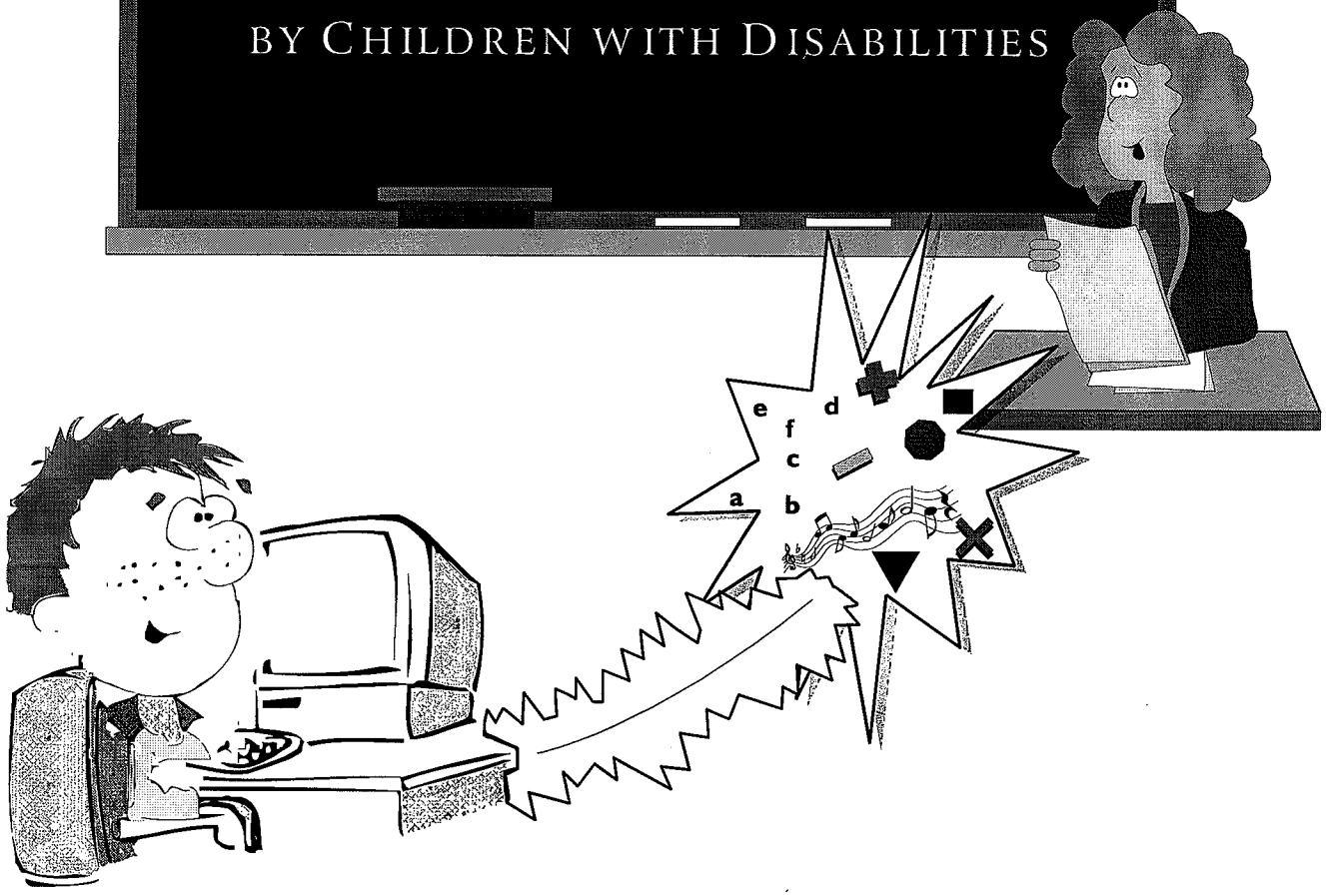
A LINK TO LEARNING

THE USE OF COMPUTERS BY CHILDREN WITH DISABILITIES



David Harris and Sally Boyd

New Zealand Council for Educational Research

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Wellington
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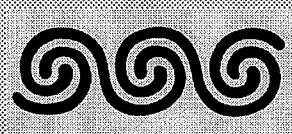

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EXECUTIVE SUMMARY

Introduction

This summary provides an overview of a study on the use of computers by children with disabilities. Partly funded by a grant from the Foundation for Research, Science and Technology, this research project was a joint effort between the New Zealand Council for Educational Research (NZCER) and the Specialist Education Services (SES).

This project examines the effects of the use of computers on the learning of children with a disability, in their home and school environments.

The research was designed as a multiple case study involving a total of 12 children from 3 geographic areas who had recently been provided with technology to assist their learning. At the start of the study the children's ages ranged from 4 to 11 years. Two of the 3 under-5-year-olds in the study attended an ECE centre; the others attended primary school. All of the children were described as having high or very high needs.

The main research questions for the study were:

- What are the IT skill levels of children in relation to objectives set in Individual Education Plans (IEPs)?
- What IT skill and knowledge transfer occurs within the family?
- What 2-directional transfer occurs between home, educational institutions, and other possible locations such as community services for people with disabilities, and the parents' workplace?

Information for the study was collected, from both home and school/ECE centre in 2 phases by an SES fieldworker familiar to the child. The first phase of data collection was from December 1997 until March 1998, and the second phase from March to June 1998. The instruments used to collect information in each phase included:

- an interview with the child's teacher/teacher aides,
- an interview with the child's parents,
- a video recording of the child using a computer at home and at school,
- an observation schedule to accompany each video recording, and
- a skills profile completed by the child, or on behalf of the child.

Summary of Findings

Significant themes to emerge from this research showed:

- the vital role that parents and the home environment play in supporting children's learning,
- the complex web of knowledge transfer occurring for children between and within home and school, and
- the importance of confidence and training in using computer equipment for parents and educators.

This research indicated that the use of computers by children in this study:

- facilitated the meeting of the goals in Individual Education Plans (IEPs);
- facilitated the children's development of a range of skills,
- enhanced children's language learning,
- enhanced children's motivation, enjoyment, and ability to work independently, and
- facilitated the inclusion of the children in the mainstream programme at their school.

