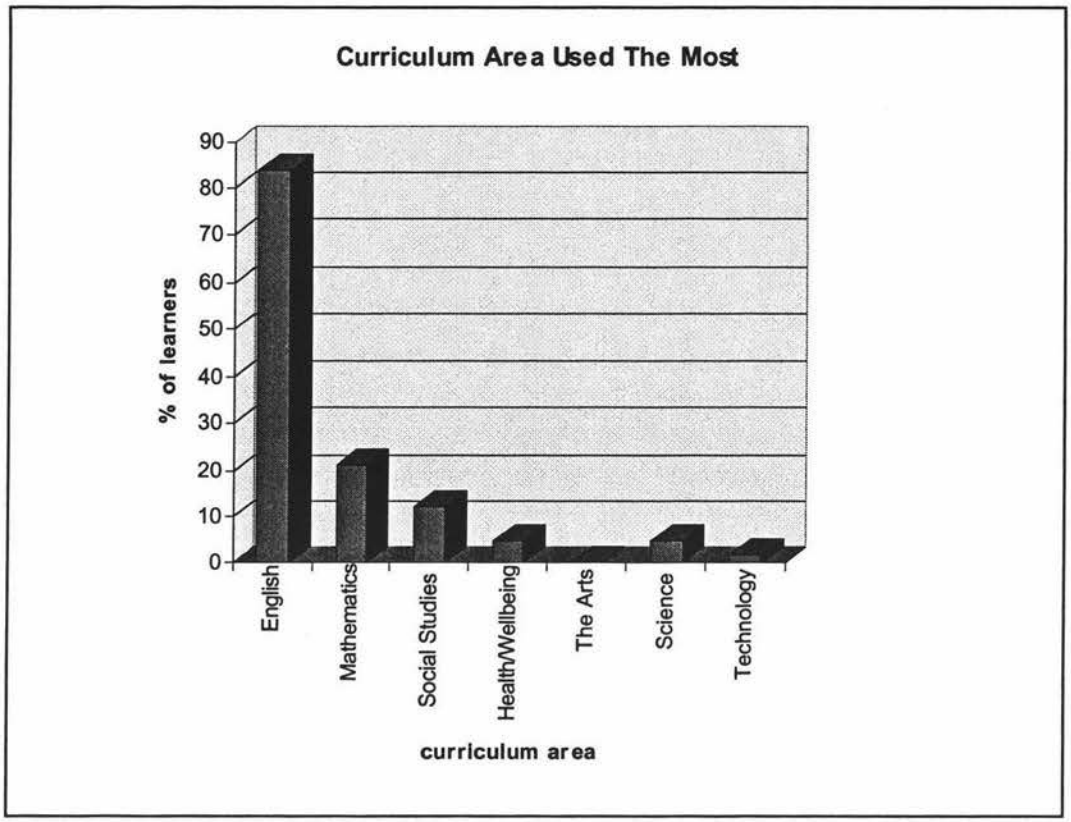

Figure 6.14 The Curriculum Area the Computer is Used for the Most.

Over 55 different software titles were listed by teachers as being used. Table 6.6 lists the more common titles from those used the most to those used the least

Table 6.6

Software Titles Used

Software Title	**% of Learners Using**
Co-Writer	28
Microsoft Works/Word	28
Clarisworks	21
Interactive Story books	21
Misc Games	23
Creative Writer	16
Storybook Weaver	16
Maths Workshop	14
Encarta	12
Kids Pix	9

A small majority of learners (58%) had adapted hardware for use with their computers. Figure 6 15 reports of the nature of the adaptive devices. Switch devices (28%), touch tablets(24%) and adapted keyboards (20%) are the most common types of adapted devices used by learners.

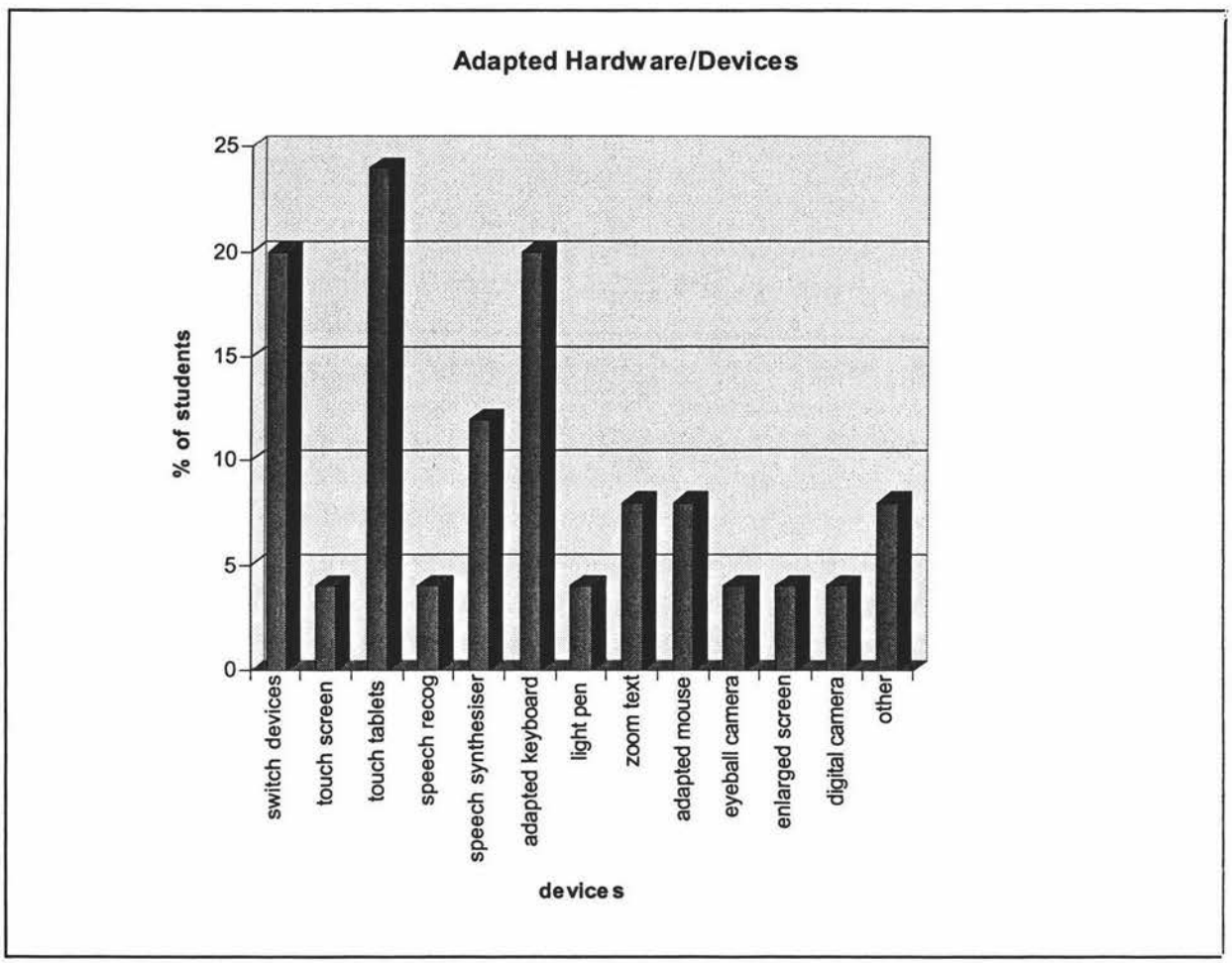

Figure 6.15 Adapted Devices Used by Learners With a Computer

While just over half of teacher respondents said that the computer played a part in the assessment process, there was a variety of ways in which it was used. Predominantly, it was used for assessment in written language and in assessing the learners level of performance on the computer itself. Other ways included testing of spelling, maths, reading and communication.

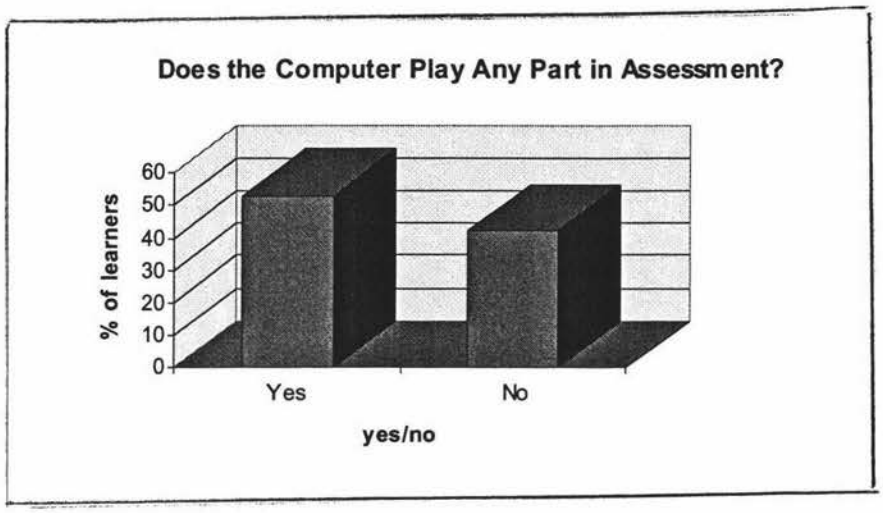

Figure 6.16 Is Computer in Assessment Process*?*

The majority (91%) of learners had a current IEP and for 89% of these learners, the computer played some part in this process. For 68% , the computer was a goal or objective in it's own right. For 91%, the computer was written into the IEP as a means of achieving other goals and objectives. Figure 6.17 displays these results.

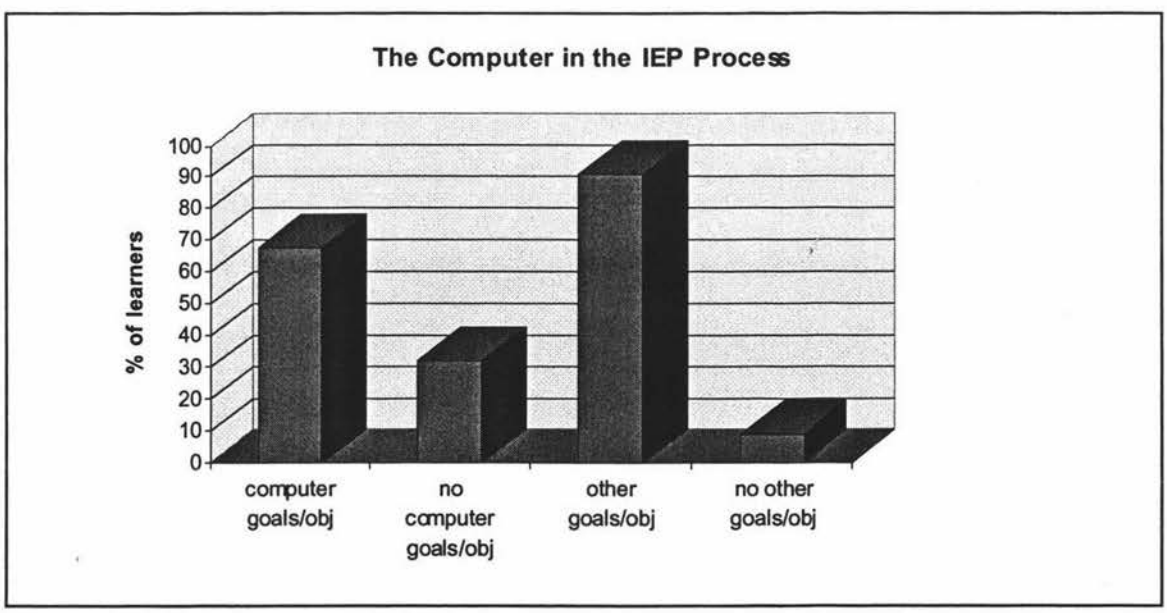

Figure 6.17 Computer goals in IEP

The computer as a specific goal or objective was written into 68% of the IEP's. There were a variety of ways that the use of computers were being focused on through the IEP. Table 6.7 outlines the five most common areas of focus.

Table 6.7

Most Common Computer Goals/Objectives in IEP

IEP Goals/Objectives	% of Learners
To use the computer more	9
To become confident and independent	13
To improve keyboard skills	13
To use a particular piece of software	13
To use particular hardware	22

In 91% of cases, the computer was a suggested means of achieving other goals and objectives in the IEP (as opposed to goals and objectives in computer use in it's own right). The most common area where this occurred was written language (87%) with reading (63%) and mathematics (60%) the next most common areas respectively. Figure 6.18 shows these results.

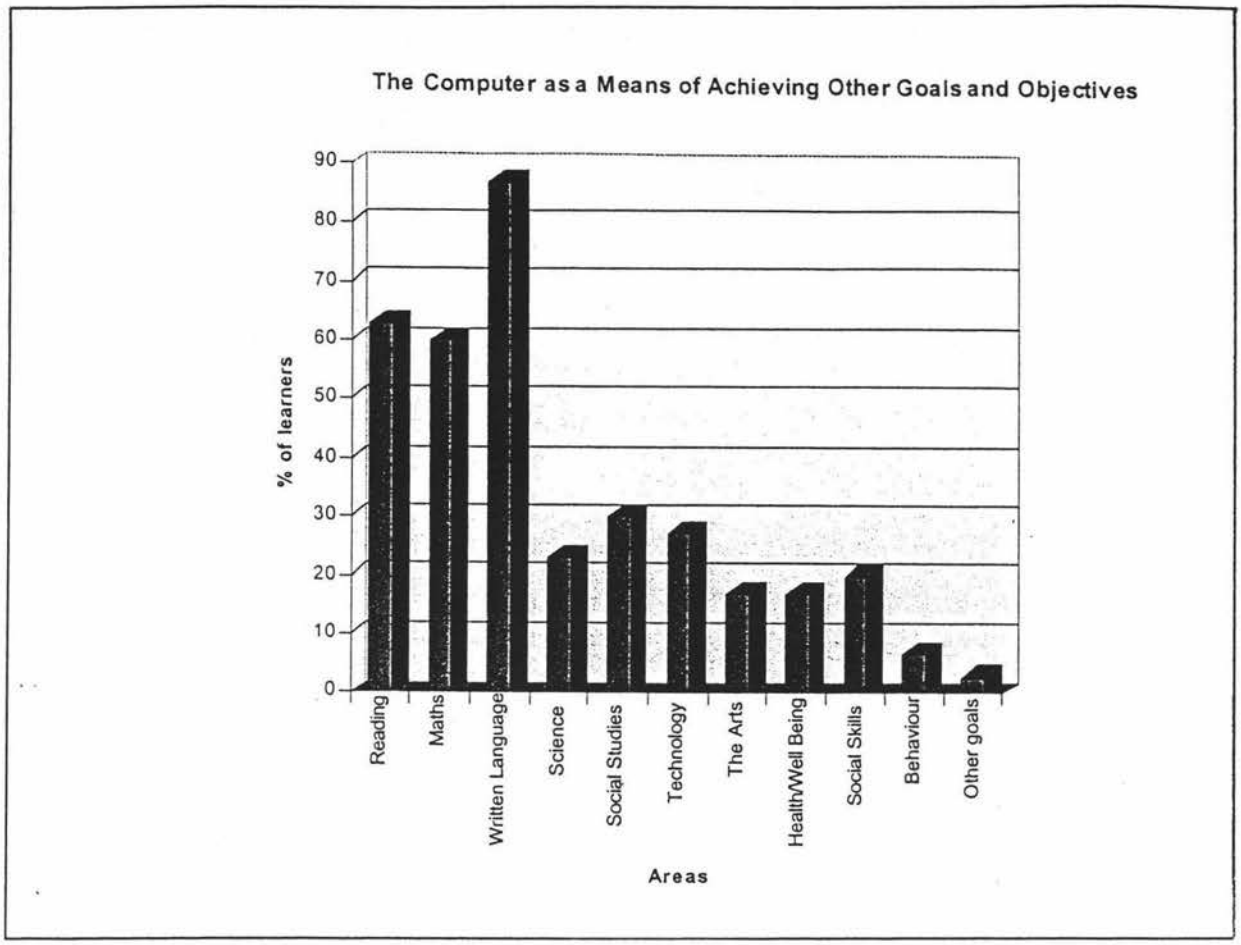

Figure 6.18 Curriculum Areas Where the Computer was Suggested as a Means of Achieving Goals and Objectives in the IEP.

TEACHER PERCEPTIONS

Teachers were asked to rate the usefulness of the computer for a variety of functions. Table 6.8 outlines these results.

Table 6.8

The Usefulness of the Computer

	Not useful at all	A little useful %	Useful %	Quite useful %	Very useful %	Not applicable %	Discourage this %
as a prosthetic device	3	6	21	6	56	9	0
as a learning aid	0	9	15	18	58	0	0
as a motivational aid	0	11	20	17	49	3	0
as a communication aid	12	18	15	18	27	9	0
in accessing the curriculum	6	13	39	13	23	6	0
inclusion in activities of the class	9	12	36	18	21	3	0
in encouraging acceptance by peers	10	23	10	17	17	23	0
in adapting the curriculum	9	12	12	18	42	6	0
in increasing self esteem	3	9	24	30	24	9	0
in developing motor skills	6	11	31	17	31	3	0
in facilitating presentation skills	3	0	20	9	60	9	0
in encouraging self management and independence	3	3	24	27	36	6	0
in increasing productivity	3	8	25	19	39	6	0
in allowing learner to be included in social	20	20	13	17	10	20	0

When results for 'quite useful' and 'very useful' are added together, the computer as a learning device is chosen by the majority teachers as being the most

useful function of the computer. This is followed in descending order by facilitating presentation skills, as a motivational aid, as an aid in self-management and independence and as a prosthetic device. When the results for 'not useful at all' and 'a little useful' are added together, the computer in allowing the learner to be accepted in peer a social group is the least useful function. This is followed in ascending order by allowing the learner to be accepted by their peers, to access the curriculum and to include the learner in the activities of the class.

Teachers were asked to outline the benefits and drawbacks of computer use for learners with special needs. Tables 6.9 and 6.10 outline these findings. in order of most commonly suggested to least.

Table..6.9

Benefits of Computer

Perceived Benefits	% of responses
To present legible work	45
To complete work in set time	29
To enhance self esteem, self satisfaction and confidence	17
To motivate the student	14
As a learning tool	12
To allow participation and access to the curriculum	10
To promote independence	10
To develop technology skills	10
It can be adapted to met the needs of the learner	5

Table 6.10

Drawbacks of Computer

Perceived Drawbacks	% of responses
Difficulty finding or accessing appropriate software	17
Teachers who don't have the skills or knowledge	12
Lack of portability	10
The time it takes to understand all the applications	10
When a fault occurs	10
There is not enough time to harness all the possibilities	7
It isolates the child	5
Getting funding to upgrade	5
The learner just playing with the computer	5
The learner being able to interfere with the set up	5

Teachers were asked to rate the effectiveness of computers for facilitating the inclusion of learners with special needs. Teachers were given the definition of inclusion as follows:

> Inclusion is about education of all students in the mainstream. It also means that all students are provided with appropriate educational opportunities within the mainstream that are challenging yet geared to their capabilities and needs. They are likewise provided with any support and assistance they or their teachers may need to be successful in the mainstream. An inclusive school is a place where everyone belongs, is accepted, supports and is supported by his or her peers and other members of the school community in the course of having his or her educational needs met. (Stainback & Stainback, 1986, p.9).