From this study some factors which could maximise the educational benefits from the use of computers by children with special needs are identified. These are:

- the child has daily access to functioning computer equipment,
- the people who work with the child view themselves as knowledgeable and confident computer users,
- the people who work with the child use positive teaching strategies,
- the people who work with the child are trained in the use of teaching strategies to encourage the child's independence and communications,
- the software and hardware used by the child are seen as appropriate by both educators and parents,
- computer use is integrated into IEP strategies for oral language, reading, writing, mathematics, and cognitive and social development rather than focused on as a separate section or not included,
- there is an awareness between home and school of the programme of computer use occurring in the other setting, and
- people in the home and school environment are satisfied with the level of contact between the 2 locations.

From this research a set of recommendations are provided which concern the need for:

- increased dissemination of information on software, hardware, and teaching strategies for parents and educators of children with special needs,
- increased training on the use of software and hardware, and teaching strategies for parents and educators of children with special needs,
- a mechanism by which the computer equipment allocated to the children could be rapidly and/or periodically reassessed to see if it was functioning as intended,
- general guidelines concerning the frequency of use of computer equipment which will most benefit children,
- guidelines for integrating the use of computers into IEP strategies, which include the depth of coverage expected, and
- personal contact and communication about children's learning between home and school, and joint training sessions.

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INTRODUCTION

This research project is a joint effort between the New Zealand Council for Educational Research (NZCER) and the Specialist Education Services (SES). The research is partly funded by a grant from the Foundation for Research, Science and Technology (FoRST).

There is a recognised need for research on how information technology (IT) helps learners who have disabilities. There is a large amount of anecdotal knowledge among special education practitioners and some research in this area, but little information on the actual use of computers by children in relation to their disability levels and learning goals.

Purpose of the Research

This research project looks at the effects of computers on the learning of children with a disability, in their home and school environments. It identifies some of the factors which lead to the maximum educational benefits for children from the use of computers. The research identifies the skills a child learns with the assistance of a computer, and progress in these skills over some months. The influences on children's learning are described and analysed in relation to their computer use and skill development. Also included are the educational goals for the child, and the home and school support that is available to meet their learning goals.

Computers and Learning

There are great expectations that the provision of information and communication technology for children with disabilities will help them overcome barriers to learning and to participation in the school environment. Ryba and Selby (1995, p. 157) asserted that "the idea of using a computer as an empowering tool to give students control over their learning is widely accepted". Educators have stated that IT—and especially computers—can be a "most valuable tool in education not only for children who have special learning needs, but for all children" (McMillan & MacArthur, 1991, p. 15). Hutton (1997, p. 19) questions this benefit on the basis of "little research in New Zealand on this topic" and the practical difficulties of bringing computers into the learning situation. Among the difficulties he describes that hinder successful use of computers are a lack of training of classroom teachers, a lack of funds to buy software and computer peripherals, a lack of computer maintenance, and too little regard for children's educational use of computers.

This study focuses on computer use in the home and school or early childhood education (ECE) centre, and in particular examines:

- whether computer use contributes to the achievement of the Individual Education Plans (IEPs) of children with special needs,
- how the family can assist the learning of children with special needs,
- what relationships exist between the home and school which may contribute to a child's learning, and
- what factors of computer use lead to maximum educational benefit for a child with a disability.

The issues that Hutton raises about training, support, maintenance of the computer, and the use made of computers are also examined in this study.

Previous Research

A Positive Potential

Describing the benefits of using computers to assist students with special learning needs Hawkridge and Vincent (1992, p. 21) consider that—

> Computers can ease learning difficulties. They can help learners overcome their difficulties. They cannot work magic.

The National Curriculum Council policy (as cited in Hawkridge and Vincent, 1992) for students in England and Wales describes "five categories of benefits for children and young people with special educational needs". The cumulative effect is to empower students with a communication and learning aid. The NCC further states that an "essential principle" of this educational technology is to "magnify abilities that are there, bypassing as much as possible cognitive, emotional, physical, and sensory disabilities" (p. 28). The 5 categories of benefit are:

- heightened motivation through using the computer, which increases the chances of producing work of high quality and thus greater success,
- increased co-operative skills through small-group problem solving and decision making,
- improved accuracy and appearance of work through the use of word-processing and graphical packages on computers,
- expanded access to more information in the form of computerised databases, and
- ability to express creativity by overcoming the students' impediments in expression and communication.

Ryba and Selby (1995, p. 156) agree that "technology provides a means of communication and information for students that enable them to become capable learners". However, they outline skills that are needed by students before they can operate switches and control devices. They place these skills in 4 areas:

- motor skills for control of input,
- sensory skills to recognise feedback,
- cognitive skills for understanding cause and effect, and
- social skills so that students may interact with others in the environment.

Once a child has sufficient skill in these 4 areas, it is likely that using a computer will enhance those skills. Trying out more of the variety of software programs on a computer provides an expanding range of actions to do on a computer which should widen a child's cognitive understanding of cause and effect. Similarly, motor skills can be refined by using a variety of input devices for different tasks, sensory skills benefited from the variety of audiovisual feedback options possible from a computer, and social skills increased by working alongside other people with a computer on a variety of tasks.

The case for using technology for children with disabilities is stated by Viadero (1997, p. 14) as being much stronger than for more general classroom teaching. She argues that:

> 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 classrooms whenever possible.

Central among the factors which confirm this advantage is the technology's capacity to enhance a child's communication. The computer can enable children to write clearly and thus be understood more readily by classmates and teachers. The printout on screen or paper gives a "visible form of achievement", allows a student to keep pace with other class members, and provides more presentable work. Indeed if the child has motor control difficulties, use of a computer may be the only written expression method available.

In describing a Wellington teacher's experience, Gerritsen (1997) reports that the enabling of writing was especially critical as it helped the child keep up with peers and provided the teacher with a better idea of the child's level of performance. However, he emphasised that "matching the right technology to a child's need is probably the most important step" in achieving some success with the technology.

Gerritsen identified further issues, such as whether or not the child felt "isolated" in the classroom, with his or her learning progressing separately from that of others in the class in terms of content, contact with others, variety, and speed. A reluctance may arise if the student is separated from other children in learning and "off task" activities. To integrate the technology into the classroom requires specific teacher training and regular updating of software, so that the child will not become bored with too much repetition, and will continue to advance educationally and academically. Finally, the technology must motivate the child and provide a path which enables the child's potential to be reached even though it does not create that potential "or replace a child's cognitive skills". A computer is a tool that the student, teacher, teacher aide, and other classroom students can all use. It becomes a common reference point for all to communicate with each other and can be a focus for work. The computer's word-processing package may provide the context where the child with a disability has his or her most effective available means of communication.

A 2-year study in the United States involving 14 children with multiple disabilities concluded by outlining the issues that must be addressed when using computers to assist with their learning:

> But can we say that these [educational] benefits actually occur in 'real life' with real children and families? The answer is *'yes, but it depends . . .'* on the child, on the resources of the educational program, on belief in technology benefits, on the technology competence of the child's educational staff, and on the interest, resources and persistence of families (Hutinger, Johanson, & Stoneburner, 1996, p. 35).

A further expectation of "effective technology intervention" is that it should "prevent the debilitating cycle leading to the relatively permanent secondary disability state of *Learned Helplessness*" (Semmel & Lieber, 1990, p. 170). This condition "characterises individuals who perceive themselves to have limited control over their environment and, therefore, assume the role of totally dependent beings". Semmel and Lieber assert that an important goal of technology is to "provide severely disabled individuals with the means for controlling and mediating aspects of their physical and social environments so as to assure maximal adaptability".

In summary, a number of conditions have been described as essential for the successful use of technology in teaching students with special needs. Hutinger (1996) gives a helpful overview:

> Several conditions are necessary for a comprehensive technology program for young children with disabilities: staff training, administrative support and technology policies, appropriate assessment and individualized programming, family involvement, and transition plans. Families must be involved in important decisions regarding their children's technology experiences. Although the attitude, training, and inventiveness of the staff closest to the child's educational program play a crucial role in whether any child will make the most of any technology application, optimal outcomes result from collaboration between home and school. (p. 106)

Software

When considering software for an effective computer program, 6 features have been identified that aid the learning and communication of children with disabilities. These are:

- a reduction of distraction or irrelevant stimuli,
- simplification and repetition of task directions,
- an abundance of practice,
- modelling in demonstrations,
- instruction in small, manageable steps, and
- immediate and frequent reinforcements and feedback.[1]

The Family and Education Relationship

Margalit, Rochberg, and Greenberg (1990) examined the attitudes of parents towards the technology assisting their children.

> Parents expected their home computing to help their children regarding present academic and leisure difficulties and future vocational opportunities. These expectations were related to areas that the parents reported as extremely important, and as a source of worries and concerns. (p. 192)

The critical factors covered in the previous sections of this chapter apply equally to the home and the school.

Bovenkerk (1994), Kaiser (1996), and Morningstar (1995) all stress the importance of the role of the family in the education of children with special needs. Parental and sibling involvement in the learning process can advance many educational goals for a child, such as communication, language, and the integration of the child into the school community. The Ministry of Education (1998a) echoes this position by suggesting that:

> If parents, grandparents, brothers, and sisters know how to tutor properly, then they could continue the practice and fluency components of a teaching programme and become real partners in the teaching process for students with special needs. (p. 14)

This would strengthen the learning environment of the child.

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[1] Why computers in special education? What the research says. Http://www.edu.york.ca/~tcs/~smastrangelo/whycomp.html [1997, July 16]

Training of Teachers

McCarthy (1995), in her study of teachers of students with special needs in Wellington, found that teachers "do not receive sufficient training to suit their individual needs". This included their knowledge and confidence in using computers, and relating software programs that the students were using to their educational needs. Furthermore the "teachers' knowledge of school and ministry [of Education] policy relating to special needs students' computers was limited" (p. 22).

One factor highlighted as a detriment to the training of teachers was the trend that teachers were "not taking the major responsibility for special needs students when they work on their computers in the classroom". Teacher aides were the group that shouldered the main responsibility. A practical aspect of this is that teacher aides remain with the student during the class changes in school, something that was less likely for teachers. Teachers needed to account for all students; the teacher aide could concentrate on just one. Furthermore, teachers reported insufficient time to learn how to use the computer and relevant software for one or two special needs students who may have computers and programs different from those of other classroom students.

McGregor and Pachuski (1996, p. 4) assert that:

> As a whole, [the] body of literature suggests that in regular class settings, teachers are not always able or willing to modify their instructional strategies or modify the curriculum to accommodate individual students with disabilities. Teachers consistently rate the desirability of making adaptions for individual students higher than the feasibility of actually doing so.

The practical difficulty of allocating time and the relative responsibilities of the teacher and teacher aide mean that frequently training and familiarity with the computer, and hence ability to guide the student with the computer, are quite different. The teacher aide is more likely to know about the child's computer than the classroom teacher.

Hutton (1997, p.19) claims that:

> The computer is seen by a few as the salvation for these students and by many as having a high value as a tool to assist special learning needs of the students.

He comments that the more severe the child's need the more frequently he is asked by parents and teachers in his work on IEPs if computers can help. When this is joined to the Ministry of Education's criterion that a computer will be supplied only if it is an "essential tool" to access the curriculum, it can be seen that such access is limited to those with highest need.

Hutton goes on to explain that, even after obtaining the equipment, there are limits on its full and effective use caused by:

- lack of training of the classroom teacher,
- lack of funds to buy software and peripherals, and
- more instruction being given to the teacher aide of learners with special needs than to the teacher.

The Research Questions in This Study

The main research questions in this study are:

- What are the IT skill levels of children in relation to objectives set in Indivi dual Education Plans? The research concentrates on the IEP goals and achievements in:
  - language,
  - mathematics,
  - social development,
  - cognitive development, and
  - computer skills.
- What transfer of IT skill and knowledge occurs within the family?
  - Who helps the child's learning at home?
  - What forms of interaction occur there?
- What 2-directional transfer occurs between home, educational institutions, and other possible locations such as community services for people with disabilities, and the parents' workplace? In particular:
  - What form of interaction takes place between teachers and parents?
  - How often does this interaction occur?
  - Does it meet the needs of the child?