Overwhelming (72%), teachers considered the computer to be very effective or effective in facilitating the inclusion of the learner in their class.

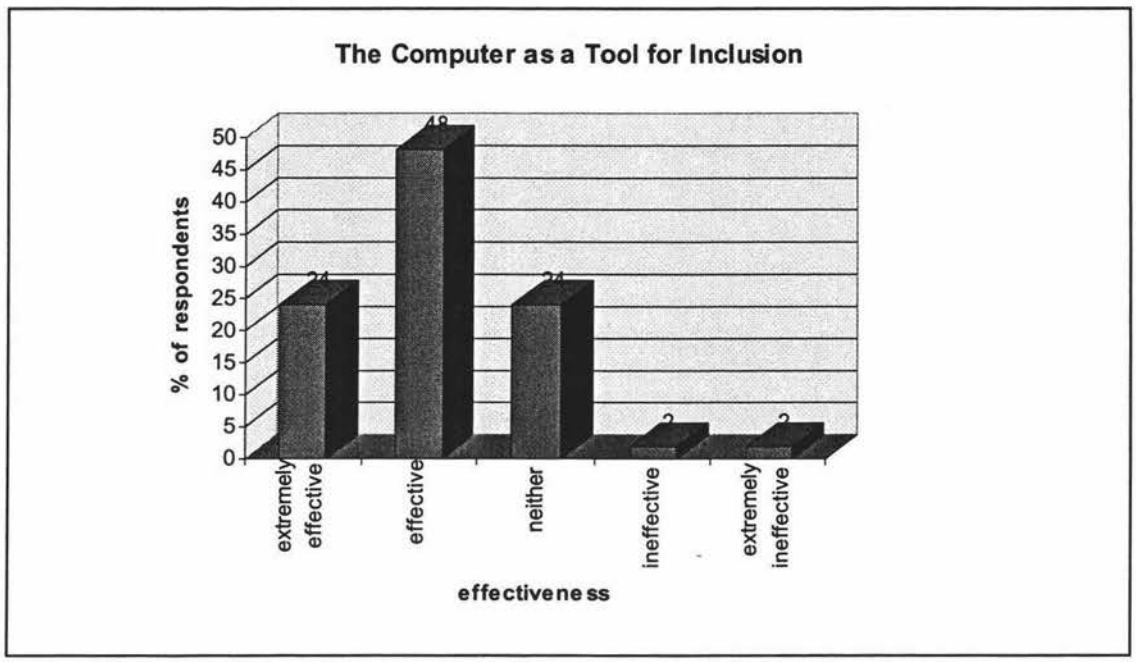

Figure 6.19 Teacher Perceptions of Effectiveness of Computer for Facilitating Inclusion.

Teachers were asked to indicate their opinion regarding the inclusion of learners with special needs (again with reference to the previous definition of inclusion as described above). Overwhelming respondents agreed or totally agreed with the concept of inclusion. Figure 6.20 outlines these findings.

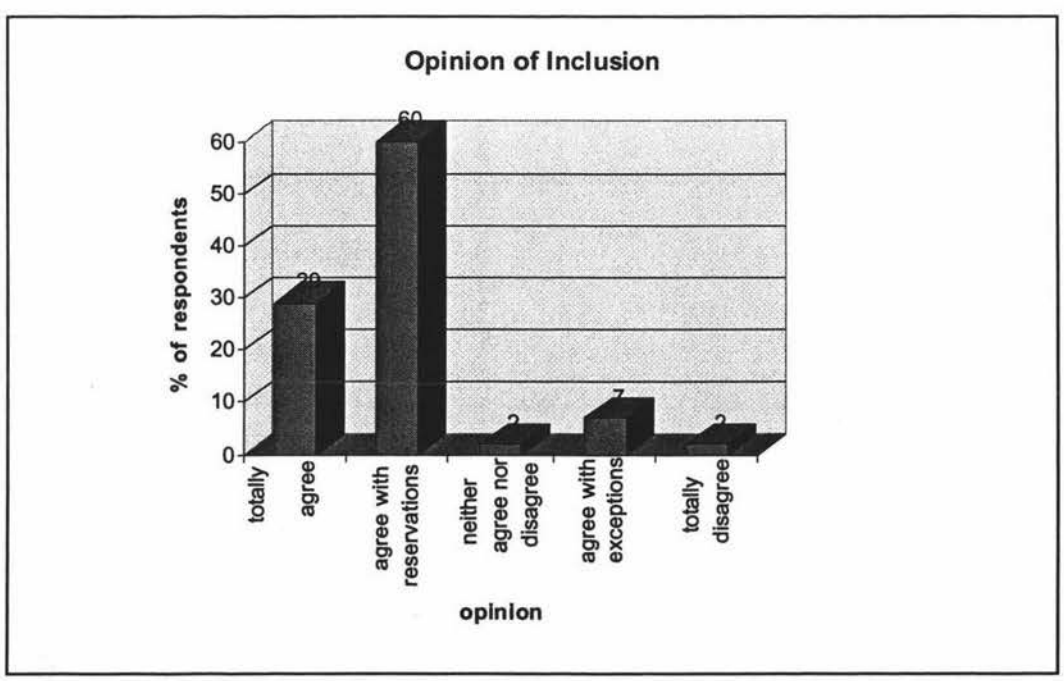

Figure 6.20 Teachers Beliefs Regarding Inclusion

PART TWO

INTRODUCTION

Part two of the results chapter provides comparisons between teachers who felt the computer was an effective tool for including learners with special needs in regular settings (the group which the researcher will now refer to as the effective group) as those who did not (which will be referred to as the not effective group). The results are divided into four sections, section one compares the background information of the teacher respondents from each group and section two, the background information on the learner. Section three provides a comparison of the uses being made of the computer and section four compares teacher's perceptions regarding the effectiveness of the computer for including learners with special needs.

BACKGROUND TEACHER INFORMATION

Teachers with more teaching experience were more likely to describe the computer as an effective tool for including learners with special needs than those with less. Table 6.11 shows these results.

Table 6.11

Years of Teaching Experience

Years of Teaching Experience	Effective (%)	Not effective(%)
< 15	47	75
> 15	53	25

Correlations were found between teacher's belief in the computer as an effective tool for inclusion and their levels of confidence and competence in using the computer. Those teachers who believed in the effectiveness of the computer rated themselves as being more confident and more competent in their use than those who thought the computer to be not effective. In the effective group, 73% of teachers rated themselves as being either very confident or confident as opposed to 50% of the not effective group. In terms of competence, 70% of the effective group rated themselves as either very competent or competent as opposed to 50% of the not effective group. Figures 6.21 and 6.22 show a comparison of these findings.

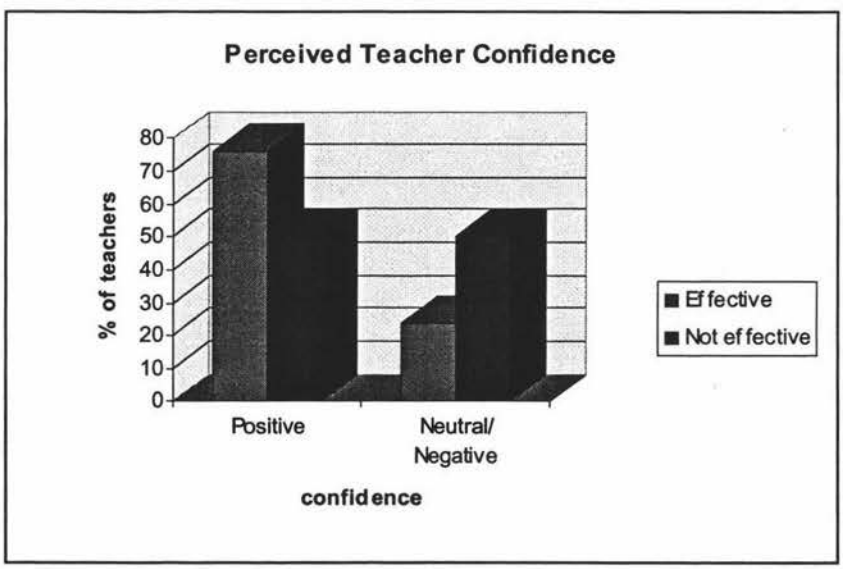

Figure .6.21 Comparison of Teacher Confidence in Computer Use

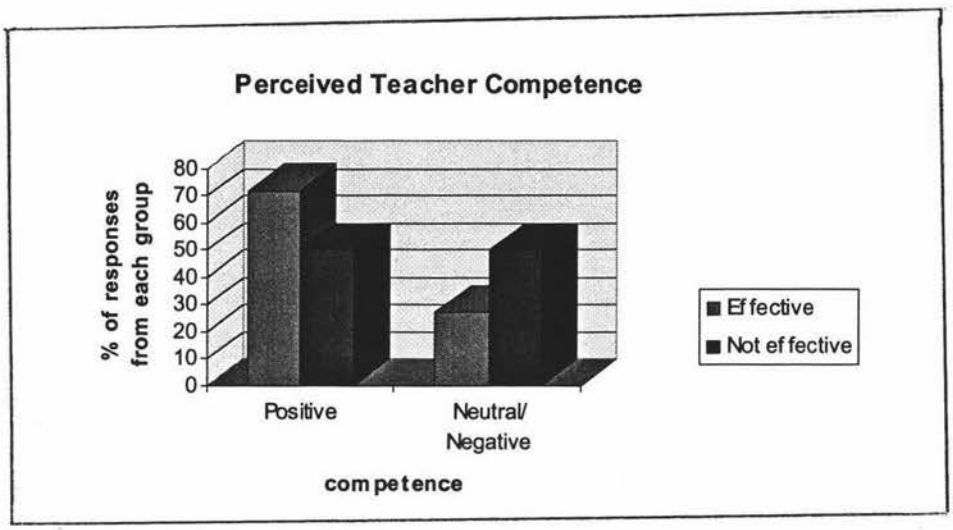

Figure 6.22 Comparison of Teacher Competence in Computer Use.

Teachers were asked if they had received any training specific to the computer, its software or any adapted hardware used by the learner with special needs. For both the effective and the not effective group, the majority of teachers had not received any training. Slightly more teachers from the effective group had not received any training (33% of teachers from the effective group had received training as opposed to 42% from the not effective group).

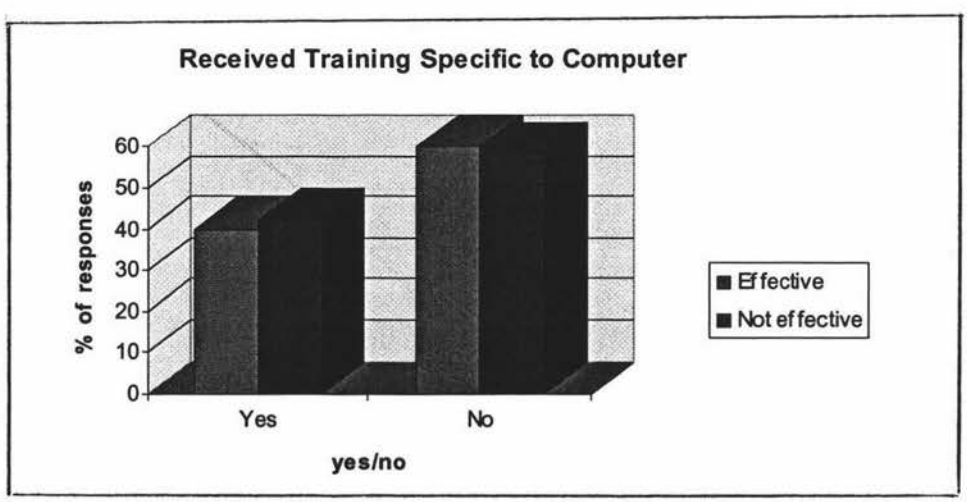

Figure 6.23 Teachers Who Received Training in Use of the Computer.

When comparisons were made as to the length of the training received, little difference could be found, although teachers who thought the computer effective received slightly longer training than did those who did not think the computer effective.

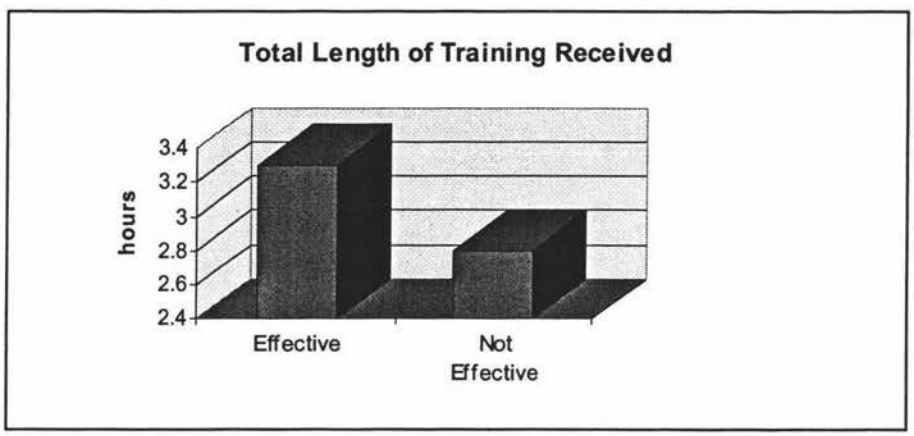

Figure 6.24 Total Length of Training Received

Both groups of teachers had similar levels of general computer training.

BACKGROUND LEARNER INFORMATION

Some cautious comparisons can be made between the mean age of the learner from the effective group and the mean age of the learner from the not effective group.

Table 6.12

Mean Age of Computer Using Learner

	Effective Group	Not Effective Group
Mean Age	10 years	8 years

When comparing the area of disability, it would seem that while there was a proportionate number of learners from both the effective and the not effective

groups with visual, hearing, behaviour, and learning difficulties, those with social or emotional difficulties and physical difficulties were over represented in the effective group. Figure 6.25 shows these comparisons.

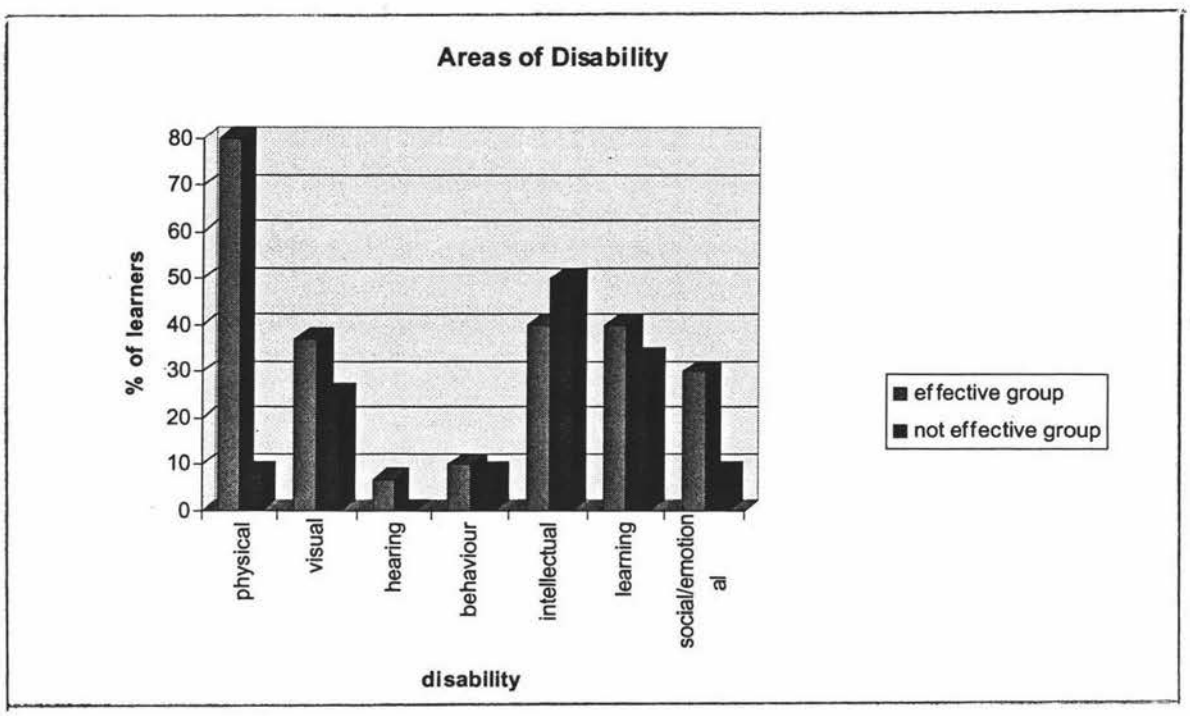

Figure 6.25 Areas of Disability

When comparing the levels of needs between learners (as defined by the Ongoing Resourcing Verification system), slightly less learners had very high needs in the effective group (40%) than the not effective group (45%). When considering high needs, there were slightly more students in the effective group with high needs (52%) as compared to the not effective group (45%). Figure 6.26 outlines these findings.

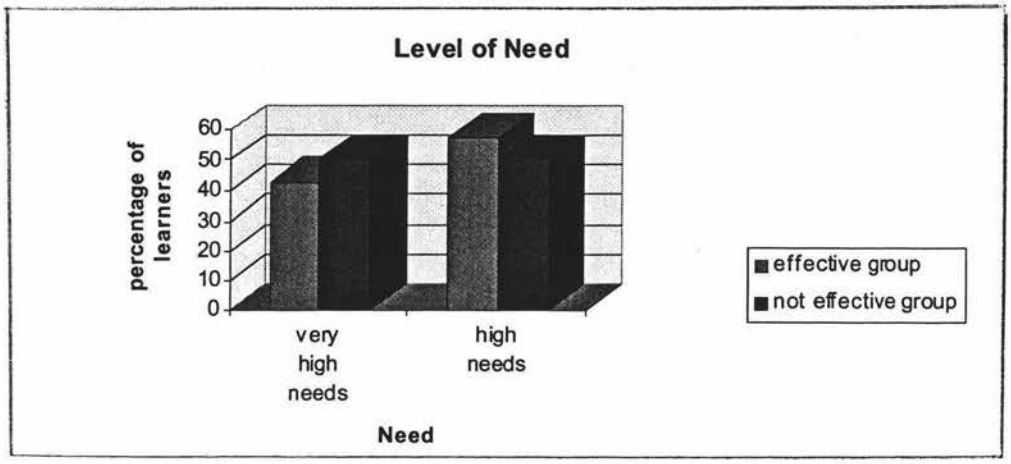

Figure 6.26 Levels of Need of Computer Using Learners

USE OF THE COMPUTER

Some differences could be found between the number of teacher aide hours teachers from the effective group had compared with those from the not effective group. Teachers from the not effective group had 54% of their learners allocated more than 21 teacher aide hours per week while those the effective group had 36% of learners with more than 21 teacher aide hours per week. Figure 6.27 shows these results.