The factors which lead to maximum benefit for children will also be identified, along with the support and training available for all involved in the learning of children with special needs.

Research Participants

A total of 12 children from 3 geographic areas participated in the study. At the start of the study the children's ages ranged from 4 to 11 years. Two of the under-5-year-olds attended an early childhood education (ECE) centre; the others attended primary school. All of the children were described as having high or very high needs using the criteria set out below.

These criteria were developed from discussions with Joanna Curzon of the Specialist Education Services, and include some of the categories used by the Ministry of Education for the Ongoing Resource Scheme (Ministry of Education 1998b).

A child or student with **high needs** typically requires extra support to overcome barriers to achievement in one or more of the 4 major functional areas:

- self-care and mobility,
- communication and social interaction,
- cognition and learning, and
- emotion and behaviour.

This extra support may be provided through significant:

- adaptation of curriculum content, the presentation of materials, and teaching strategies in most learning areas,
- special assistance for effective communication,

- physical modification to the environment and materials, and
- personal assistance for many self-care activities.

A child or student with **very high needs** typically requires extra support to overcome barriers to achievement in 2 or more of the 4 major functional areas listed above. This extra support may be provided through extensive:

- adaptation of curriculum content, the presentation of materials, and teaching strategies in all learning areas,
- special assistance for all face-to-face communication,
- physical modification to the environment and materials, and
- personal assistance for all self-care activities.

The students were randomly selected from a group of special needs students who had recently been assessed for their educational needs and computer requirements, and had been provided with technology to assist their learning. These children represent a cross section of children with special needs. They each have uniquely individual and different patterns of special needs as their profiles show. Due to the extreme diversity among the students to be studied, a multiple case study approach was adopted. By selecting 3 different geographical areas, it was hoped that a variety of circumstances would be included in the study.

Research Method

The research began with trials to test the instruments developed. Material was collected for each child in 2 phases:

- December 1997 until March 1998
- March to June 1998

Each child was visited twice in each phase by an SES fieldworker familiar to them, once at home and once at their school/ECE centre.

The data collected included:

- an interview for the teacher/teacher aide,
- an interview for the parent,
- a video recording of the child using the computer at home and at school,
- an observation schedule to accompany the video recordings, and
- a skills profile filled out by the child, or on behalf of the child, that outlines that child's achievements at home and at school.

These were used during both phases of the fieldwork to allow a comparison, to see whether advancements in learning made over the period could be attributed to their IT use over the period.

Each participant in the study had the right of refusal, to join or continue in the study. Confidentiality of identity is assured by the use of fictitious names in reporting the findings.

The information sought in the face-to-face interviews covered these issues:

- The reasons for locating the technology to be used by the students.
- The learning objectives that the technology was obtained to achieve.

- The incidence of technology use.
- Other people involved in the child's learning assistance in the education process, and the training they had to help.
- The activities done most often with the computer.
- The programs that are used most frequently.
- How the programs fit into the classroom teaching plan.
- The activities that were the most enjoyable/motivational on the computer.
- The most beneficial uses of the computer.
- Whether computer use altered the behaviour and skills of the student after they started using the computer.
- How the computer was used in the teaching of the child.
- Whether the computer contributed to the goals in a child's learning.
- Whether others learnt skills while the child was learning with the computer.
- Whether parents had a clear understanding of how the technology was used at school to help their child's learning.
- How the computer was used at school to assist learning.
- How the computer was used at home to assist learning.
- The discussion and planning that took place at home on learning with a computer.
- The interaction between home and school.
- Any problems with the support a child was getting in using the computer.
- Any problems that parents and teachers faced when using the computer to assist their child's learning.
- The technical support available to use the computer at home and at school.

The skills and abilities noted via the video camera recording and observation included:

- general cognitive and problem-solving skills with computers,
- computer operating and information skills regarding equipment and programs,
- social and communication skills to do with computer use,
- self-management skills and self-esteem,
- visual language, oral language, and written language relating to computer use,
- visual number, oral number, and written number skills, and
- overall technology skills.

EDUCATOR AND PARENT INTERVIEWS

Introduction

The information summarised here was collected from interviews with parents, teacher aides, and psychologists in round 1 (referred to as 1997) and round 2 (referred to as 1998) of the data collection for this project.

Home

Eleven interviews were conducted in 1997 with members of the children's family. This included 9 interviews with the child's mother, one with both parents, and one with the child and the father. One interview schedule was not returned.

Twelve interviews were conducted in 1998 with family members. This included 9 interviews with the child's mother, 2 with both parents, and one with the child's father.

School and Early Childhood Education

In 1997 there were 9 interviews at schools with the teacher aides who worked with the children in the study. Three of the children were under school age: for 2 of these children an interview was conducted with the psychologists who worked with them at an ECE centre; one child did not attend a centre and therefore an ECE interview was not conducted for this child.

In 1998 a total of 11 interviews were conducted, that is, 8 with teacher aides, one with a teacher, one with both a teacher and a teacher aide, and one with a cognitive therapist at an ECE centre. Again one child was not attending a centre.

When data from the teacher aides and teachers at school, and the psychologists or cognitive therapists at ECE centres are combined, the term "educator" is used to describe the person working with the child. Otherwise, the terms "teacher aide" and "psychologist" are used.

Computer Use at Home

In 1997 the most common place for the children's computer equipment to be located at home was in a shared family room such as a lounge. Usually this was because there was no other space available, or to put the computer near other family members:

> So I'm able to keep an eye on it so he doesn't wreck it!

Other locations for the computer equipment included a study, a hallway, the child's room, and near a network port:

> There are networks linking computers in the house, it is placed by the network port, and he is now able to concentrate okay in this place.

In 1998 the child's computer was less likely to be located in a shared family room and more likely to be located in the hallway or in a study or home office.