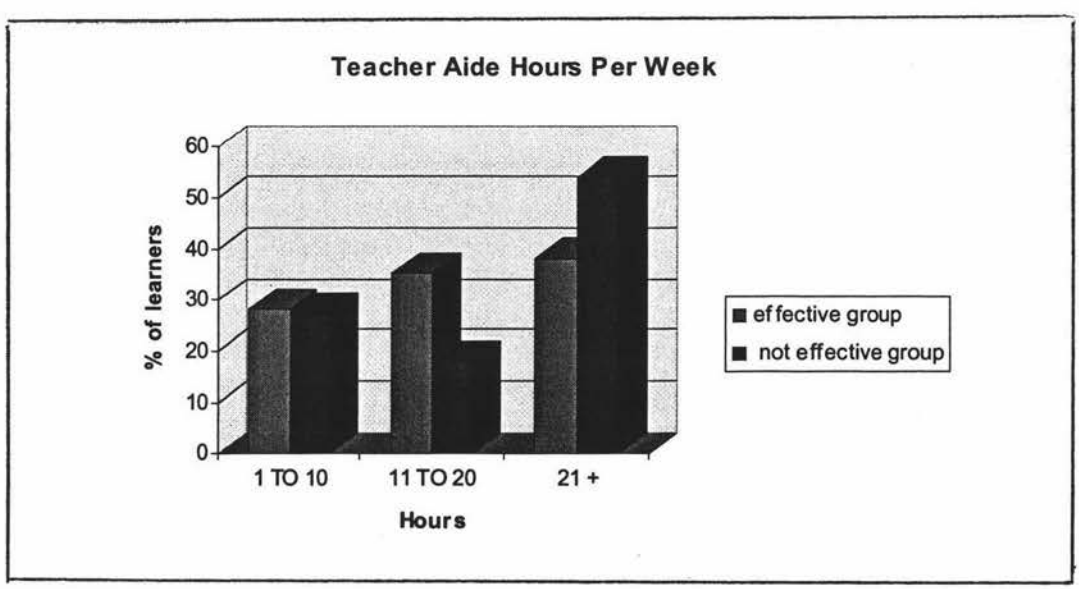

Figure 6.27 Teacher Aide Hours of Learners

For both groups, the teacher aide worked with the learner on the computer. No significant differences could be found between the percentage of the teacher aides' time spent working with the learner on the computer. Figure 6.28 shows these findings.

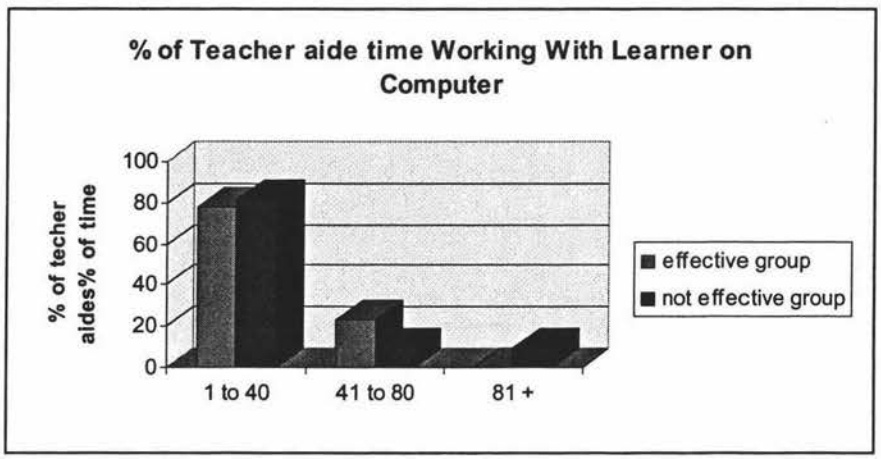

Figure 6.28. The Percentage of Teacher Aide Time Spent Working with the Learner on the Computer.

While teachers in the effective and not effective group showed similar computer use in the areas of Maths and English, teachers in the effective group used the computer more over the other curriculum areas. Figure 6.29 reports these findings.

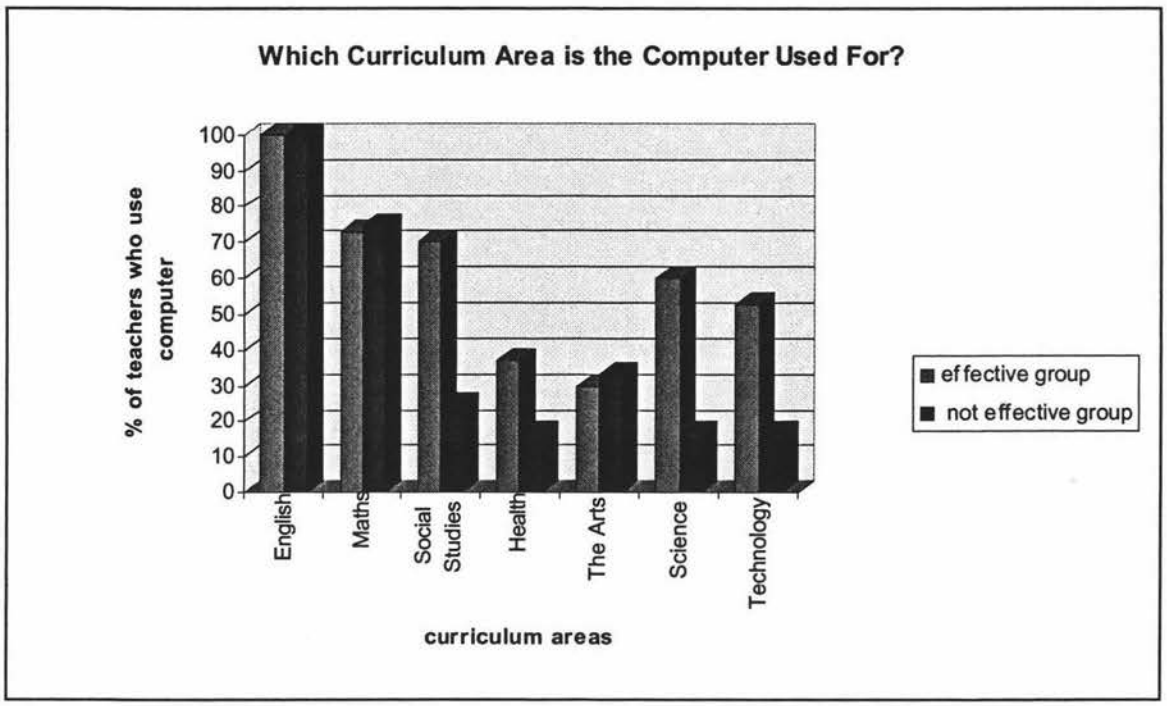

Figure 6.29 Percentage of Computer Use by Area of Curriculum.

Table .6.13

Most Common Software Titles used by Computer Using Learners.

Software Title	Effective Group % of Learners Using	Not effective Group & of Learners Using
Co Writer	37	8
Microsoft Word/Works	27	33
Clarisworks	23	17
Interactive Story books	20	42
Encarta	17	17
Storybook Weaver	17	17
Misc Games	17	42

Table 6.13 outlines the most common software titles used by learners from each group. Two significant differences appear in the use of games and interactive storybooks. Those teachers in the not effective group use these types of software

more than those teachers from the effective group. Conversely, those teachers in the effective group use the software title *Co-writer* (a programme that assists in written language) more than those in the not effective group.

Learners whose teachers considered the computer an effective tool for including them in the regular class used a greater variety of adapted hardware. Figure 6.30 outlines these findings

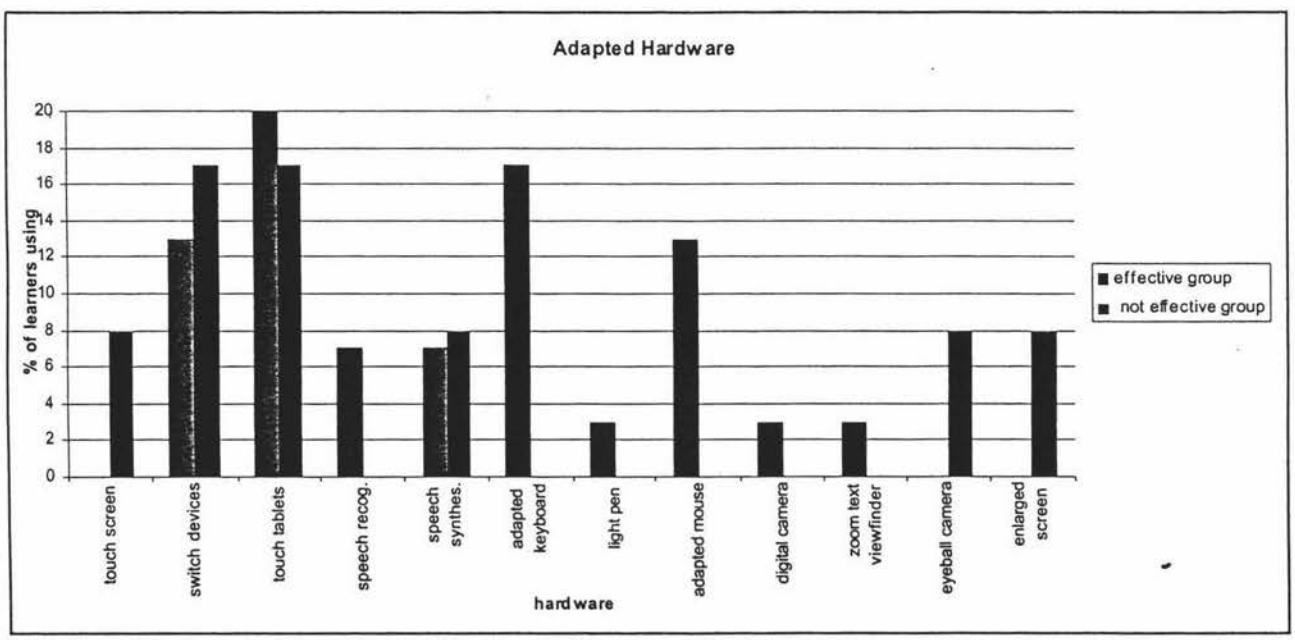

Figure 6.30 Use of Adapted Hardware

Learners who had teachers that believed the computer to be an effective tool of inclusion, spend more time per day on the computer than those whose teachers believe it not to be effective. Figure 6.31 shows these findings.

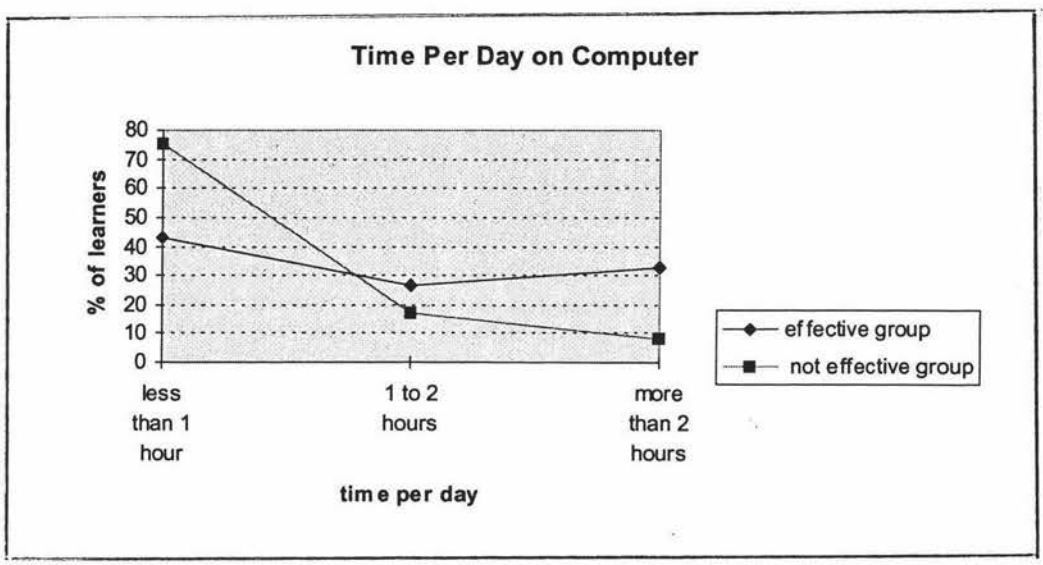

Figure 6.31 Average Time Spent on Computer Per Day

Figure 6.32 outlines who the learner works with on their computer. Those learners whose teachers believed the computer to be an effective tool for inclusion, worked predominantly with a Teacher Aide. Those learners whose teachers believed the computer not to be an effective tool worked with a greater range of people such as fellow students, the class teacher or specialist teachers.

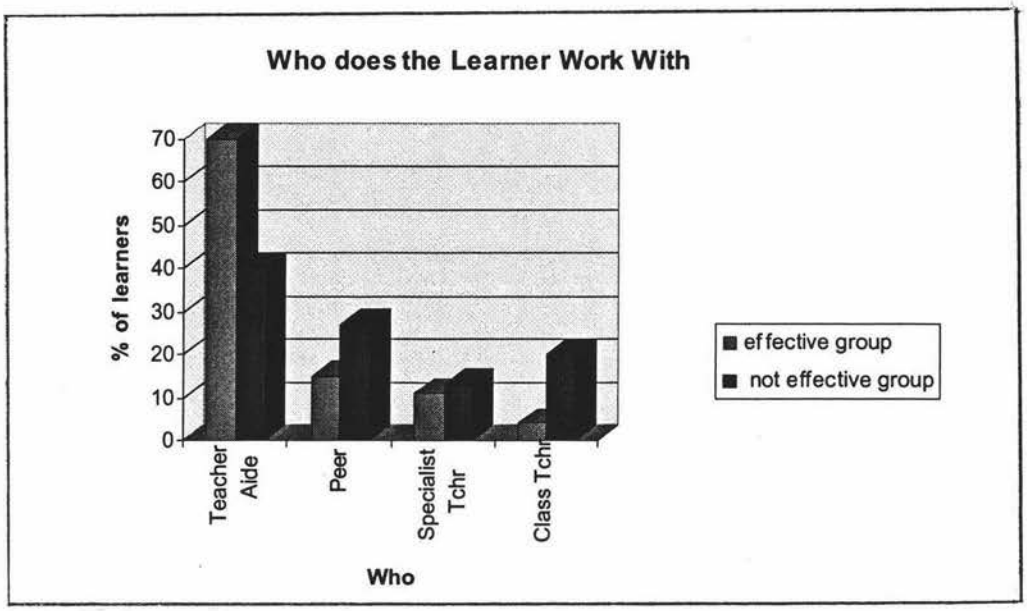

Figure 6.32. Who Does Learner Work With

For both groups, the computer was situated in a withdrawal space inside the classroom and at a desk of their own reasonably equally. Slightly more learners from the effective group had their computer placed within a group of other learners desks, and slightly more learners from the not effective group had their computer placed in a withdrawal space outside the classroom..

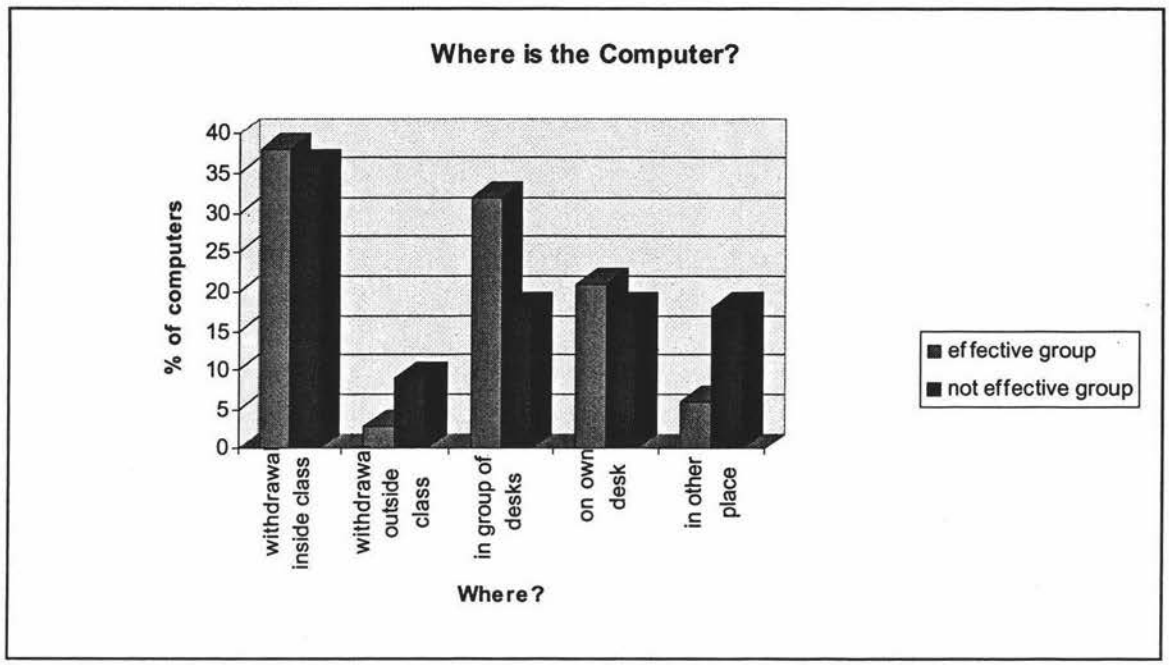

Figure 6.33 Location of the Computer.

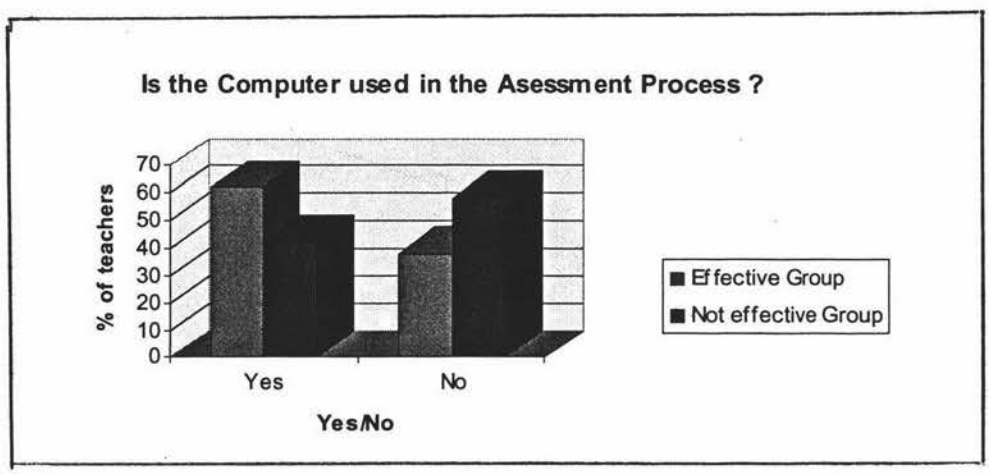

Figure 6.34 The Computer in the Assessment Process

Figure 6.34 presents information on the use of the computer in the assessment process. Respondents were asked if the computer played any part in the assessment process. Slightly more teachers in the effective group included the computer in the assessment process that teachers from the not effective group. Figure 6.34 reports these findings

Respondents were asked if the learner had a current IEP. For both the effective and not effective groups, the majority of learners had a current IEP. When asked if the computer was written into the IEP in any way, again the majority of teachers indicated this to be so. Table 6.14.reports of these findings.

Table 6.14

The Place of the Computer in the IEP Process

	Current IEP		Computer written into IEP	
	Yes	No	Yes	No
Effective Group	90	10	89	11
Not effective Group	92	8	82	18

Differences were found between the two groups when comparing how the computer was written into the IEP. Teachers from the effective group were more likely to have the computer written into the IEP in its own right, that is, goals and objectives specific to the use of the computer.

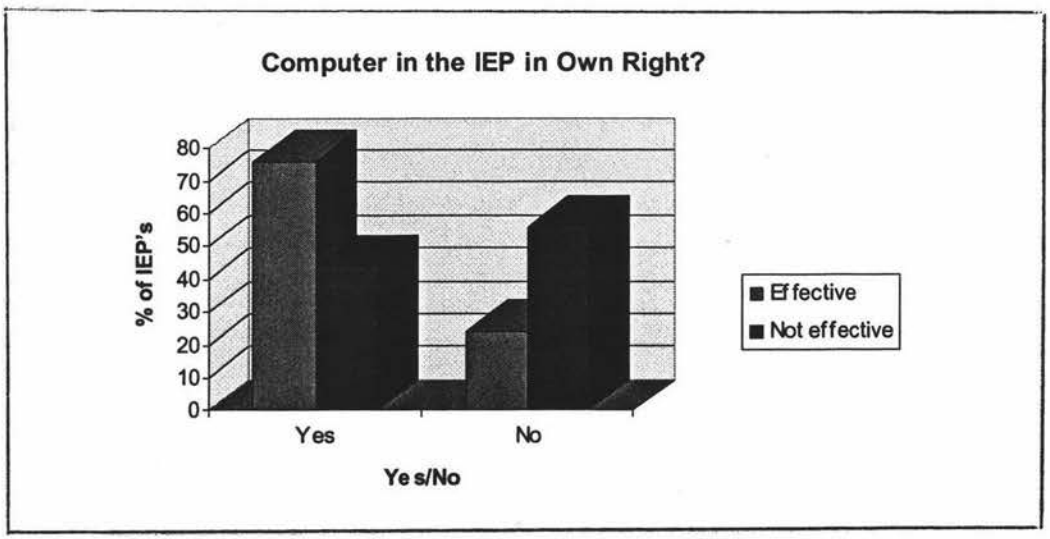

Figure 6.35 Goals/Objectives in the IEP Related to the Use of the Computer.

Table.6.15 outlines some of the most common reported goals or objectives written into the IEP for the use of the computer as reported by those teachers from the effective group.

Table 6.15

Common Goals and Objectives in IEPs

IEP goal/objective	%
Keyboard skills	16
Independence and confidence in computer use	21
Research skills using the computer	5
To use a particular piece of software	16
To use a particular adaptive device	16
To use the computer more	5
To manage files on the computer	5
To update hardware/software	5

Both groups of teachers reported similar levels of suggested computer use in the IEP to achieve goals and objectives in the areas of reading, mathematics and written language. In other areas there were marked differences between the two groups. Teachers from the effective group utilised the computer to achieve IEP goals from a much wider range of learning areas than those teachers from the not effective group. Table 6.16 outlines these findings.

Table 6.16

Utilisation of the Computer to Achieve IEP Goals.

Area	Effective	Not effective
Reading	47	41
Mathematics	43	42
Written Language	63	58
Science	23	0
Social Studies	30	0
Technology	23	8
The Arts	13	8
Health and Well Being	17	0
Social Skills	10	25
Behaviour	3	8
Other	3	0

TEACHER PERCEPTIONS

Figure 6.36 compares the perceptions of both groups of teachers as to the level of support the learner required to have their needs successfully met. Teachers from the not effective group perceived the needs of their learners to be higher that those of the effective group. Figure 6.36 reports these findings.

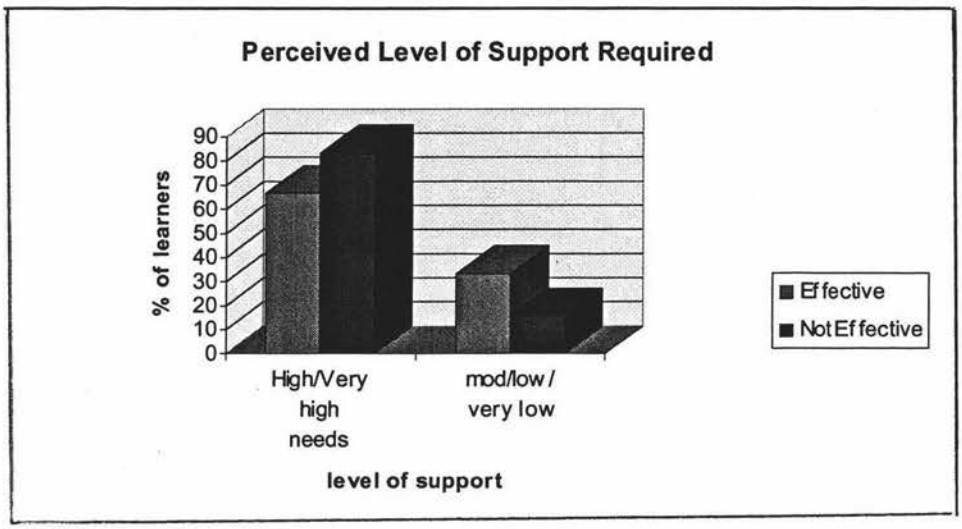

Figure 6.36 Teacher's Perceived Level of Support Required

When comparisons were made between teacher's perceptions of the usefulness of the computer for a variety of functions, differences were found in a number of areas. Table 6.17 reports on these findings.

Table 6.17

The Usefulness of the Computer

	Very Useful %		Quite useful %		Useful %		A Little useful %		Not useful %		Discour. this %		Not Applic. %	
	E	N	E	N	E	N	E	N	E	N	E	N	E	N
as a prosthetic device	68	22	8	0	16	33	0	22	0	11	0	0	7	0
as a learning aid	65	40	22	10	9	30	4	20	0	0	0	0	0	0
as a motiva-tional aid	52	40	20	10	16	30	8	20	0	0	0	0	4	0
as a commun -ication aid	35	10	13	30	9	30	17	20	13	10	0	0	13	0
Accessing the curriculum	32	0	14	11	36	44	9	22	5	11	0	0	5	11
inclusion in activities	25	11	21	11	38	33	8	22	8	11	0	0	0	11
encouraging acceptance by peers	19	11	14	22	14	0	24	22	10	11	18	33	0	0
adapting the curriculum	52	20	22	10	9	20	4	30	9	10	14	10	0	0
in increasing self esteem	29	11	37	11	17	44	8	11	0	11	8	11	0	0
in developing motor skills	40	10	20	10	20	60	8	20	8	0	4	0	0	0
facilitating presentation	80	10	8	10	4	60	0	0	0	10	4	10	0	0
encouraging self management	46	11	38	0	13	55	0	11	0	1 1	4	11	0	0
in increasing productivity	54	0	19	20	19	40	8	10	0	10	4	20	0	0
facilitating inclusion in social groups	14	0	14	22	14	11	24	11	19	22	14	33	0	0

E = effective

N = not effective

When comparisons were made between each group of teachers beliefs regarding inclusion, some differences were found. Figure 6.37 reports on these differences.

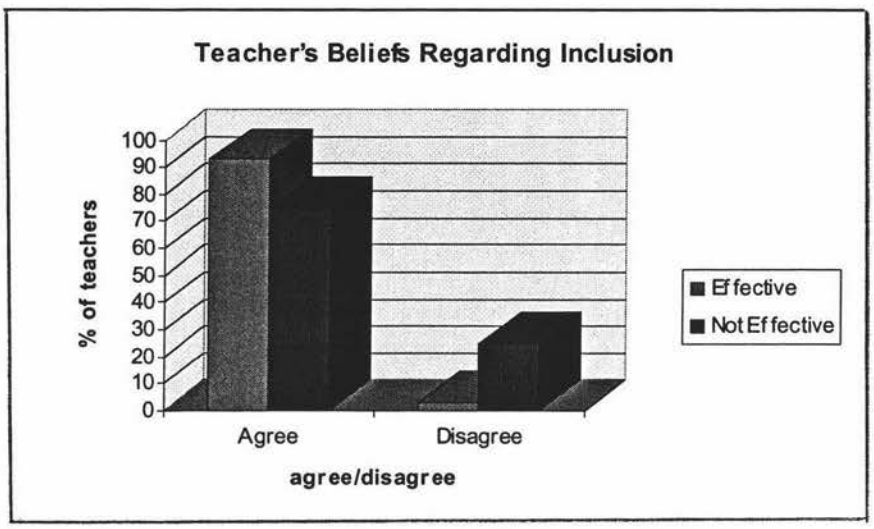

Figure 6.37 _Teachers Beliefs Regarding the Concept of Inclusion.

No significant differences could be found between the teaching and learning setting of the two groups of teachers. The majority of teachers came from a mainstream setting in both the effective group (97%) and the not effective group (83%).

SUMMARY

This chapter outlined results from phase one of the study. Part one reported on the overall findings from the questionnaire and provided an overview of the nature and extent of computer use by learners with special needs and the perceptions and opinions of their teachers. Results were presented in four sections. These were: background information on the teacher respondents, background information on the

learner, the utilisation of the computer and finally, teacher's perceptions regarding the effectiveness of the computer for meeting the needs of the learner. Results show that most teachers feel confident and competent in implementing computers for learners with special needs, even though for many, they had received no training in the specific use of the computer. Teachers believed that the computer had many advantages, the most often cited advantages were presenting and completing work and as self esteem/confidence and motivation enhancers. Drawbacks included difficulty finding or accessing appropriate software, lack of teacher skills and lack of time to understand all the computer can do. The vast majority of teachers in the study agreed with the concept of inclusion but with some reservations.

The mean age of the computer using learner was 8.5, and the majority had teacher aide support and were classified as having high or very high needs on the Ongoing Resourcing Scheme. Many of the learners spent less than 1 hour per day on the computer and usually worked with the teacher aide. English and Mathematics were the curriculum areas where the computer was most utilised. Most learners had an Individual Education Plan, and for most of these learners, the computer was written into that plan.

Part two compared the findings of those teachers who believed the computer to be an effective or very effective tool for including learners with special needs and those teachers who believed it to be either neutral in it's effectiveness, ineffective or very ineffective. Results were presented in the same four sections as part one.

Teachers with more teaching experience were more likely to describe the computer as an effective tool for including learners with special needs in regular classes. No correlations could be found between teachers training and their perceptions of the usefulness of the computer.

Overwhelmingly, those teachers who believed the computer to be effective for including learners with special needs had a learner with a physical disability. Learners whose teachers' believed the computer to be an effective tool for inclusion had slightly less teacher aide hours allocated to them, used the computer over a greater variety of curriculum areas and used a greater variety of adapted hardware. They also used games and interactive storybooks less than those learners whose teachers believed the computer to be not effective. While both groups of learners had IEP, those learners from the effective group were more likely to have the computer written into the IEP as a specific goal or objective.

The next chapter outlines the results of phase two of the study.

CHAPTER SEVEN

RESULTS PHASE TWO

INTRODUCTION

This chapter provides results for the second phase of the research. It presents the data from interviews with five teachers who believed that the computer was an effective or very effective tool for including learners with special needs in regular class settings.

The following table outlines demographic data on each of the teachers who participated in this phase of the research. For a detailed description of the methodology of phase two, refer to chapter five.

Table7.1

Teacher Interviewee Data

Teacher Code	**Ethnicity**	**Age**	**Gender**	**Length of Teaching**	**Class Level**	**Opinion Of *Inclusion***	**Usefulness o Computer for Inclusion**
T1	NZ Caucasian	41-50	Female	11-15 years		Agree	Extremely Effective
T2	NZ Maori	20-30	Female	Less than 5 years		Totally Agree	Extremely Effective
T3	NZ Caucasian	20-30	Female	5-10 years		Agree	Extremely Effective
T4	NZ Caucasian	51-60	Female	More than 25 years		Totally Agree	Extremely Effective
T5	NZ Caucasian	51-60	Male	More Than 25		Totally Agree	Extremely Effective

The data is presented in six main themes, these are: (a) computers and inclusion; (b) computers and teacher practices; (c) computers and the curriculum ; (d) teacher support; (e) the potential of the computer and (f) computers and school philosophy and climate.

COMPUTERS AND INCLUSION

Beliefs Regarding Inclusion

> *All teachers agreed with the concept of inclusion (as related to the definition supplied). Reasons for this were varied. One teacher talked of the right all children have to be included with their peers and the importance of other children mixing with learners with special needs:*
>
> *I think one reason is that they have the right to be included with their peers and their peers have the right to learn to mix with people that need to be included...(T3).*

Other teachers talked of the benefits of inclusion:

> *...She benefits so much socially and in my situation she has nothing wrong with her social issue, she mixes with the other kids ...I do a lot of cooperative teaching and learning in my room...I feel that from cooperative learning strategies she's learnt and the kids learn...she feels so much better about herself and being in a classroom where she is doing what other kids are doing (T2).*
>
> *As well as being valuable for the child I think it is valuable for the whole of the rest of us to understand that fact that these are other human beings just like us mostly, that need our help and support in some ways and that they*

can learn just like everybody else, in some ways more than everybody else....but it is so valuable for them to just be part of everything instead of in their own little enclave as they used to be once, many of them (T5).

When teachers were asked to describe any events that may have shaped their views regarding the inclusion of learners with special needs, many teachers talked of their experience:

I went to a secondary school which had a unit attached so I did have experience with a secondary school student with special needs (T2).

Before mainstreaming, we were all a bit isolated ...it may be that we have been protected from kids that we might have once thought were odd and different but now of course that they've been in school and we've had contact with them, we realise that they are just kids in many ways, in most ways probably like every other kid, but different in some special and interesting ways (T5).

Well I think it is from personal experience, I think that when- I mean I am sure I would have moved in my opinions since in the last ten years or so since mainstreaming has become a reality (T5).

One teacher talked of her training:

I trained where inclusive education was taught to us so I learnt all about that at Teachers' College. I think Teachers College played a big factor in that too because I did special work in my third year (T2).

But also, the characteristics of the teacher were seen as important in shaping views regarding inclusion:

> *Pretty much I totally agree with inclusive education and I think it has a lot to do with you as a teacher and how you teach and how you deal with teaching and making that child inclusive (T2).*

> *...the patience having been a mother. Also right through my training at Teachers' college the visiting lecturers would say "oh you're great with the special needs kids, you have to come back and do that special needs training"(T1).*

The Role of the Computer in Facilitating Inclusion

One of the goals of inclusive education is that diversity is accepted, that children belong, have friends and are supported by their peers. Teachers were asked their views regarding the role of the computer in facilitating this.

> *I think that the computer helps achieve this. It means that while she is working, she is on a par with everyone else, she is able to complete what everybody else is doing, she doesn't have her special work, so she's very much an equal in terms of work completion and what she actually does, I think sometimes special needs children are set apart just by what they are required to do. The other thing is that the children like to use her computer so it's keeping up with the Jones's in some respect, and sometimes they will help her publish or edit or whatever (T3).*

> *The other kids know that the computer costs lots of money and that we have to look after it. ...status I think for (name of learner) in terms of the other*

kids, they sort of look up to her, thats quite important for her, she's not teased about that at all. Also the kids in my class value that because it's locked away at interval and they will take any responsibility for looking after that with (name of learner) (T2).

Oh it helps especially when he is playing some of the programmes he has got on there. Microsoft golf is a really good one, but what's really good about it is that he can teach the other kids how to play it because often they are teaching him, but with the computer, he is teaching them and it socially helps him to integrate with the other students and at playtime and lunchtime if it is wet and that, he will go over to the library and he has a roster of students that work with him and they play games, access information or whatever they need to do at the time. Other children work with him on his computer (T1).

Yes, the computer helps this, it helps to involve the older kids in having something similar to interest them and also that he is somebody with his particular expertise that many of them haven't got, you know it is not an ideal way of interacting, I mean it is a sort of cargo-cult kind of way, but even so, it is a real way for (name of child) to relate to those other kids in a more equal footing than you might otherwise (T5).

I don't let him work at the computer unless they (the rest of the class) are all working individually, otherwise he has to sit in a group and work with the group. It is inclusion of everybody, he has to do the same thing at the same time. Also, I have groups that move continually so he is sitting beside different people every fortnight...so he knows everybody in the classroom (T4).

The Social Nature of the Computer

Teachers were given the opportunity to discuss the social nature of the computer, that is, what sort, if any social interaction occurs when utilising the computer. Teachers provided examples of varied social interaction that occurs through the use of the computer. All teachers allowed the computer to be used by other learners to a greater or lesser extent. All teachers agreed that the computer provided a useful vehicle for encouraging social interaction between the learner with special needs and other learners in the class.

> *Yes she has done it a few times when my teacher aid has been sick, so I've had to put the CD in and choose a buddy for that situation and also there is times like when she types up her information ...because she doesn't speak, you have to have someone side-by-side with her – it is a matter of touching for you to respond if she needs help (T2).*

> *... but what's really good about it is that he can teach the other kids how to play it because often they are teaching him, but with the computer, he is teaching them and it socially helps him to integrate with the other students and at playtime and lunchtime if it is wet and that, he will go over to the library and he has a roster of students that work with him and they play games, access information or whatever they need to do at the time. Other children work with him on his computer (T1).*

> *Yes, other kids use his computer although he is not always happy about that, sometimes he is and sometimes he isn't. the parents have made it perfectly clear that the computer is to be used as we see fit rather than as he(learner)*

sees fit and that's good you know, I suppose that's the Ministry's approach too (T5).

I think the computer helps the learner be accepted by his peers- in presentation because everything goes up on the wall and it is the same, every body's is the same, his stands out sometimes because the printing is a bit bigger, but everybody is actually looking at his work and thinking wow that neat oh well done, they actually get peer praise. He actually got a certificate today in assembly, school assembly because of his work being so neat and it was better than everybody else's and he was you know, big grin and feeling really proud and accepted by the school (T4).

Sometimes if he is in a group and the group have to do a chart then they use his computer-they get round and do it (T4).

Myself the teacher aide and occasionally children would work with her on the computer (T3).