Ten of the study's children in 1997 were using their computer equipment at home. One child was not using the Government-funded computer at home due to its unsuitability for her needs

as perceived by her parents and teacher aide. One child was waiting for the equipment to be repaired by the school. These 2 children worked on family computers.

In 1998 there were 11 children using their computers. The child whose equipment was not seen as suitable was still not using this computer at home.

The Pattern of Home Use in 1997

Eight of the children used the Government-funded or family computers every day, 2 used a computer a couple of times a week, and another occasionally used her family's, rather than the Government-funded, computer.

An average session ranged from 10 to 45 minutes for 9 of the children. For 2 children an average session ranged from 1 to 2 hours, depending on the activity being undertaken.

Four of the children spent nearly all of their time working with other people, 5 split their time between working individually and working with others, and one spent nearly all the time working alone.

On average the children spent approximately 8 hours working with others on the computer at home. The children mostly worked with members of their immediate family: 8 of the children worked with their mother, 8 with their father, 8 with siblings, 3 with friends, and 2 with step-parents. The person the children spent the most time with was their mother. One child spent approximately 10 hours a week working with his mother.

Parents tended to work with children for both educational and recreational purposes. On the whole most computer use appeared to be related to the child's educational goals, such as completing homework and developing language, mathematics, and writing skills using general or educational software and games, e.g.:

> Constant coaching. Spelling words. Homework. [Mother]
>
> Typing out stories for his diary. Playing adventure games. Maths programs. Drawing pictures. [Father]
>
> Talking about what is happening. Giving him instructions. [(Mother and father]

Although siblings and friends completed some educational activities with the children in this study, they were more inclined to use the computer equipment for recreational purposes, e.g.:

> Games. Spelling program. Reader Rabbit. [Siblings)]
>
> Playing games. [Friend]

Changes in the Pattern of Home Use Over Time

In 1998 the pattern of home use for most children stayed relatively constant with 7 using the Government-funded or family computers every day. One child used a computer 2 or 3 times a week. Three children used their computer equipment less frequently, about once a week. One child who did not use the computer at home in 1997 also did not use it in 1998.

For 4 children the average time spent on the computer increased slightly in 1998. In 1998 computer sessions ranged from 20 minutes to an hour. The 2 children who spent over an hour per session in 1997 on the computer reduced the time to an hour in 1998.

By 1998 the children in this study were using computers more independently. Two worked by themselves all or nearly all of the time, 6 split their time between working individually and

working with others depending on the activity they were undertaking, and 3 worked with others nearly all the time.

In 1998 the children still worked mostly with members of their immediate family. Eleven worked with their mother, 4 with their father (a decrease from 1997), 10 with siblings, 2 with friends, and 2 with step-parents or other caregivers.

In 1998 the person children spent most time with was still their mother. On average those children spent approximately 5 hours a week using the computer with others at home. This is lower than the 8 hours reported in 1997.

In 1998 the activities the children completed with others on the computer showed a similar pattern as in 1997, that is, parents tended to work with their child on subjects related to the child's educational goals:

> Helping him with homework, project work and words. [Mother]
>
> Using prereading software guided by her. [Mother]

Computer Use at School or ECE Centre

At school the most common location for the children's computer was at the back of the classroom (8 in 1997, and 9 in 1998). This location was chosen as it provided a quiet place where the child would not be distracted, or distract other children, e.g.:

> To be off in a corner, secluded, private.

Other locations were chosen for a number of reasons such as to be near a power jack or to be included with other children.

Some teacher aides expressed concern about trying to get a balance between including the child in the classroom and also ensuring that the child could concentrate on his or her work, e.g.:

> Not too distracting visually or too isolated.

The computer equipment of the children at ECE centres was located in a separate room.

In both 1997 and 1998, 11 of the children were using their computer equipment at school or at an ECE centre. In 1997 one child waiting for his equipment to be repaired used other school computers when they were available.

The Pattern of School and ECE Centre Use in 1997

All but 2 of the children used the computer at school every day. One used the school computer a couple of times a week; the other used it once a week as his computer equipment was not functioning. A session on the computer lasted from 5 to 60 minutes with an average session lasting approximately 26 minutes.

Five children spent nearly all their time working with other people, 3 split their time between working individually and working with others, and 3 spent nearly all their time working by themselves.

All the children worked with their teacher aide, 3 children with their teacher or a resource teacher, and 5 worked regularly with their classmates. The amount of time spent with the teacher aide varied from 30 minutes to 10 hours a week. On average each child spent approximately 9 hours working with others each week.

The 2 children attending ECE centres used computers with a psychologist once a week for

approximately half an hour.

The activities the children completed at school tended to be more focused on educational goals than those at home. The most common activity, performed by all the older children in the study, was developing writing skills, e.g.:

> Encouraging story writing. Instructional work on spelling.
>
> Enhancing vocabulary. Reading the alphabet.

Other activities performed by half the children included developing reading ability and mathematics ability, e.g.:

> Reading activities.
>
> Maths—shape and number.

For the younger children in the study, activities focused more on developing cognitive skills, pre-reading and writing ability, and increasing verbalisations, e.g.:

> Choosing tasks. Memory doors [problem-solving], using cause and effect programs.
>
> [To develop ideas of] choice and fun. Key concepts: numeracy, letter recognition, and to enhance verbalisations.

The 5 students who worked with their peers completed reading, writing, and mathematics activities, as well as playing games, e.g.:

> Shared writing. Shared games during wet lunchtimes.
>
> Language and poetry work.

Classroom management issues also decided part of the children's computer use. Three teacher aides used access to the computer equipment as a reward for good behaviour (this use was not mentioned by parents), e.g.:

> He has to do work before he can play on his favourite programs.

One teacher aide commented that:

> The computer is used at school as a 'sitter' for when the class programme is not appropriate or there is no teacher aide.

Changes in the Pattern of School and ECE Centre Use Over Time

By 1998, 10 of the children were attending school. The child attending an ECE centre was using a computer with a psychologist once a week for approximately half an hour.

As in 1997, nearly all of the children at school were using their computers every day. Only one used the computer 2 or 3 times a week. In 1998 session times were similar to those in 1997, that is, lasting from 10 to 45 minutes. Three teacher aides reported that the child had 2 or 3 sessions using a computer a day.