COMPUTERS AND TEACHER PRACTICES

Type of Teacher

I'm highly organised, really organised person. I would run what I would call a very cooperative classroom and a very tightly structured classroom. I think I've got very good management. I am right into quality work, setting goals, my kids get goals and evaluate goals every term and we do that as a class and as individuals. I value every one of my kids, I am very dedicated to my teaching, I put a lot of time into my job. I welcome parents to come in whenever they want to meet the teacher and I give them my phone number,

I'm quite happy and I've met everyone of my parents, and I would have spoken to everyone of my parents one or twice beside the interview just on how their child is progressing, whether it be for a not so good reason or a good reason. I just ring parents to say that Joe Bloggs is doing really well at the moment (T2).

I think I'm pretty formal although when I see someone who is formal I think I'm not like that at all, but I would place myself as fairly formal. I feel that I really do get to know the individual needs of the children and I know them pretty well. I am a very structured, very organised teacher (T3).

I am a firm but fair teacher and I think that everybody should be treated the same. I think inclusion is very important and that nobody should be excluded, everybody has strengths they just need to be brought out (T4).

I am a reasonably authoritarian and reasonably structured teacher. Although I am never as well prepared as I would like to be, but I like to have things ready and waiting so there is a sort of dichotomy there isn't there between having things ready and getting kids initiative, room for initiative – it is a difficult balancing act. Sometimes I feel I should be allowing the kids more time to do their own thing, and some of the time I think what the hell are the kids all over the place doing this fiddling around, they ought to be knuckling down more (T5).

I am an organised teacher, I have my resources always ready, reasonably structured, semi structured I would say. I know where I am going, I have my objectives for the day and for the session and I know where I am headed I have all my resources set out what I need and what I am doing, my

planning is all pretty good, however if something crops up and we get off on a tangent, fine, we do (T1).

Role of Teacher

I really see my role as providing opportunities for children and of providing learning activities that will excite them, interest them, encourage them to want to find out more about things, use and develop their skills, use their initiative (T5).

I like to make it very hands on, very little teacher talk, just what is necessary, it is the kids that are important and they need to be self motivated in their learning (T1).

Use of Computer

I use the computer as a tool and it is not the end all and be all of everything. I would like children to have a really good basic background in English and Maths and Language and Social skills (T4).

Beliefs About Learning

I think learning takes place in a safe classroom where everybody is talking with everybody else, there are no put-downs. The children have got to feel safe to make mistakes and I encourage kids to make mistakes, to have a fair go and just to learn (T4).

The kids are important, they are the number one, they are the priority, I'm only here as a facilitator, I guide them in their learning, I try to get them to do the thinking through issues and thinking where they should go to and what they should be doing instead of just telling them what to do. With me I

work a lot with the kids, I get down sit down and work with them, I'm still a hands on because basically I've taught juniors and these kids are no different (T1).

Children are all different, many children learn best when they have their goals modeled over and over and over and over for them and they can, they understand because you've modeled it and you've talked about what it is the point of what you are doing. That's a really big think for me, some children need lots of time and practice, others here do it once and off they go. It is really difficult to answer that question because they are all so different (T3).

Teacher Confidence and Competence

When teachers were asked to rate their levels of confidence and competence in using computers, two teachers rated themselves very confident, and four rated themselves confident. One teacher rated herself as very competent, four as competent, and one as neither competent nor incompetent. The following quotes are examples of these teachers' explanations regarding their levels of competence and confidence.

I own a computer at home and use it all the time. I guess I got competent from using them at Teachers' College ...I use it all the time, I teach it here now, I've been on a couple of courses, my partner uses it in his job a lot, ...lots of things I have learnt off him a lot. I've really learnt by doing I guess. I wouldn't be afraid to have a go at something on the computer that was new, I would be quite happy to have a go and play around, I mean

that's exactly what happened with 'Freely Achieve' it was all a matter of trial and error (T2).

We've got two computers networked at home, we run our own business, which is basically work on computers....my husband spends all day every day on computers and over the years I have just generally upskilled myself on computers, by basically using them because that is the only way you get to know what everything does by actually getting in there...I was just in boots and all, because that sort of technology and that sort of thing just clicks with me (T1).

I have had lots of experience, I'm thinking right back to when I was a student I used to work at the Warehouse, using databases and things like that there so it doesn't frighten me, I'm well used to it. The staff training, yeh, the staff training definitely it's made me feel more confident, I mean for example at the moment I'm doing my school reports on the computer and I can cut and paste and do all sorts of things and that is no trouble (T3).

Having one at home is a great help, I've been using computers now for - since right from the very beginning really. I have done quite a bit of reading and as I said before, heaps of courses and things but there are still lots of things that I wish I knew more about and could do more competently so that I could be pushing kids on more (T5).

I have used the class computer and I've used my husbands computer at work, that's why we don't own one...And I think when we have got one at school, I may as well use the school one. Also I am confident because I have been on courses (T4).

COMPUTERS AND THE CURRICULUM

One Ministry of Education criteria for computer allocation for learners with special needs is that it is essential for learners to access the curriculum. Teachers were asked their opinions regarding this and all agreed that the learner could not access the curriculum at all or as well if they did not have the computer.

> *I definitely think the computer does this. This child does not have the verbal skills, so to communicate effectively, he has to put everything down in writing, he has some verbal skills but it is slow in coming out, his speech is very indecipherable often. And so the computer is essential to him to record his work, he also doesn't have the fine motor skills to be able to do that writing, so he needs to put it down very quickly (T1).*

> *She has certain motor skill difficulties which mean that putting ideas on paper with a pencil and pen are really difficult, so using the computer eliminates all of those things, so it's majorly (sic) used as a tool for written language, and without it, things take a very long time (T3).*

> *It is definitely quicker, she can see the results, they look good, she is able to read it, other children are able to read it, there's a great sense of pride and all those sorts of things (T3).*

> *Sometimes, it gives him success with things like spelling, he can actually look at the word and the he can actually do the outline shape and say no I've got it in the wrong order...for neatness of work (T4).*

This guy has been here his whole school life and I don't think his handwriting would have improved much since he was five. He is still very very slow, so that is one think the computer enables him to write, probably three times as fast and five times more accurately. The other think is that he has very poor concentration and the computer in some ways helps him to remain focused on his task in other ways is actually provides new distractions (T5).

Teachers talked of the curriculum areas that the computers were used for. In all cases, mathematics and language were identified by all teachers as the curriculum areas were the computer was most utilised.

Maths, English, I mean the whole lot really, language, written, reading, she uses an oral tool because quite often she'll write a message to the class and the computer will read it back to the class because that's her only way of communicating. She's got a notebook that goes home so Mum and Dad might write a message about her weekend and then the teacher aid helps her type in and that is her way of sharing it with the class (T2).

I find it useful for Social Studies and English, especially spelling because then they can look at it and they can actually see the word clearly without any extra pencil marks..if the word is clear and then they can pick it up,, and you can actually say to them go back and check and they can see where they have got to go back to (T4).

It is most useful in the area of written language, definitely. One reason that we've used it is that it was the Co-Writer programme and I actually thought it would take her spelling ability away because the words are given, but her

spelling ability has just gone sky rocketed and so has her hand-writing too which is interesting (T3).

On the basis of the importance based on computer integration in the literature, teachers were asked their opinions regarding integrating the use of the computer with the class programme. All teachers believed that it was important to integrate the use of the computer with what was happening in the classroom, some gave the following reasons:

It is important and we normally have two other computers in the classroom accessible by all students, we also have two desktop publishers which are accessible to all students. So they all have that access to computers so that the student who has sole use of the computer for his special needs is not seen as being different to them except that he has it all the time (T1).

It is important because I don't like or want her to be the one singled out. Having a laptop it really good because it is small and it sits on her desk and it is accessible and she can move somewhere else in the room with it if she has to (T2).

Teachers were asked it if was difficult to integrate the computer use into the normal class programme

No, no it's become part of the routine (T3).

I don't have a problem with that, not at all. I have a good teacher aide ....she just does what we do at that time and it works out fine (T2).

No it is not difficult...the teacher aid that is with him actually helps other children as well, and sometimes the children ask if they can use his computer and so computers are just a natural part of children's lives now (T4).

IEP/Goals and Computer Use

Every learner had a current individual education plan (IEP) and all teachers indicated that the computer was written into the plan in some way. For all but one, it was written in as a goal in itself, while for all teachers, the computer was written into the IEP as a way of achieving other curriculum goals.

Yes it is used for curriculum goals and used for communication goals because one has to type in a message and things like than, yeh, that's probably the main two that we are aiming at because the goals are quite reoccurring (T2).

It is just a tool to achieve goals, it is not a goal of it's own. The child has never really had difficulties learning to use the computer, it's been like a duck to water I suppose, never needed to be a goal in it's own (T3).

SUPPORT FOR TEACHERS

Training and Professional Development

Teachers were asked if they received any training in the specific use of the computer for the learner with special needs. Three of the five teachers had received some training specifically related to the computer.

We received some brief training from SES (Specialist Education Services) – like very informal, coming over after school, sort of us having a play around. It lasted about 45 minutes...both me and the teacher aide...When the computer was purchased for the learner there was hours built into that for training, we haven't used it fully. How long was the training that was built into the purchase? *I think it was two or three hours, I think that's right (T2).*

A lady called (name) came and she worked with (name of learner) and (learners father) and resource teacher and a little bit with me, but I wasn't there most of the time. I think she came about three or four, two hour or one and half-hour sessions. She was very good. The resource teacher got a lot of good strategies from her, and she was very complimentary to (name of learner). Next year we plan to buy more of that training because it was very good (T5).

One teacher spoke of the need for follow up

Once you've used it for a while it would be useful for the person to come back (T5).

Two had received no training.

Nothing, but then I didn't need it, I am fully computer literate (T1).

Nothing, but besides this learner, I have had three other children with computers (T4).

Teachers were asked about any professional development they had received in general computer use (as opposed to specific training or professional development in the use of the computer for the learner with special needs). Four of the five teachers had been involved in some professional development. The one teacher who had not rated her computer competence very highly, was involved in a computer business with her husband and described herself as being surrounded by computers. The following comments give an indication of the range of professional development that teachers had been involved in over the last two years.

> *I have just been one of the five staff who have gone through the training for 'Freely Achieve', so we have had five one and a half hour sessions after school. Freely achieve is basically all your schoolwide planning and assessment is on a computer and so the course took us through how to put all your long-term plans on there, like it has got every kids name in the school and how to access their assessments with your planning (T2).*

> *We have had our school professional development (as we have a new suite of computers). It started of as a personal thing I wanted to learn to use the IBMs and do desk top publishing and all that sort of thing and then it started to branch into the kids and of course many of them are quite proficient anyway so I was quite lucky (T3).*

> *At Teachers' College I did a course ...they were on Acorn, but it actually set me up...(T3).*

Last year was our ICT development year and we went to dozens, literally dozens of courses and worked in the classrooms developing our programmes and developing the way we use computers and had consultants come in and see what we were up to and make suggestions and work with the kids and all that sort of stuff (T5).

I went to some of the Telecom ones when computers were first interneted. We had in-school service courses and I have also sat down with the manual at the computer. Yes I have been to quite a few courses on different aspects when they were first new. Also we have had courses at school, after school, we've had them two nights a week, sometimes one night a week and we try to keep updated. We used to do it on our technology day when the children were at technology we would go down to the computer suite, have a computer to ourselves and work on that and work through the sheets (T4).

All teachers were confident about what they could do if they needed help with the technical side of the computer. In terms of support for them in planning for, and utilising the computer to the best advantage, a number of the teachers felt unsupported.

Initially I would trouble shoot myself and that's my next thing that I want to do, is go and do some training in that field in the technical side, so I've got a few more skills and the new have a guy who comes in on site, he spends one morning a week here that I've got his phone number and I'll just ring him and he will come. The school pays for that, he's employed by a cluster of schools in the area and he comes in and does any technical stuff or he will take the computer away if there is a problem (T1).

If something went wrong with the computer I would probably ring SES first, confer with them but then send it to a computer place that we know really well, who we've done out dealings with for the software. I would always confer with SES because it is their property (T2).

If I was coping by myself I would probably need support, but because I have got a very good teachers' aide, whose experience with and knows all the software I don't. If something goes wrong with the computer I would inform the special needs administrator and they would deal with it (T4).

I wouldn't complain about the support that I've been given but I don't feel that I get the support that I need to use this computer effectively with the learner (T3).

I think it (support) could be better...I think that what we are doing is effective and the parents are very happy and SES are happy, but for me it's a bit like a stab in the dark, I'm sort of using my initiative more than using something I've read or been told which I don't see anything wrong with but I still think it is important to have a balance of what you want to do and maybe professional stuff and in terms of computers in education I sort of haven't found a lot of support out there. That's a scary thing for a teacher I guess that you are doing everything of your own accord (T2).

THE POTENTIAL OF THE COMPUTER

All teachers thought that the computer could be doing more for the learner that it was now, or that it could be better utilised. For most teachers it was about the

time needed to get to know the programmes and what the computer could do. The following comments highlight these issues.

> *The computer could do more for the learner than it is doing now if we could find the programmes (T1).*

> *Yes I think the computer could be doing more and I think also that (name of teacher aid) and I are probably limited in some way because this is my first experience of having a computer in the room. It is getting to know the programmes ....I still think that what I'm doing with her on the computer is like 30% of what could be done and I'm sure there are heaps of other ideas out there that we could utilise especially in terms of enhancing her learning (T2).*

> *Time, my time it takes to sit down with someone and experiment and say oh shall we try this, and before you know fifteen minutes have gone and somebody else in the room needs you. Time and class numbers definitely. You have to learn the skills, once you've got those it just needs practice, but of course the time schedule stops you from doing that (T3).*

Many advantages were described by the six teachers including overcoming barriers to learning, saving of time and resources, as a tool for motivation, encouraging acceptance in the social group, and for presentation. The following are some indicative comments from teachers

Providing Focus and Motivation

> *At the beginning of last year before this computer was set up, it was really difficult to get her to complete anything, stay on task, not that she is*

disruptive or anything like that, it is just lack of motivation and tools to get on with the job. Yeh it is just part of her and part of her package and she just gets everything done because it is there (T3)

I think that the greatest benefit is that it helps him to remain focused (T5).

It is motivating, not just all boring book work, there is a balance in the maths that she gets to do some computer work with a game and which is learning (T2.)

Time Saving

I also think in my situation with my learner is that she is able to produce pictures and type words....whereas if she was to do that in written form it is quite a slow process (T2).

Enjoyment

And I think it is beneficial for her too because I think she gets a lot of enjoyment out of the programme (T2).

Neatness

She can keep it neat and present it and have it like all the other kids (T2).

Probably their ability to get their work down in a legible fashion and it is also as good as the others (T1).

Social Interaction/Acceptance

The social interaction thing, I think that would be the main thing (T5).

It has enabled her to complete the classroom programmes that everyone else does, there is nothing that she doesn't do, everything that she does is what everybody else does and I really put that down to the computer (T3).

A lot of children now are using computers so he feels that his presentation and their presentations are the same, and nobody knows whose is whose, except you've got the name on the bottom. It brings a sameness in content..(T4).

Acceptance (T4).

Having a laptop is really good because it's small and it sits onn her desk and it's accessible and she can move somewhere else in the room with it if she has to (T2).

Overcoming Barriers

He has been able to get into recording work more, because writing was so difficult for him, is so difficult for him (T5).

The computer is for him because his big printing and his big writing is not neat enough for him to say this is mine (T4).

Probably their ability to get their work down in a legible fashion (T1).

Teachers were asked if there were any drawbacks to using the computer for the learner with special needs. Issues ranged from portability and placement of the

computer to the computer being a different brand to the computers in the school computer suite.

Portability

The biggest thing is the portability of them this is probably the biggest problem we have found. I had a student last year who had one and she had a wheelchair, so where do you put the computer? This year he has got a walking frame, how do you lug the computer around, there is only one way to do it and the teacher aid has got to carry it for him. Feel how heavy that is. (T1).

Software

The availability of software is a drawback (T1).

Placement of the computer

Now this is going to sound funny but every time we've had to set the classroom up, the first thing you've got to think about is where am I going to put it and I'm not the kind of person to put it in the corner and turn her back around so that she can't be part of the classroom so her desk is right there (points to the side middle of the classroom). Okay because she can move from one to the other. The big pain in this classroom is the plugs. Huge nuisance, they are just in stupid stupid places. In the first room we were in last year, they were all in the doorway, so the computer had to go in the doorway and she had people walking past her and she couldn't it was really hard too because you don't put a group of desks in the doorway, it was very hard for her to be part of the group. That's really been the biggest issue for me, it sounds funny, but it can actually be quite a problem (T3).

Well he sits at his computer all the time and he is right over here in this corner, because that's where theplug is and I don't really want cords traipsing all over the classroom. If the wall plug was in a different place, would the computer be in a different place? Yes I would put it in the centre of social things and more in my vision (T5).

Miscellaneous

In some ways the computer keeps him more focused, and in some ways it is a distraction, a very potent distracter (T5).

The drawback for us is that at the end of the day I don't know if what (name of teacher aide) is doing is the right thing and the support, and I guess the drawback for (name of learner) is that maybe because of tht she might not be getting the full benefit of the computer. I mean at the moment it is fine because it is new and we have got some new things to do, but I am sort of thinking what's it going to be like maybe this year, next year down the track when we've had it for quite a while are we going to be saying, right, we've done all that we need (T2).

They can become too reliant on them. They find something on the computer, they highlight it and take it off, they don't actually read it, they just put it on a piece of paper (T4).

It would be really good if her computer was an IBM (that is what they have in the school computer suite) because if we start something on there she can't bring it back and finish it here or vice versa (T3).

SCHOOL PHILOSOPHY/CLIMATE AND COMPUTERS

Teachers were questioned as to the philosophy of computer use in their schools. The researcher was looking to explore the philosophy, beliefs and practices of the school as a whole to the use of computer technology. The following comments describe the computer environment of the five teachers.

> *We've in a really interesting situation, as you know, at the moment because we've just got out new computer suite and on the whole I think we've got a real spread of commitment to computer use and information technology in our school, right from the people who are just really frightened, it's a big new world and the skills take a wee while to get used to ,especially when you are trying to teach them to a class of kids you know with all sorts of management issues, right through to people who are really keen. We use the computers a lot, we haven't used it as a research tool, but we've used it mostly as a publishing tool so far. The reason for that is that policy for internet use has not been finalised yet. Also as a staff we have had ongoing professional development (T3).*

> *Yes we have just developed this year in our ICT planning- we are actually employing a full time teacher for next year, for information communication technology. Applications close on Friday. We have a computer suite next door here with fifteen computers, and we are going to have a computer suite next year with probably close to twenty computers in it, there is going to be two in every classroom and the will actually be rostered in working with the ICT teacher so it is very important to our school (T1).*

A lot of children have got computers at home and come with work done. We have actually got two computer suites, one is a very old one which I've taken children down to do story writing on.....(T4).

Yes, we have a computer suite, over the year they have two terms in the computer suite over a timetable they have one day in an hour and half slot so like in term one, form one go to computers when two goes to music and swaps around. We have a technology team who plan the programmes for every classroom teacher. The school definitely values computer technology, the whole school is networked (T2).

I think that our school could be described as computer smart, we have a philosophy of computer use which is trying to integrate ICT with the curriculum...computers are one very useful tool in the total curriculum...Last year was our ICT development and we went to dozens, literally dozens of courses and worked in the classrooms developing our programmes and developing the way we ue computers. We had consultants come in and see what we are up to and make suggestions and work with the kids and all that sort of stuff (T5).

SUMMARY

This chapter has outlined the results of phase two of the study. Teachers who believed the computer to be an effective tool for including learners with special needs in the regular class identified a number of common beliefs and practices. These included their belief in the concept of inclusion, the importance they placed upon incorporating the use of the computer into the regular curriculum, the uses

they made of the computer and the school and class climate in which the computer was utilised. They all held similar beliefs regarding the role of the teacher, and their descriptions of themselves as teachers also highlighted several key similarities. All teachers regarded themselves as competent computer users, and although reasons for this were varied, most owned a computer and attributed their confidence and competence to this. All teachers worked in schools that valued the use of computers, some to a greater extent than others.

The following chapter presents a discussion of the results, highlighting a number of themes that emerged from phase one and phase two of the study.

CHAPTER EIGHT

DISCUSSION

INTRODUCTION

This chapter discusses the results of phase one and two of the research. The discussion of phase one is in two parts. Part one discusses the nature and extent of computer use by learners with special needs, and highlights a number of themes that emerged from the research. Part two highlights and discusses the comparisons between teachers who felt the computer was an effective tool for including learners with special needs in regular class with those who did not. The discussion of phase two reports on the beliefs, attitudes and practices of a group of teachers who perceived the computer to be a useful tool for including learners with special needs into regular class settings.

PHASE ONE PART ONE

The following is a discussion of the results of phase one, part one of the research into the nature and extent of computer use by learners with special needs.

THE TEACHER

Perceived Confidence and Competence

Most teachers in the study (69%) reported to be either very confident or confident in the use of the computer for the learner with special needs. Similar results were found in levels of teacher's perceived competence. The majority of

teachers (66%) felt that they had the necessary skills to competently make use of the computer for the particular learner in their class. In terms of what is known about the importance of the teacher's role in creating effective computer using environments (Cochran-Smith, 1991) these results regarding teacher confidence and competence in computer use must bode well, and have positive implications for the use of computers for these learners. These results, do however, contradict findings from similar research projects (Tyler-Wood, Putney & Cass, 1997; Cicchelli & Baecher cited in Au, 1996) which suggest that teachers feel unprepared and lacking in knowledge to successfully implement computers into classrooms, and that the use of computers generated a great deal of fear and confusion. Possible explanations for the results from this study could be the high percentage of New Zealanders (approximately 48%). who own a computer (Ministry of Commerce, 1999). Tyler-Wood, Putney and Cass, (1997) suggest that accessibility to a computer is the greatest indicator of teacher confidence and competence in computer use in the classroom.

Training

The majority (63%) of teachers had received no training in the use of the computer that had been allocated to the learner with special needs. These results were somewhat surprising considering the levels of confidence and competence that teachers reported in the use of the computer. These results were contrary to findings from other countries that report a corresponding lack of confidence

attached to lack of training in the use of the equipment (McGregor & Pachuski, 1996). There may be several explanations for this difference. First, 70% of the teachers in the study while not receiving training specific to the use of the computer for the learner with special needs had received general computer training. This training would no doubt affect their confidence and competence in a positive way. Secondly, while not a question that was asked in the questionnaire, it could be expected that up to 40% of these teachers had their own computer at home (Ministry of Commerce, 1999). This has been shown to have positive effect upon confidence and competence in computer use.

Perceived Usefulness of the Computer

The greatest usefulness of the computer as perceived by teachers was as a learning tool. The next most common, in order of teacher selection, was as a motivational tool, in facilitating presentation skills, as a prosthetic device, in encouraging self management and in adapting the curriculum. The role the computer can play in all these functions for learners with special needs is well-documented (Au, 1996; Keen & Davy, 1987; Male, 1997; Meyers, 1994; Okolo, Bhar & Rieth, 1993). What is surprising however is the perceived usefulness of the computer in encouraging the learner to be included in the social group and encouraging peer acceptance. Teachers rated these functions as being the least useful function of the computer, while the literature consistently indicates the important role that the computer has to play in this area. Once again, reasons for

these findings are probably complex, but the literature points to the fact that technology can be viewed by teachers as alternative ways to develop isolated academic skills, rather than as a tool to integrate into daily activities (Raskind, Herman, & Torgesen, 1995). Raskind et al. report that technology applications are often used as individual activities that are not necessarily related to the ongoing day to day activities in the classroom. Also, the type of software used by the learner can promote or discourage interaction with peers as can the placement of the computer in the classroom. This is a complex issue and there is uncertainty as to the reasons for these findings. What is certain however is that while teachers continue to believe that the computer has little part to play in promoting the inclusion and acceptance of the learner in the social group, as well as not using computers in ways that allow or encourage this, there is little chance that this important function of the computer will be utilised or fulfilled for learners with special needs in New Zealand schools.

Perceived Drawbacks of the Computer

Teachers identified a number of drawbacks of computer use by learners with special needs. These included (in descending order of teacher selection) difficulty in finding or accessing appropriate software, the teachers themselves not having the skills or knowledge, the lack of portability of the machine and the time it takes to understand all the applications. These findings match, with striking similarity, to those of teachers of computer using learners with special needs in other studies.

McGregor and Pauchuski (1996) reported that over 40% of teachers found the time required to become proficient with the equipment presented a substantial barrier to computer use. Au (1996) reports of lack of good quality software as a common criticism of computer use and Derer, Polsgrove and Rieth (1996) a lack of teacher knowledge and training. Lack of portability is also reported by Carey (1994).

The Computer and Inclusion

When given a common definition of inclusion (Stainback & Stainback, 1986) overwhelmingly teachers considered the computer to be effective or very effective in facilitating the inclusion of the learner in their class. It would be of use to reiterate that definition again for the purpose of discussion:

> Inclusion is about education of all students in the mainstream. It also means that all students are provided with appropriate educational opportunities within the mainstream that are challenging yet geared to their capabilities and needs. They are likewise provided with any support and assistance they or their teachers may need to be successful in the mainstream. An inclusive school is a place where everyone belongs, is accepted, supports and is supported by his or her peers and other members of the school community in the course of having his or her educational needs met.
>
> (Stainback & Stainback, 1986, p.9)

While much of the philosophy of inclusion is about educational needs being met, it is also about the acceptance and belonging of every individual learner in a

school. It is interesting that 72% of teachers thought the computer to be effective in facilitating the inclusion of learners with special needs, but when asked in a separate question about the usefulness of the computer in promoting acceptance of the learner in the social group, did not believe the computer to be useful in this. This could be simply explained by the complex nature of the definition of inclusion provided for teachers, including both social and learning goals. It could also be explained by the teachers understanding of the philosophy of inclusion, regarding it as being primarily about learners with special needs having their educational needs met in the mainstream setting.

THE LEARNER

Level of Need

For 88% of the learners identified in the study, their needs had been verified as high or very high under the Ongoing Resourcing Scheme (refer to chapter three for a discussion of this scheme). Of this figure, 42% were very high needs and 50% high needs. Reference to the Ministry of Education Draft Guidelines for Assistive Equipment (1999) shows that students eligible for funded assistive equipment must (among other things) receive special education assistance through the Ongoing Resourcing Scheme. One can only hazard a guess as to how the other 12% came to have a Ministry of Education funded computer for reasons of special need.

Who Uses Computers?

The age range of the learners was from five years old to fourteen years old There were only seven learners under the age of eight. The mean age was ten. Many learners in the study had physical disabilities (79%), while intellectual, learning and visual disabilities were the next most common area of disability of computer using learners. These results could point to the perceived usefulness of the computer for overcoming physical difficulties associated with learning and socialising at school and also the Ministry of Education criteria for allocation of computers to learners with special needs. The Draft Assistive Equipment Guidelines (Ministry of Education, 1999) outline three priority indicators for consideration of assistive equipment. The third of these indicators is that there is clear evidence that the student's access to one or more of the Essential Learning Areas from the New Zealand Curriculum Framework will be provided by assistive equipment, specifically physical access modifications and adapted presentation of learning materials.

These results are similar to those from studies in other countries. McGregor and Pachuski (1996) found that the largest segment of the student population using assistive technology was comprised of students with a physical disability who required some type of augmentative communication systems. Similar results were also found by Green, (1997).

THE COMPUTER

Use of the Computer

Slightly more that less students used their computer for less that 60 minutes per day (52%) while 48% of learners used the computer for more that one hour a day - (25% one to two hours, 8% two to three hours and 15% more than three hours). Considering the many and varied advantages provided by the computer, the number of learners using their computer for less than an hour per day is surprisingly high. These findings however, were consistent with similar studies (Green, 1997; Hutinger, Johanson & Stoneburner, 1996; McGregor & Pachuski, 1996) where similar levels of computer use were reported.

When working on the computer, 72% of learners would work with someone else but for the majority of these learners, this was the teacher-aide. Only approximately 20% of learners worked with their peers on the computer, a number far fewer than might be expected considering the vast amount of literature that reveals the computer to be an effective agent of socialisation. Au (1996), Cosden & Semmel (1987), Lieber & Semmel (1989), and Mason (1996) all report of the usefulness of the computer in facilitating acceptance by peers and general socialisation skills, however, findings from this research project suggest that the computer is not being used in ways that promote this. Similar findings have also been reported by Johanson and Stoneburner (1996) who found that while much was known of the significant opportunities offered by the computer in the way of

socialisation, the learners in their study were not using computers in ways that allowed or encouraged this. Green (1997) also found that both formal and informal groupings of students were not rated highly by the teachers in her study of computers using learners with special needs and reported that teachers still view the computer as a place where one or possibly two students work at completing a remedial task.

Teachers and other professionals must guard against assuming that the computer is a socialising agent if the learner is predominantly working with the teacher-aide. Research shows that despite the best of intentions, teachers aides associated solely with a learner with special needs can actually encourage exclusion of that learner from the peer group (Prochnow, Kearney & Carroll-Lind, 1999). In order to fully capitalise on the potential of the computer to promote social and co-operative skills, teachers must set up situations where the learner is working more with their peers.

Curriculum

Teachers in the study used the computer in a wide range of curriculum areas. English and Mathematics were the most likely curriculum areas, and Health/Wellbeing and The Arts the least. It would appear that teachers are utilising the computer for most of the New Zealand Curriculum. Lack of use in some areas may point to a lack of available appropriate software. Comparing these findings to a similar New Zealand study, it would appear that the computer is now used over a

greater range of curriculum areas. Green, (1997) found that only 2% of teachers used the computer in social studies, and no teachers identified social studies or science as the curriculum area where the computer was used the most.

Software

The most common type of software used by learners in the study was word processing software. This was both regular word processing software packages such as *Clarisworks*, as well as word processing software specially designed for learners who have difficulty with written language such as *Co-Writer*. Interactive storybooks were also a common type of software used, as were a variety of games. It would appear that while software use reported in this study is similar to that in other studies, the lack of drill and practice software identified by teachers is conspicuous in its absence. MacArthur and Malouf (1991), Okolo, Bahr and Rieth (1993), Hutinger, Johanson and Stoneburner (1996) all report high levels of both word processing and drill and practice software. This may be because over the last few years, software has become more sophisticated in its nature, not simply of the drill and practice type. In any instance, Brown, (1995) cautions against making generalisations about such findings. While it is interesting to know the range of software being used by learners with special needs in New Zealand classrooms, he points out that the findings of this sort may be deceptive. This is because such data gives very little insight into the context of practice. and cites the example of the pen

as a writing tool pointing out that it would be absurd to quantify and draw conclusions from how often students use pens in the classroom.

Assessment

The computer played a part in the assessment process of just over half of the learners identified in the study. Considering the ongoing nature of assessment, and its place in the learning process, this number is relatively low. While teachers were not asked to comment upon reasons the computer was not any part of the assessment process, relevant literature does make reference to some of the reasons reported by teachers. This includes that pen and paper work can be corrected at a glance during or after school, but the computer work required watching the screen, using record-keeping programmes if available or training students to self record. A further reason cited is that teachers believed the computer should be fun (MacArthur& Malouf, 1991).

Individual Education Plan

As would be expected, 91% of learners had an Individual Education Plan (IEP) and for 89% of these learners, the computer played some part in this process. As the IEP is the process that determines the assessment, planning, provision and evaluation for a student with special needs (Ministry of Education, 1998), it would be highly desirable for all learners with a computer for reasons of special need to have the use of that computer incorporated into their IEP. The figure of 89%, while not ideal, is encouraging. Of those 89%, 68% had the computer written in as a goal

or objective in it's own right, while for 91%, the computer was written into the IEP as a means of achieving other goals and objectives. Similarly, while not ideal, these figures are encouraging. Encouraging also are comparisons made to a similar, but earlier New Zealand study. Green (1997) reported that only 79% of learners with a computer for reasons of special need had an IEP and of those students, only 43% had computer goals stipulated in the IEP. This comparison would indicate that over the last two years, the importance of stipulating the computer in the IEP has been recognised.

PHASE ONE PART TWO

This part of the discussion focuses on the comparisons made between teachers who felt the computer was an effective tool for including learners with special needs in regular class settings (the group which will be referred to as the effective group) with those who did not (which will be referred to as the not effective group).

THE TEACHER

Experience and Training

The effective group had a larger percentage of teachers with over 15 years teaching experience. This is in keeping with a wide range of research in this field which indicates that teacher experience, while not the only factor, is a critical one in the effective use of computers in classrooms (Brown, 1995; Tyler-Wood, Putney & Cass, 1997). Related closely to this phenomenon were the higher levels of both confidence and competence in the effective group.

No significant differences could be found between the two groups of teachers, and the training they had received in both the use of the computer for the learner with special needs and in general computer use. The relationship between training and effective use of computers for learners with special needs appears rather tenuous, and little evidence can be found in the literature of a direct link between in-service training and effective use of the computer with learners with special needs. As Tyler-Wood, Putney & Cass, (1997) point out, merely providing training on computers may not be enough to ensure that special education teachers achieve computer literacy. They also point out that computer training may not be effective if special education teachers have no adequate access to computers and if that access is not ensured before computer-training activities begin. This, and the results from this study may suggest that the training is not the critical factor, and while important, needs to be in conjunction with other factors. What these other factors might be will be discussed further in this chapter.

The Computer and Inclusion

Slightly more teachers in the effective group agreed with the philosophy of inclusion. It seems highly likely that teachers who believed in the philosophy of inclusion would look for, and utilise more effectively, tools that facilitated this. The computer has been shown to have the potential to facilitate inclusion (for example its role in facilitating learning, communication motivation and socialisation) and thus, teachers who believed in such a philosophy may be more

likely to use the computer.

When considering ways to improve the use of computers for learners with special needs, it would seem that a focus on the principals of inclusion may be useful in bringing about such an improvement.

THE LEARNER

Area of Disability

When considering the area of disability of the learners, those with physical difficulties are predominant in the effective group (80% of learners in the effective group had physical disabilities compared to 8% in the not effective group). These are striking comparisons and may suggest that the computer is especially useful in catering for the needs of learners with physical disabilities. It may also suggest that it is easier to utilise the computer in an effective way for these learners. The not effective group also had a larger proportion of learners with intellectual disabilities. Again, one may surmise that the computer may not be as useful in catering for the particular needs of these learners, or that it may be difficult to make the best use of it for this group of learners.

Use of teacher–aide

Those learners whose teachers believed that the computer was an effective tool for inclusion had less teacher aide hours than those in the not effective group. This is an important finding that is worth considering. Recent literature warns of the excessive reliance upon the teacher aide to meet the needs of learners with special

needs, especially in terms of encouraging the inclusion of learners into regular class settings (Prochnow, Kearney, & Carroll-Lind, 1999). The findings of this research may reinforce these warnings. Considering the potential of the computer to act as a socialising agent, teachers need to consider facilitating more learning situations where the learner can work with peers on the computer. The presence of the teacher aide may actually discourage this sort of interaction.

THE COMPUTER

Software

Learners in the not effective group use games and interactive storybooks more than learners from the effective group. As Brown (1995) points out, computer games do not have the potential to create particularly empowering learning environments, especially as viewed through the 'emancipatory' paradigm, Hutinger, Johanson and Stoneburner (1996) also report that this type of software limits the activities of both students and teachers to isolated skill development rather than concept development and problem solving. However, when viewed in a special education context, computer games and interactive storybooks do have the potential to encourage social interaction between the learner with special needs and others in the class and from this perspective may bring many advantages.

Hardware

Learners whose teachers considered the computer an effective tool for including them in the regular class used a greater variety of adapted hardware.

There may be many reasons for this. First it could be supposed that those teachers using the most adaptive hardware are those teachers who are most knowledgeable about them (which this group of teachers perceive themselves to be). On the other hand, it may be the adaptive devices themselves that allow the computer to be more effective in meeting the needs of the learner.

Placement of the Computer

The placement of the computer in the class may play some part in teachers perceived effectiveness of it for facilitating the inclusion of the learner. Results show that slightly more learners from the effective group had their computer placed within a group of other learners desks and slightly more learners from the not effective group had their computer placed in a withdrawal space outside the classroom. While the differences were slight, these factors are worth considering.

Assessment

For those learners whose teachers considered the computer effective in meeting their needs, the computer was more likely to be used in the assessment process. Also, this group of learners were more likely to have the computer written into the IEP in its own right, that is, goals and objectives specific to the use of the computer. Considering the importance of the IEP for planning and meeting the needs of learners with special needs, it seems that the more the computer can be incorporated into this process and plan, the more likely it is that the computer will be an effective tool for meeting learners needs.

Use of the Computer

Expected results were found in the length of time learners spent on the computer and the range of curriculum areas that the learner used the computer for. Those learners whose teachers found the computer effective used the computer (on average) for longer periods of time each day, and in a wider range of curriculum areas than those learners in the not effective group.

PHASE TWO

INTRODUCTION

The discussion of phase two reports on the beliefs, attitudes and practices of a group of teachers who perceived the computer to be a useful tool for including learners with special needs into regular class settings. The discussion is presented in six main themes, these are (a) computers and inclusion; (b) computers and teacher practices; (c) computers and the curriculum; (d) teacher support; (e) the potential of the computer and (f) computers and school philosophy and climate.

COMPUTERS AND INCLUSION

All teachers agreed with the concept of inclusion, many talked of the benefits of inclusion for not only the learner with special needs but also for the other learners in the class. When considering the benefits they seemed able to look outside the individual learner, to the whole learning environment. Their beliefs regarding inclusion had been shaped by a number of things, mostly past experience. Two teachers talked of their role as a mother, and two of their Teachers' College

experience. One talked of her experience at a High School where there was an Experience Unit. It would be fair to say that all teachers had had experience/contact with learners with special needs.