Unlike home, at school the children were still likely to work with others for at least a proportion of the time they spent using a computer, though fewer children (3) spent nearly all their time working with others. Seven split their time between working individually and

working with others. In 1998 fewer (1) children spent nearly all their time working by themselves. It appears that some children were becoming more independent users at school and others were working more with teacher aides. These changes could be due to changes of teachers and teacher aides who worked with the children.

All the children worked with a teacher aide. Six children also worked with a teacher or resource teacher, and 6 worked regularly with their classmates. The amount of time spent with the teacher aide varied from a minimal amount—as the child was "quite independent"—to 10 hours a week. On average each child spent less time working with others in 1998 (6 hours compared with 9 hours in 1997).

In 1998 the activities the children completed at school with teacher aides were again focused more on educational goals than those at home. The most common activity, performed by 8 of the older children, was developing writing skills. Five children worked on developing mathematics skills and 4 on reading skills. One new use emerged in 1998—2 children were using software to gather information for projects, e.g.:

> Looking up Encarta for information.

As in 1997, in 1998 the younger children in the study worked more on activities designed to develop their cognitive skills, e.g.:

> Choice-making programs and matching.

Six children worked with their peers, concentrating mostly on writing tasks. One worked with peers during mathematics time and another worked on cognitive skills. Four students played games with their peers.

A Comparison Between Computer Use at Home, School, and ECE Centre

In 1997 children used their computers more independently at school. By 1998 this pattern had changed; children were now more likely to use their computers more independently at home. In 1998 at school, some children were working more independently and others were working more with teacher aides. Essentially by 1998 children worked in similar ways (either mostly independently or with others) both at home and school. Parents and educators were performing similar tasks with the children, for similar periods of time, and with similar educational goals in mind (though children used their home computers more for recreational purposes). In 1998 most children worked on consolidating existing skills with their teacher aides, and some children were developing new skills such as information gathering. Language skills were the focus for most of the older children, and cognitive skills for the younger children. There appeared to be some differences in the way that access to the computer equipment was managed at home and at school, that is, for some children the computer was used as a reward for completing other activities at school.

Interactions Between Home and School in the Use of Computers

The data from this study show a complicated web of knowledge transfer occurring between and within home, school, ECE centres, and parents' workplaces. Home and school were the main locations where the children used computers. Four children in 1997 used a computer at other locations. Three used computers at relatives' or family friends' houses, 2 used them at a friend's house, and another used a computer at a teacher aide's house.

By 1998 more children (7) were using computers at other locations. A similar pattern of use at friends' and family friends' houses emerged. In addition, 2 children were using computers at the public library.

For all the children in this study the most common directions for knowledge transfer were:

- Parents' work ⊃ parent ⊃ child
- School/ECE centre ⊃ educator ⊃ child

In 6 of the homes surveyed parents had acquired computer skills through work or study and passed on these skills to their children. Therefore some children had a reasonable level of computer skill before they received the Government-funded computer equipment.

Exchanges of knowledge relating to computer use also occurred in just about all possible permutations, e.g.:

- Parent ⊃ child ⊃ peers
- Parent ⊃ child ⊃ teacher aide
- Parent ⊃ teacher aide
- Educator ⊃ child ⊃ parent
- Educator ⊃ parent
- Child ⊃ parent
- Sibling ⊃ child

Parents and educators described this web of interactions in a number of ways, e.g.:

> He has shown me how to move the CD ROM out. [Parent]
>
> We have always had computers at home—he knows how to network and play a game on 3 different computers. [Parent]
>
> He shows classmates how to use the computer. [Teacher aide]
>
> He shows me! [Teacher aide]

Teaching the Children New Activities

Home

In 1997 and 1998, when asked how they taught their child new skills using the computer, most parents described working through all or some of the following 5 steps:

- Modelling the activity to the child.
- Explaining the activity.
- Working through the activity together with prompting.
- The child working through the activity independently.
- Repeating the activity (together or independently) until it was mastered.

For example:

> Decide what you want to do and show him, then lots and lots of repetition.
>
> Show her first, explain to her, do it with her, let her attempt and correct if necessary.

Ten parents in 1997 and 11 in 1998 described how their child's siblings would actively teach their child. The siblings used similar methods to the parents to introduce new software programs in 7 cases in 1997 and 9 in 1998, e.g.:

> Show him and he'll watch, and then give him verbal prompts when it is his turn.
>
> Same as us, decide what they want him to do, show him, then lots and lots of repetition.

In 2 instances in 1997 and 1998 the child learnt by observing siblings, rather than the siblings taking an active role, e.g.:

> His sister will discover something and he will observe and pick it up.
>
> He will watch them play and copy them.

One parent in 1997 commented that the child's siblings would "barge in and take over". By 1998 this parent observed that the child's siblings would try to show him but they did not have much patience. In 1997 another parent reported that the siblings had not yet tried to teach the child any activities. By 1998 this child was working with his siblings who used hand-to-hand facilitation and verbal prompts to show him new activities.

School and ECE Centres

In 1997 and 1998 when educators were asked to describe how they taught the children new activities using the computer they mentioned the same steps as parents (but in a more detailed manner), e.g., educators reported using—

- Hand-to-hand facilitation.
- Frequent praise.
- Peers learning alongside the children so that they can support them later.

For example:

> Repetition, repetition, and modelling. Hand-to-hand facilitation. Lots of praise—it has to be fun.
>
> I've learnt that one of the best ways to teach him is to talk about the task and what we want to do. I show him and then let him use it. He then finds his own way around and learns by doing. He will ask if he has a problem.

In both 1997 and 1998 one teacher aide stated that they had not needed to teach the child how to use the software as he already had this skill. Another mentioned that the child taught them.

In 1997, 6 educators and in 1998, 5 commented that the child's peers would use a similar process to themselves to teach the child, e.g.:

> Two girls in particular will support him and go through the activity— [using] repetition.

In both 1997 and 1998, 2 educators commented that the child's skills were equal to or ahead of their peers, and therefore these children did not need to be taught activities by their peers, e.g.:

> I don't know that this has happened yet because he is showing them. That's another thing that is really good. He has the control and the knowledge.

In 1997 and 1998, 3 children did not work with their peers; 2 of these children were under 5.

Software Used

Each child used an individual set of software tailored to their needs as perceived by SES. Most of the children used the same core software at home and at school. But for nearly every child there were also some differences between the software used in these 2 locations. A list of the software used by the children at home and at school is provided in appendix F. The software that was used by more than one child in this study is shown in table 1.

Table 1
Most Commonly Used Software

Software	Software type	Location used
ABC	Early childhood activities	Used by 3 children at home or school
Reader Rabbit	Interactive reader	Used by 3 children at home or school
James Discovered Math	Interactive maths puzzles	Used by 3 children at home or school
Clarisworks	Word processing	Used by 2 children at home or school
Microsoft Works	Word processing	Used by 2 children at home or school
Kevin Goes to the Zoo	Interactive choices and reader	Used by 2 children at home or school
Story Book Weaver	Interactive story writing or reader	Used by 2 children at home or school
Simcity	Problem-solving game	Used by 2 children at home or school
Touchgames	Early childhood activities	Used by 2 children at home or ECE centre
Lemmings	Problem-solving game	Used by 2 children at home
Peter Pan	Interactive reader	Used by 2 children at home

The younger children in this study tended to use software such as ABC, Touchgames, Choices, and Switch On at their ECE centre. At home the younger children used software such as Fisher Price ABC. The software used by younger children was designed to assist the development of cognitive skills such as cause and effect, choice making, and matching; and prereading and pre-mathematics skills such as recognising the alphabet, colours, and shapes.

In both 1997 (4) and 1998 (5) older children who had more developed computer skills used word-processing software such as Microsoft Works and Clarisworks both at home and at school for story writing in English and projects in other curriculum areas.

The children in the age group between these 2 groups used a wide range of software. The types of software used by the children in this group included:

- Assisted word-processing, story-writing, and spelling programs (such as Story Book Weaver). Software of this type was used by at least 5 children. In 1997 this software was more likely to be used at school; by 1998 it was equally likely to be used at home.

- Maths programs (such as James Discovers Math) and problem-solving games (such as The Logical Journey of the Zoombinis). This software was used at home or at school by at least 4 children.
- Interactive readers (such as Reader Rabbit). This software was used by a couple of children at school and more at home. At home children had a wider range of reading software available.
- Presentation programs (such as Hyperstudio and KidPix Studio). Presentation software was used by 2 children mostly at school for projects and story writing.
- Drawing and graphics programs were used by a couple of children to illustrate stories and projects.
- Computer game software such as Quake was used by a couple of children at school and at least 4 children at home.

In addition to the software listed in appendix F, a range of unspecified games and interactive readers were used by the children both at home and at school.

In 1997 over half the educators stated that the software suited topics the class was doing and the students' learning goals, and was used for writing. Approximately one-third of the educators reported that the software was used to develop students' reading skills, to consolidate existing skills, to access the curriculum in general, and as a recreational tool. This pattern stayed the same in 1998, though more educators reported that the software was used to access the curriculum in general.

In 1997 the use of the software had not yet been incorporated into the classroom programme for one child. This occurred after a training session for the teacher aide.

Reasons for Providing the Children with Computer Equipment

Home

Parents saw the development of writing and reading skills as the main reasons for their child being provided with computer equipment. Other areas mentioned by parents included mathematics, and oral language, cognitive, and motor skills. Parents also saw the provision of computer equipment as a way of assisting their child to participate in the classroom programme at school, e.g.:

> To help him at school with reading, writing, and maths—to [assist him to] participate in the mainstream.
>
> I think because of his speech and fine motor skills. It is a speech aid, and a reading and writing aid. I think his brain goes a lot faster than his hand. It helps with speed.

School and ECE Centres

The majority of educators described the reasons why the children had been given computer equipment in terms of:

- improving written communication and knowledge of language, and
- developing and increasing the speed of the children's communications.

Other areas mentioned less frequently by educators included:

- enhancing independence and social skills,
- improving motor skills,
- improving mathematics skills, and
- as a general motivator.

For example:

> Communication and independence. To stop using hand and start using fingers as a pointer.
>
> His fine motor skills make writing difficult and laborious.

A Comparison Between Home and School

Educators and parents used different language to describe a similar objective—to enhance the child's access to and channels of communication. Educators described the general process of communication, and parents the tools of communication, that is, reading and writing. The ability of the children to participate in the mainstream was a focus for both parents and educators, though parents were more likely to consider that the use of computers assisted their child to "keep up" with their peers. In 1997 parents placed more emphasis on mathematics skills than educators.

Learning Objectives and Goals for Computer Use

In both 1997 and 1998 educators had a wider range of learning objectives and goals for the use of computers than the initial reasons given for the allocation of the equipment. The most common learning objective mentioned by educators was accessing the English curriculum. The majority also saw the use of the computer equipment as an aid to:

- accessing the mathematics curriculum,
- developing motor skills and co-ordination,
- increasing self-management and independence,
- increasing self-esteem, and
- developing communication and social skills.

In 1997 more than a third of educators, and in 1998, over half thought that the use of computers would have the additional benefits of assisting:

- the development of IT skills, and
- the child's concentration span.

In addition, 4 educators saw the use of computer equipment as a way of enhancing the child's enjoyment in their learning.

Beneficial Aspects of Computer Use

Eight educators in 1997 and 9 in 1998—and all but one of the parents in 1998—thought that the children were generally benefiting from the use of computers. All but one of those who were unsure of the overall utility of the equipment also identified some areas of benefit for the child. The benefits most commonly mentioned by parents and educators are shown in table 2 and include increases in written, oral, or visual language skills, motor skills, computer skills, and concentration skills. These benefits corresponded to the extra goals that teachers had listed from the use of computers.