This group of teachers held varying beliefs regarding how the computer facilitates the inclusion of learners with special needs although three consistent themes did emerge. Teachers thought that the computer gave the learner status in the eyes of their peers and that it encouraged socialising of the learner with their peers. They also believed that the computer put the learner with special needs on a par with everyone else or that it made them equal. Significantly, through this phase of the research, many of the teachers talked of the computer making the students with special needs the same as the others. This is at odds with long established thinking regarding inclusion (e.g. Forest & Pearpoint, 1992) where *difference* is valued and accepted. None of the teachers talked about difference being accepted or valued. They did however, talk of the importance of treating all students equally, and ensuring that they were doing the same work as the rest of the class and not setting them apart by having them doing different things.

All teachers allowed the computer to be used by other learners in the class, and agreed that it was a useful vehicle for promoting social interaction. This was a significant factor to emerge because only a very small percentage of teachers in phase one of the study had other learners in the class working on the computer (25%) or thought that it was a useful vehicle for socialisation. It appears obvious

that allowing others to work on the computer would encourage and promote social interaction with other students in the class, and that this can only help in the inclusion of the learner with special needs.

TEACHER PRACTICES

Without exception, all teachers described themselves as organised, structured, good managers and firm. All teachers appeared devoted to their role as teacher, putting in a lot of time, effort and thought into setting up learning environments for students. A number of teachers talked of providing opportunities for children that excite and encourage them to want to find out more, and of facilitating learning in their class rather than being the source of knowledge. This is a common theme in the literature, when students use computer based instruction teachers must adopt new and different roles. One of these is the teacher as a facilitator of knowledge rather than a provider of knowledge (Brown, 1995; Cosden & Semmel, 1987; Okolo, Bahr & Rieth, 1993). Also, because the computer can give students access to more authentic experiences (especially students with disabilities that may be denied access to authentic experiences in normal circumstances) the types of activities that are possible are changing teaching practices and roles (Okolo, Bahr & Rieth, 1993).

All teachers perceived themselves to be confident and competent in the use of computers for learners with special needs. They all talked of their experience as being an important factor contributing to their levels of confidence and competence.

All but one teacher owned a computer and the one teacher who did not own a computer used her husband's and the school one in her classroom. This teacher had also had had a number of learners in previous years with a Ministry of Education funded computer for reasons of special need. Many teachers talked of gaining confidence from receiving professional development, both at school, and through going to courses.

COMPUTERS AND THE CURRICULUM

All teachers agreed that the computer allowed the learner to access the curriculum, and that they would not be able to achieve many of the things they did in the classroom without the computer. In terms of curriculum areas where the computer was used, all teachers identified mathematics and language as the areas where it was most utilised, particularly written language where teachers talked of the computer giving the learner a vehicle for communication. Other areas of the curriculum were also mentioned, particularly theme work.

Teachers talked of the importance of integrating the computer into the normal class programme, most feeling (as previously discussed) that it was important that the learner was not singled out as being different from others in the class. Generally, teachers did not believe that it was difficult to integrate the use of the computer into the normal class programme, one said it has become part of the routines and two relied upon the teacher aide to do this. Literature in the use of computers for learners with special needs consistently talk of the need to integrate

the computer into the class programme. It may be that teachers who are confident and competent in the use of computers for learners with special needs, and believe it their effectiveness, are more motivated to put in the effort to integrate computers into the class curriculum. On the other hand, it may be that teachers who integrate the use of the computer into the class curriculum, may find it more effective.

SUPPORT FOR TEACHERS

Three of the teachers had received training in the use of the computer for the learner. The two who had not felt they did not need it or want it. One believed herself to be completely computer literate (her husband had a computer business) and one had had three other students previously with Ministry of Education funded computers for reasons of special need. All but one teacher had been involved in professional development over the last year, and for some this had been quite extensive. Again the one teacher who had not had any professional development rated her competence very highly as she and her husband worked with computers extensively through her husbands computer business.

All teachers were confident about what to do if they needed help with any technical aspects of the computer.

THE POTENTIAL OF THE COMPUTER

Some teachers felt unsupported in terms of planning for, and utilising the computer to the best advantage and all teachers thought that the computer could be doing more for the learner than it was now or that it could be better utilised. One

reason for this could be that these teachers were able to reflect upon, and evaluate their practices, and therefore look for better ways to use the computer. The fact that they were looking for more support in the utilisation of the computer meant that they were not quite satisfied with their present practices, believing that there were better ways to make the best use of the computer. It may be that these teachers realised the computer was just the tool, and they were the key to its effective use.

Teachers identified a number of advantages of computer use by the learner with special needs. These were mostly global, affective outcomes rather than specific academic outcomes. Reported in the literature is that teachers usually describe affective outcomes when describing advantages of computer use (MacArthur & Malouf, 1991) and this was also true of this group of teachers. Advantages such as motivation, providing focus, producing legible work, enjoyment, have work like other students; social interaction and acceptance were commonly mentioned. This was also true when teachers were asked to identify drawbacks to computer use. Again rather than specific cognitive outcomes, teachers identified more global affective drawbacks such as lack of portability and lack of software, the restrictions as to the placement of the computer, the brand of the computer and that at times the computer can be more distracting than focusing. While the computer certainly has the potential to enhance in many of these affective domains, their use for specific cognitive outcomes should not be overlooked by teachers.

SCHOOL PHILOSOPHY AND CLIMATE

Without exception, all teachers came from what could conservatively be called 'computer smart schools' that valued computer technology, and saw it as an important part of the school curriculum. A climate of computer use was established and encouraged, with supports for teachers in terms of planning and teaching as well as professional development. This could be a key determinant of successful computer use in each of these teachers' cases. While there are important factors related to the computer, the learner and the teacher, the environment in which these factors operate appear to be a vital aspect. Selwyn (1999) has found that for the past 20 years, the computer has noticeably failed to permeate the school settings and suggests that this should not be solely attributed to deficiencies of practices, but rather a wider perspective. He believes that many schools have failed to make adaptations to their pre-existing cultures of schools (cultures that existed before the implementation of computers) and many of these pre-existing cultures do not allow for the successful adoption of effective computer practices. This school culture of computer use is, a vital link, and one the researcher believes worthy of further research.

SUMMARY

This chapter has discussed the results of phase one and phase two of the research. It has highlighted a number of themes that have emerged. Part one of phase one provided a detailed analysis of the nature and extent of computer use by

learners with special needs as well as a description of the practices and beliefs of teachers Generally, teachers appear both confident and competent in facilitating the use of the computer for the learner even though many had had no specific training in its use. While teachers identified the computer as a useful tool for learning, motivation and presentation they believed it to be least useful in promoting interaction with peers and social acceptance. While the literature consistently points to the important role that the computer can play in this area, it appears unlikely that this is indeed happening in New Zealand schools. Indicators of this are the attitude of teachers as to the usefulness of the computer for this role, and the fact that very few learners worked with their peers on the computer.

Many learners are working for less than 60 minutes per day on the computer and for the majority of learners, they are working with their teacher aide. Very few learners work with their peers on the computer.

Part two of the phase one discussion compared the findings of those teachers who believed the computer to be an effective or very effective tool for including learners with special needs and those teachers who believed it to be either neutral in it's effectiveness, ineffective or very ineffective. Teachers with more teaching experience were more likely to describe the computer as an effective tool for including learners with special needs in regular classes. Overwhelmingly, those teachers who believed the computer to be effective for including learners with special needs had a learner with a physical disability. Learners whose teachers'

believed the computer to be an effective tool for inclusion had slightly less teacher aide hours allocated to them, used the computer over a greater variety of curriculum areas and used a greater variety of adapted hardware. They also used games and interactive storybooks less than those learners whose teachers believed the computer to be not effective. While both groups of learners had IEP, those learners from the effective group were more likely to have the computer written into the IEP as a specific goal or objective.

While the discussion has highlighted factors that the researcher has found significant, these results are open to interpretation. While caution should be exercised in drawing generalisation from these results, it is hoped that the results and subsequent discussion will highlight for the reader, ways in which the computer, the teacher, and the environment in which they operates might best accommodate the needs of learners with special needs in regular class settings.

The final chapter revisits the research objective and evaluates the research against it. The overall implications of the study are discussed with some suggestions for future practice.

CHAPTER NINE

CONCLUSION AND RECOMMENDATIONS

INTRODUCTON

This chapter is devoted to answering the question, "so what?" It may sound a simple question, but is in fact, a complex and very important question when considering any research. This question places a focus on a number of key issues. These are:

- What did we want to find out and did we do this?
- What is the relevance of the findings and what will it mean for the improvement of educational practice?
- What are the implications for future research?

WHAT DID WE WANT TO FIND OUT AND DID WE DO THIS?

The objective of the research was to examine how computers are used to cater for the needs of learners with special needs in regular class settings. It also set out to explore the beliefs, experiences and practices of teachers who believed the computer to be an effective tool for including learners with special needs in regular class settings. The aim of the research was not to make definitive judgements regarding what is good practice for using the computer in an inclusive way, or as a tool of inclusion. Rather it was to (through exploring the beliefs, principles and practices of teachers) highlight ways in which the teacher, the computer, and the

environment in which it operates, might best accommodate the needs of learners with special needs in inclusive ways.

A central aim of the research was to gather information on the present use of computers for learners with special needs and document the beliefs that teachers have about the use of computers to include learners with special needs. It also set out to identify those teachers who believed the computer to be a useful tool for the inclusion of learners with special needs, gather information on, and document their beliefs, experiences and practices. It was hoped that the research would identify the beliefs and practices of teachers who believed the computer to be an effective agent of inclusion, in order to highlight factors that may bring about the successful use of computers for the inclusion of learners with special needs in regular class settings.

The study was successful in identifying a purposive sample of teachers who had a learner in their class with a Ministry of Education funded computer for reasons of special need. Through the questionnaire, a wide range of information was gathered regarding teachers' beliefs about inclusion, statistical information on the present use of computers with learners with special needs and the beliefs and practices of those teachers. The questionnaire was less successful in identifying any differences between the beliefs and practices of teachers who believed the computer to be an effective tool for inclusion and those who did not. There were a number of reasons for this. First the number of teachers in the not effective group was a small percentage of the total sample (29%) while the effective group was

71% of the total sample. These differences could 'skew' comparisons. Secondly, the use of a questionnaire to gather information on teacher's beliefs was problematic. Teachers may not have been able to describe their beliefs in the constraints of a written questionnaire and may not have accurately portrayed their practices. However, it did give valid information on the perceptions of their practices and a number of key differences were identified that may be useful in guiding future practice in computer use with learners with special needs.

The questionnaire was successful however, in identifying those teachers who believed the computer an effective agent of inclusion, allowing selection of a group of teachers to participate in the phase two interviews. The interviews were able to gather a view of the perceptions of this group of teachers who believed the computer an effective agent of inclusion. A number of key themes emerged that again, may be useful in guiding future research and practice in computer use for learners with special needs. There is some doubt that the interviews were as successful in obtaining the *real beliefs* of teachers. In summary, the research was reasonably successful in achieving its aims and objectives.

RELEVANCE OF FINDINGS FOR PRACTICE

The aim of the research was not to make definitive judgements regarding what is good practice for using the computer in an inclusive way, or as a tool of inclusion. Rather it was to (through exploring the beliefs, principles and practices of teachers) highlight ways in which the teacher, the computer, and the environment

in which it operates, might best accommodate the needs of learners with special needs in inclusive ways. With this in mind, a number of themes emerged that are worth highlighting.

In order for the computer to be an effective tool for the inclusion of learners with special needs, it may need to be viewed from a philosophy of inclusion. There were no teachers who believed the computer to be a useful agent of inclusion and who did not believe in the philosophy of inclusion (to a greater or lesser extent). This belief may be the key imperative to the effective use of the computer in including learners with special needs.

A further imperative highlighted by the research is the philosophy and climate of the school in which the computer-using learner attends. Without exception, all teachers who were interviewed in phase two (and considered the computer an effective tool for inclusion), worked in 'computer smart schools'. These were schools that valued computer technology, and saw it as an important part of the school curricula. A climate of computer use was established and encouraged, and teachers were supported in terms of planning and teaching as well as professional development. This could be another key imperative to the effective use of the computer in including learners with special needs.

The usefulness of the computer as a socialising agent, and as a tool for promoting peer acceptance is well documented in the literature. Teachers in this study however, did not perceive the computer to be useful in this role, and often

failed to use it in ways that might promote this. For example by having the learner working predominantly with the teacher aide or own their own, and in positioning the computer away from the other students in the class. Thought needs to be given to encouraging social and cooperative uses of the computer, for example the learner working with peers and groups of other learners, the positioning of the computer where social interaction is possible and encouraging other learners in the class to use the computer. Furthermore, consideration needs to be given to the nature of the software used by the learner as some software can lend themselves to social interaction if they require cooperation and collaboration among students.

Teachers identified difficulty in finding or accessing appropriate software, and the time it takes to become knowledgable about the applications. While appropriate software is supplied to the learner when the computer is initially purchased, it appears there it a need for ongoing assessment of software needs as the learner moves through the school system. Associated with this should be training for teachers in the use of these applications as well as provision of the necessary time to become proficient.

As the IEP is the process that determines the assessment, planning, provision and evaluation for a student with special needs (Ministry of Education, 1998), it would appear highly desirable for all learners with a computer for reasons of special need to have the use of that computer incorporated into their IEP. Teachers who believed the computer to be an effective tool for the inclusion of learners with

special needs were more likely to have the computer written into the IEP in its own right, that is, goals and objectives specific to the use of the computer. It appears that this assessment and planning for computer use through the IEP is likely to have a positive effect for the inclusion of the computer-using learner.

IMPLICATIONS FOR FUTURE RESEARCH

School philosophy and climate that promotes the effective use of computers by learners with special needs appears an important topic for future research. The fact that without exception, all teachers who were interviewed in phase two, worked in schools where there was a climate of computer use and support seems a theme that is worth pursuing.

As it appears the majority of learners with Ministry of Education funded computers have physical disabilities, it would be worthwhile investigating why learners with other disabilities such as intellectual, behaviour and sensory are not receiving the benefits of computer use. Is it because computers are not suited to their needs, or that teachers are not applying for computers for these learners, or perhaps other reasons.

Those teachers that used the computer over a wide range of curriculum areas appear more likely to perceive the computer as an effective tool for inclusion. Research into how teachers can make more use of the computer in curriculum areas outside reading, language and mathematics (the traditional curriculum areas) may be beneficial.

Finally, further research into the links between training and teachers perceptions of their confidence and confidence may be useful. It appears from this research that training may not be the major indicator of teacher competence and competence as often described in the research.

FINAL REMARKS

The number of learners with special needs in regular classrooms is growing steadily every year in New Zealand. Similarly, an increasing number of these learners are being supported in classrooms by computers and adapted hardware and software (Ministry of Education, 1996). In terms of the history of Special Education in New Zealand, the use of computers is a recent phenomenon and therefore the need for continuing research in this field is imperative. It is hoped that this research goes some way in providing some answers. As well as providing some answers however, this research has created many more questions that require further research. The researcher believes this is a positive outcome, research is not just about providing answers, it is also about creating questions. Barbara Keogh (1999), after 30 years of research in special education, sums this up by saying: "good research provides more questions than answers, but it is certainly true that one thing does lead to another" (p.300). It is hoped that this research provides a catalyst for thinking about our philosophies and practices in the field of computers use by learners with special needs, and lead to the more effective use of them for these learners.

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APPENDICES

APPENDIX A

MEMBERS OF THE RESEARCH ADVISORY COMMITTEE

RESEARCH ADVISORY COMMITTEE

Member:

Ms Roseanna Bourke, Senior Lecturer, Department of Learning and Teaching, Massey University, Palmerston North.

Background.

Roseanna Bourke is a senior lecturer at Massey University College of Education in Palmerston North. She is course co-ordinator for the Masters of Education endorsed in Special Education. Prior to coming to Massey University, Ms Bourke was an educational psychologist. Presently, she is project leader for the Special Education 2000 policy monitoring and evaluation research.

Member:

Mr Greg Durkin, Senior Tutor, Department of Learning and Teaching, Massey University, Palmerston North.

Background:

Greg Durkin is a senior tutor at Massey University College of Education in Palmerston North. He is course co-ordinator for the 300 level paper, Computers in Education.

Member:

Ms Carolyn Atkinson, Deputy Principal, Roslyn School, Palmerston North.

Background:

Carolyn Atkinson is presently the Deputy Principal at Roslyn School in Palmerston North. Prior to that, she was a visiting senior tutor at Massey University College of Education, teaching in special education. She has a background in teaching learners with special needs.

APPENDIX B

PHASE ONE OF THE RESEARCH

Massey University
COLLEGE OF EDUCATION
Te Kupenga o Te Mātauranga

Learning and Teaching
Private Bag 11 222,
Palmerston North,
New Zealand
Telephone: 64 6 356 9099
Facsimile: 64 6 351 3383

1 July 1999.

The Principal
<name of school>
<address of school>
<town/city>

Dear <name of Principal>,

I am writing to seek your assistance with research I am doing into the nature and extent of computer use by learners with special needs. This research is part of my thesis towards a Masters of Education endorsed in Special Education. I understand that in your role as Principal, you get many requests for help with research projects and must make informed decisions regarding those that you give time to (or ask your teachers to give time to) and those that go into the rubbish bin. **PLEASE DON'T THROW THIS IN THE BIN - READ ON!**

I have fifteen years experience as a teacher in New Zealand schools, including five years in special education as a Guidance and Learning Teacher, and a Resource Teacher of Special Needs. It was during this time that I saw the growth in computer use by learners with special needs, recognised their potential, but suspected that much more could be done to ensure their maximum potential was utilised. I searched for information that would guide my practice in this area, but could find very little. I believe that there is a critical need for informed research in this field and that teachers have a wealth of useful information to share with others regarding this. The aim of this research therefore, is to investigate how computers are used to support the inclusion of students with special needs in New Zealand schools and the conditions necessary for their successful use.

I understand you may have a student/s at your school with a Ministry of Education funded computer for reasons of special need, and would appreciate it if you could please pass on the attached questionnaire to their ***teacher.*** The teacher is asked to complete the questionnaire (which takes approximately twenty minutes) and indicate whether they would be prepared to participate in a follow up interview with me. Results of the research will be

made available to all participants, as well as being disseminated through teacher education publications and conferences.

Participants will be afforded all rights under the Massey University code of Ethical Conduct and these are outlined clearly in the information sheet attached. If you or any participating teacher at your school have any questions or concerns, I may be contacted directly at the address below. Also below, are the names and contact addresses of my supervisors who are also available to answer any queries.

Thank you for your cooperation.

Alison Kearney

Department of Learning and Teaching
Massey University College of Education
Private Bag 11 222
Palmerston North
Ph 356 9099 ext 8704
e-mail: a.c.kearney@massey.ac.nz

Supervisors:

Mark Brown and Ken Ryba
Department of Learning and Teaching
Massey University College of Education
Private Bag 11 222
Palmerston North.
Ph 356 9099

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THE NATURE AND EXTENT OF COMPUTER USE BY LEARNERS WITH SPECIAL NEEDS

Information Sheet

To all Teacher Participants

Introduction

This is a survey about the nature and extent of computer use by learners with special needs. You have been given this questionnaire as you have a student in your class with a Ministry of Education funded computer for reasons of special need. Your time in completing the questionnaire would be very much appreciated and should take approximately twenty minutes.

Rationale and Aims

The number of learners with special needs in regular classrooms is growing steadily every year in New Zealand and an increasing number of these learners are being supported in classrooms by computers and adapted computer hardware. Little however is known of the nature and extent of their use and how they can be best used to support the inclusion of learners with special needs in regular class settings. The aim of this survey therefore is to investigate how computers are used to support the inclusion of students with special needs in mainstream New Zealand schools and the conditions necessary for their successful use.

Participant Rights

As a participant in this study, you are afforded certain rights as outlined in the Massey University Code of Ethical Conduct. In summary these include:

- the right to decline to participate;

- the right to refuse to answer any particular questions;
- the right to withdraw from the study at any time;
- the right to ask any questions about the study at any time during participation;
- protection of your anonymity;
- confidentiality of information you provide;
- the right to access to a summary of the findings of the study when it is concluded.

If you have any questions or concerns regarding this study, please don't hesitate to contact me at the address below. The names and addresses of my supervisors are also listed below, and similarly can be contacted.

Thank you for your time in completing the attached questionnaire. It is assumed that filling in the questionnaire implies consent. Remember however that you have the right to decline to answer any particular questions. Please return the completed questionnaire in the attached stamped addressed envelope by **9th July 1999. Also, if you are prepared to participate in a follow up interview with me, please indicate this in the appropriate box at the end of the questionnaire.**

Many thanks,

Alison Kearney
Department of Learning and Teaching
Massey University College of Education
Private Bag 11 222
Palmerston North
Ph: (06) 356 9099 ext 8704.

Supervisors
Mark Brown & Ken Ryba,
Dept Learning & Teaching
Private Bag 11 222
Palmerston North

MASSEY UNIVERSITY
Department of Learning and Teaching

A SURVEY OF THE NATURE AND EXTENT OF COMPUTER USE BY LEARNERS WITH SPECIAL NEEDS

Respondent Code: 138

BACKGROUND TO SURVEY
Please read carefully

This is a survey regarding the nature and extent of computer use by students with special needs. It is specifically targeted at teachers of students with a Ministry of Education funded computer for reasons of special need.

If you have a student in your class with a computer funded by the Ministry of Education, your time in completing this questionnaire would be appreciated. The data gathered will provide useful information on which to base the effective use of computers for learners with special needs.

This questionnaire is confidential - this means that neither you nor you school will named and the information you give will not be identified to you, your school or the child with the computer in any way.

INSTRUCTIONS
Please read carefully

Please use a pen, not a pencil

Please follow the "GO TO QUESTION..." instructions in this questionnaire carefully. This will make it quicker for you and it will make more sense.

For most questions all you have to do is put a tick in the box beside the answer that you want to give or write in the space provided. Some questions you may be able to put more than one tick if you want to.

The questionnaire should take approximately 20 minutes.

Student Information

The following questions relate specifically to the learner in your class with an allocated computer for reasons of special need.

BACKGROUND INFORMATION

1. Gender: ☐ Male ☐ Female

2. Age:_____

3. Ethnicity

   ☐ New Zealand Caucausian or European

   ☐ New Zealand Maori

   ☐ Pacific Island Polynesian

   ☐ Asian

   ☐ Indian

   ☐ Other _____

4. How long has this student been in your class?

   ☐ less than 1 month

   ☐ 1-4 months

   ☐ 5-8 months

   ☐ 9-12 months

   ☐ more than 1 year (please specify) _____

5. Please specify the area of disability (you may tick more than one box)

   ☐ physical

   ☐ visual impairment

   ☐ hearing impairment

   ☐ behaviour difficulty

- ☐ intellectual impairment
- ☐ learning difficulty
- ☐ social/emotional difficulty
- ☐ other (Please specify) _____

FUNDING AND SUPPORT

6. Does this student have OngoingResourcing Funding?
   - ☐ Yes
   - ☐ No GO TO QUESTION 9

7. Is this student classified as having
   - ☐ very high needs
   - ☐ high needs

8. Is your school a fund holder for the ongoingresourcing students?
   - ☐ Yes
   - ☐ No

9. Please estimate the level of support thislearner requires to have his/her needs met.
   - ☐ 1. very low level of support
   - ☐ 2. low level of support
   - ☐ 3. moderate level of support
   - ☐ 4. high level of support
   - ☐ 5. very high level of support

10. Does the learner have a teacher aide?

- ☐ Yes
- ☐ No GO TO QUESTION 14

11. How many hours per week does the learner have a teacher aide? _____

12. Does the teacher aide work with the learner on the computer

- ☐ Yes
- ☐ No

13. On average, what percentage of the teacher aides time would be spent working with the learner on the computer? _____ (please state as a percentage)

CURRICULUM

14. Which of the following curriculum areas would the learner use the computer for: (you may tick more than one box)

- ☐ English
- ☐ Mathematics
- ☐ Social Studies
- ☐ Health and Well Being
- ☐ The Arts
- ☐ Science
- ☐ Technology

15. In which curriculum area would the computer be used most?

_____

SOFTWARE AND HARDWARE

16. Please list the software titles that the learner currently uses

_____

_____

_____

_____

_____

_____

17. Does the learner have any of the following adaptive devices?(you may tick more than one box)

- ☐ touch screen
- ☐ switch devices
- ☐ touch tablets or concepts keyboards
- ☐ speech recognition devices
- ☐ speech synthesisers
- ☐ braille keyboard
- ☐ large/adapted keyboard
- ☐ sucker/blower
- ☐ phonotic head wand
- ☐ light pen
- ☐ scanner
- ☐ Other (please specify) _____

18. On average, how much time per day would the learner spend on the computer

- ☐ less that 30 minutes
- ☐ 30 - 60 minutes
- ☐ more than 1 hour but less than 2

☐ more that 2 hours but less than 3

☐ more than 3 hours

19. On average, would the learner work on the computer:

☐ on their own

☐ with someone else (please specify who) _____

20. Where is the computer used by the learner with special needs?

☐ in a withdrawal space within the classroom

☐ in a withdrawal space outside the classroom

☐ among a group of other learners' desks

☐ on the learners work desk with no others

☐ other (please specify) _____

INDIVIDUAL EDUCATION PLAN

21. Does the computer play any part in the assessment process for this student?

☐ Yes (please specify) _____

_____

☐ No _____

_____

22. Does this student have a current IEP?

☐ Yes

☐ No GO TO QUESTION 26

23. Is the use of the computer written into the current IEP in any way

- ☐ Yes
- ☐ No GO TO QUESTION 27

24. Is the use of the computer a goal or objective inthe IEP in its own right (that is not associated with another goal or objective)

- ☐ Yes (please specify)

_____

_____

_____

- ☐ No

25. Is the computer suggested in theIEP as a method of achieving other goals and objectives?

- ☐ Yes (please specify from the following:)
  - ☐ Reading
  - ☐ Maths
  - ☐ Written language
  - ☐ Science
  - ☐ Social Studies
  - ☐ Technology
  - ☐ The Arts
  - ☐ Health and Well Being
  - ☐ Social Skills
  - ☐ Behaviour
  - ☐ Other (please specify)_____

_____

- ☐ No

26. Please use the following key to rate the usefulness of the computer for the functions below:

1	**not useful at all**
2	**a little useful**
3	**useful**
4	**quite useful**
5	**very useful**
NA	**not applicable**
0	**discourages this**

- ☐ as a prosthetic aide (that is as a compensation for the loss of certain normal functions)
- ☐ as a learning aid
- ☐ as a motivational aid
- ☐ as a communication aid
- ☐ in accessing the curriculum
- ☐ in including the student in the activities of the class
- ☐ in allowing the learner to be accepted by their peers
- ☐ in allowing the learner to be included in peer social groups
- ☐ in adapting the curriculum to meet the needs of the learner
- ☐ in increasing the self esteem of the learner
- ☐ in developing motor skills
- ☐ in facilitating presentation skills
- ☐ in encouraging self management and independence
- ☐ in increasing productivity

Teacher Information

BACKGROUND INFORMATION

The following questions relate to you the teacher.

27. **Age**

- ☐ <20
- ☐ 20-30
- ☐ 31-40
- ☐ 41-50
- ☐ 51-60
- ☐ 61+

28. How long have you been teaching?

- ☐ less than 5 years
- ☐ 5-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ 21-25 years
- ☐ 26 years or more

29. Please tick the box that best describes your ethnicity.

- ☐ New Zealand Caucasian or European
- ☐ New Zealand Maori
- ☐ Pacific Island Polynesian
- ☐ Asian
- ☐ Indian
- ☐ Other _____

30. On a scale of 1-5, how would you rate your confidence in using computers?

- ☐ 1 Very confident
- ☐ 2 Confident
- ☐ 3 Neither confident nor unconfident
- ☐ 4 Unconfident
- ☐ 5 Very unconfident

31. On a scale of 1-5, how would you rate your competence in using computers?

- ☐ 1 Very competent
- ☐ 2 Competent
- ☐ 3 Neither competent nor incompetent
- ☐ 4 Incompetent
- ☐ 5 Very incompetent

TRAINING AND PROFESSIONAL DEVELOPMENT

32. When the student with the allocated computer came to your class did you receive any training in the use of that particular computer and the associated software?

- ☐ Yes
- ☐ No GO TO QUESTION 35

33. Who provided this training?

- ☐ SES personnel
- ☐ A private computer consultant
- ☐ A representative from the company where the computer was purchased
- ☐ Resource Teacher Learning & Behaviour or other special needs teacher
- ☐ Other _____

34. In total, approximately how long was this training?

- ☐ > 1 hour
- ☐ 1-2 hours
- ☐ 3-4 hours
- ☐ 5-6 hours
- ☐ > 6 hours

35. Over the past two years have you received anyinservice training or professional development in the general use of computers in the classroom? (as opposed to training in computer use for the learner with special needs)

- ☐ Yes
- ☐ No GO TO QUESTION 37

36. What type of professional developmentor inservice training did you receive?

_____

_____

_____

_____

BENEFITS AND DRAWBACKS OF COMPUTER USE

37. What do you consider to be the greatest benefit to the learner in using a computer?

_____

_____

_____

_____

38. What do you consider to be the greatest drawback?

_____

_____

_____

_____

COMPUTER USE AND INCLUSION

39. One of the aims of Special Education 2000 is to create a world class inclusive education system by the year 2000 (Ministry of Education, 1996). Please read the following definition of inclusion.

> Inclusion is about education of all students in the mainstream. It also means that all students are provided with appropriate educational opportunities within the mainstream that are challenging yet geared to their capabilities and needs. They are likewise provided with any support and assistance they or their teachers may need to be successful in the mainstream. An inclusive school is a place where everyone belongs, is accepted, supports and is supported by his or her peers and other members of the school community in the course of having his or her educational needs met.
>
> (Stainback & Stainback, 1986)

Considering this definition of inclusion, please rate how effective you feel the computer is for facilitating inclusion of this particular learner.

- ☐ Extremely effective
- ☐ Effective
- ☐ Neither effective not ineffective Ineffective
- ☐ Ineffective
- ☐ Extremely ineffective

40. Considering the definition of inclusion above, please indicate youropinion regarding the inclusion of learners with special needs into regular class settings.

- ☐ I totally agree with the inclusion of learners with special needs.
- ☐ I agree with the inclusion of learners with special needs but have some reservations.
- ☐ I neither agree, nor disagree wit the inclusion of learners with special needs.
- ☐ I disagree with inclusion of learners with special needs except for some circumstances.
- ☐ I totally disagree with the inclusion of learners with special needs.

41. Are there any other comments you wish to make about the use of computers for students with special needs?

_____

_____

_____

_____

_____

Thank you for taking the time to complete this questionnaire. Please return it in the stamped addressed envelope. As an extension of this questionnaire, I would like to conduct interviews with some teacher respondents. If youwould be prepared to be interviewed please tick the box below.

If you would like a copy of the findings, please also tick the box below. One will be sent to you near the end of the year.

☐ I would like a copy of the findings of this questionnaire.

☐ I would be prepared to be interviewed. My contact details are:

Name: _____

Address: _____

_____

Phone: (Day) _____

(Evening) _____

E.mail: _____

Addendum

What type of class setting is the learner in?

- ☐ a regular class
- ☐ a special class in a mainstream school
- ☐ a unit attached to a mainstream school
- ☐ a special class in a special school
- ☐ other (please specify) _____

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18 August 1999

Dear

I am writing to thank you for your assistance with the study I am undertaking into the use of computers by learners with special needs. The response rate to the questionnaires has been great, and the information provided extremely useful.

The next stage of the study is to follow-up on some of the questionnaires to gain further information. Of the 58 questionnaires I sent out over 45 were returned and of those, more than 50% agreed to participate in a follow up interview. Thank you for indicating on the questionnaire that you would be prepared to participate in an interview, this is very heartening. I will be contacting the teachers I would like to study further in the next week with the intention being to interview approximately six teachers.

At the end of this study, I will be able to forward you a summary of the results. I hope that you find these useful in making the most of the computer when working with learners with special needs. If I can help with any matter regarding the use of computers for learners with special needs, please don't hesitate to contact me.

Kind regards,

Alison Kearney

APPENDIX C

PHASE TWO OF THE RESEARCH

Research Advisory Group

Welcome, and thank you for providing your expertise into this part of my M.Ed (Special Education) thesis.

The purpose of this meeting is to set criteria for selection of interviewees for phase two of the study. This will be done by examining the responses from the phase one questionnaires. To do this, you will need a little background information, and thus, the following outlines the nature of the research.

The Computer as Agent of Inclusion

Justification for the Research

The number of learners with special needs in regular classrooms is growing steadily every year in New Zealand (Ministry of Education, 1996). Similarly, an increasing number of these learners are being supported in classrooms by computers and adapted computer hardware and software. The New Zealand Ministry of Education has given a commitment to provide learners with assistive technology where it is needed to improve learning opportunities and have allocated extra funding under the new special education policy, Special Education 2000 (Ministry of Education, 1997). This policy aims to create a world class inclusive system over the next decade.

There has not however, been adequate critical debate over the use of computers as an agent of inclusion. The use of technology in itself is not guaranteed to promote inclusion, in fact there is the potential to erect unforeseen barriers (Carey & Sale, 1995). There has been a tendency to emphasise the computer itself and the needs of the learner in isolation without considering the other critical conditions necessary for their successful use. It is for these reasons that justification can be made for research into the use of the computer as an agent of inclusion.

Research Objective

To investigate how teachers are using computers to successfully facilitate/support the inclusion of learners with special needs in regular classes

Research Aims:

The specific aims of the research are to:

- Gather information regarding teachers beliefs about the inclusion of learners with special
- needs in regular classes

- Provide background statistical information on the present use of computers with learners with special needs

- Document the beliefs that teachers have about the use of computers to included learners with special needs

- Identify teacher's perspectives regarding the positive and negative aspects of computer use for the inclusion of learners with special needs

- Identify the purposes for which computers are being used with learners with special needs

- Determine how computers are being used to support inclusion

- Identify barriers to successful computer use by learners with special needs

- Identify the conditions necessary for successful use of computers by learners with special needs

I have given you each a blank questionnaire to examine.

I have made one initial selection of criteria, and that is those respondents from phase one who said they would be prepared to participate in a follow up interview. This is 22 respondents. I am hoping to select approximately 6 teachers to interview.

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18 August 1999

Dear <enter name>

I am writing to thank you for your time and effort in completing the questionnaire I sent to you recently regarding the use of computers by learners with special needs. The responses from this phase of the study have provided some important information regarding the nature and extent of computer use by learners with special needs.

You indicated on the questionnaire that you would be prepared to participate in a follow up interview and I am hoping that this is still the case, and you are willing and able to do this. The interview, which would be taped, should take approximately one hour and would be treated as confidential. I will telephone you in the next day or so to discuss whether you are still willing to participate, and if so, to arrange a time and place suitable to you.

Thank you for your support so far, I value it. Regardless of whether you are able to participate in an interview or not, I will be sending you a summary of the results at the end of the study in the hope that you will find them useful in making the most of the computer when working with learners with special needs. I look forward to talking to you soon.

Kind regards,
Alison Kearney.

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The Effective use of Computers to Support the Inclusion of Learners with Special Needs

Information Sheet

To all teacher participants

Thank you for your participation in phase one of this study and agreeing to participate in phase two. The aim of the study is to investigate how computers are used to support and include learners with special needs in regular class settings and the conditions necessary for their successful use. The questionnaire in phase one yielded a lot of very useful information, and has provided the basis for phase two.

Phase Two

Phase two of the study involves interviews with six teachers identified from phase one. The teachers were selected by a research advisory committee on the basis of the following criteria:

- Those teachers who agreed to participate in a follow-up interview
- Those teachers who believed that the computer was a very effective tool for including learners with special needs in regular class settings

The interviews will be conducted in a semi structured way, with the interviewer having some themes to pursue, but not specific questions as such. It is hoped that the interview will be driven by the responses given by the interviewee.

It is envisaged that the interview will take no more than one hour. The interview will be taped unless the interviewee as objections to this.

Participant Rights

As a participant in this study, you are afforded certain rights as outlined in the Massey University Code of Ethical Conduct. In summary these include:

- the right to decline to participate;
- the right to refuse to answer any particular questions;
- the right to withdraw from the study at any time;
- the right to ask any questions about the study at any time during participation
- protection of your anonymity;
- confidentiality of information you provide;
- the right to access a summary of the findings of the study when it is concluded.

Attached to this information sheet is an interview consent form. If after reading the information sheet you still agree to participate in an interview, could indicate this by signing the form.

Thank you once again for giving up your time to contribute to this research. I am sure that the information gained through your participation will contribute not only to our understanding of computer use by learners with special needs, but towards more effective practice in this field.

Kind Regards,
Alison Kearney

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The Effective Use of Computers to Support the Inclusion of Learners with Special Needs

INTERVIEW CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to by satisfaction, and I understand that I may ask further questions at any time.

I understand I have the right to withdraw from the study at any time and to decline to answer any particular questions.

I agree to provide information to the research on the understanding that my name will not be used without my permission (the information will be used only for this research and publications arising from this research project).

I agree/to not agree to the interview being audio taped

I also understand that I have the right to ask for the audio tape to be turned off at any time during the interview

I agree to participate in this study under the conditions set out in the Information Sheet

Signed:.....

Name:.....

Date:.....