Table 2

Skill Enhancement or Benefit from the Use of Computers

Benefit	1997 Parents N = 10 n	1997 Educators N = 11 n	1998 Parents N = 11 n	1998 Educators N = 11 n
Too soon to tell	–	2	–	2
Written/oral/visual language skills	8	5	9	6
Motor skills/co-ordination	8	5	7	8
Concentration skills	7	8	6	4
General computer operation skills	6	7	7	7
Communication skills	5	7	6	2
Social/interaction skills	5	4	5	4
Work completion skills	5	3	5	7
Enjoyment	5	3	4	5
Self-management and independence skills	4	5	7	6
Increased self-esteem	4	4	8	5
Presentation skills	4	3	5	4
Mathematics skills	3	4	4	2
Cognitive skills (e.g., picture/object recognition)	3	5	4	3
Problem-solving skills	2	4	3	3

Between 1997 and 1998 the emphasis given to the benefits noticed by parents and educators changed slightly. In 1998 parents and educators were less likely to mention concentration and communication skills as benefits but were more likely to talk about self-management and independence, self-esteem, and work completion skills. Benefits given by one parent in 1997 were:

> He has good computer skills—he's in and out of programs and drags with the mouse. . . . He's learnt the alphabet, recognises numbers up to 10, and is developing his language skills by recognising words such as 'up' and 'down'.

In 1998 the same parent stated:

> He is learning to read—his sight vocabulary is growing, and he knows the alphabet. His being in control has been a benefit—he has less opportunity for this elsewhere. His concentration is improving.

In 1997 another parent reported that:

> He's mastered 'on' and 'off', the mouse (hand to eye co-ordination) and generalised this to the video player.

In 1998 this parent noted that:

> He is more confident at finding his way around programs and more independent.

In 1998 another parent commented on an increase in her child's self-management and computer skills:

> He knows not to handle CD ROMs and is a responsible user.

Teacher aides commented that:

> She has a sense of controlling the environment.

> He's learnt mouse skills, co-ordination, understanding of maths concepts for example discriminating length (he can't do this with physical objects). He seems to be ahead on the computer. . . He gets a choice and he can nonverbally 'answer'.

Having a high level of computer literacy seemed to increase the children's ability to participate in the mainstream. For these children benefits such as increased opportunity to be part of the classroom programme and interact with their peers were mentioned by educators and parents. Computer-literate children were able to communicate more effectively through the use of computers, complete class work, and have it presented in a similar fashion to other students. These children were also teaching their peers how to use computer software, e.g.:

> It gives him something to talk about. He can help other kids learn about the computer. He writes stories on it, demonstrates to other students. He shares his computer with others in the class. He is the teacher. [Parent]

The comments of those adults who were not sure or did not think that the child was benefiting over all from their use of computers (that is, 3 educators and a parent in 1997, 2 educators and the same parent in 1998) showed some common themes. In 1997 one of these commonalities was access—one child did not have access to his computer equipment as it was broken, and another only worked on the computer for half an hour a week. These issues were resolved by 1998. In both 1997 and 1998 another commonality was the perceived lack of suitability of the software, e.g.:

> She can't see what she is doing. The classroom computer is not set up to print off. [Parent]

> Sometimes he does but it is variable. Due to the slowness of the set up, it is just as frustrating as writing by hand. [Teacher aide]

Another similarity was lack of computer confidence and training for the teacher aides who were working with the children. For 2 of the children, both family members and teacher aides were unaware of how the computer equipment was being used in the other setting to help the child's learning. Both teacher aides reported that they rarely had contact with the family, and that they would like more contact.

Children's Reactions to Computer Use

Home

Nearly all the parents (10 in 1997, and 11 in 1998) thought that their child enjoyed using the computer. In 1997 the majority reported that they could see verbal and physical signs of enjoyment as well as increased motivation, e.g.:

> Loves to go on, hard to get him off. He is at his most verbal (mixes signs with speaking), very talkative and interactive.
>
> Says 'more'. Tells you when she is finished. She would stay at the computer as long as you let her.

In 1998 parents again mentioned verbal sign of enjoyment and increased motivation, but were also likely to report additional signs of enjoyment such as repetition of activities and increased concentration, e.g.:

> He has more concentration than some of his friends on the computer.

School and ECE Centres

Nearly all the educators (9 in 1997 and 8 in 1998) thought that the children enjoyed using the computer. In 1997 one thought that the child's enjoyment varied depending on the activity undertaken, and one was unsure; in 1998, 3 thought that the child's enjoyment varied depending on activities. In both 1997 and 1998 most could see increased motivation and verbal signs of enjoyment, e.g.:

> He will turn it on himself. He always wants to work on it.
>
> His output goes up when he uses it. He talks constantly about the computer.

Other signs of enjoyment reported less frequently by educators included physical signs of enjoyment, repetition of activities, and concentration on tasks.

As shown by table 3, parents and educators had similar views on what the children enjoyed about using computers.

Table 3

What Do the Children Like about Using Computers?

	1997 Parents N = 11 n	1997 Educators N = 11 n	1998 Parents N = 11 n	1998 Educators N = 11 n
Interactive games	9	4	6	5
Sounds and noise	7	4	7	3
Interaction with others	6	5	3	5
Pictures	5	5	7	4
Movement	5	4	5	3
Increased presentation of work possible	3	5	6	6
Increased communication possible	2	2	3	3
Success and control	2	2	2	3
Inclusion in class	0	3	0	2

In 1997 parents were more inclined to indicate that the children enjoyed playing computer games and enjoyed the sounds the computer made. In 1998 they were more likely to comment on the increased work presentation, and less likely to mention interaction with others (this could be due to the fact that children were working more independently at home).

In 1998 teacher aides commented:

> He has been enjoying producing his own books—he is close to achieving his goal of reading one of his books to the class.
>
> He loves learning new things like learning how to use a spreadsheet.

Aside from the characteristics of the software, some parents and educators mentioned other reasons why the children liked using computers; these mostly concerned enhancements to their social functioning, such as having successes with their work and being at the same level as classmates, e.g.:

> He's in control and succeeding. He loves music and LOVES repetition. [Parent]
>
> On her Acorn home-based computer she enjoys presentation and verbal feedback etc. [Parent]
>
> He gets success from it (he has difficulty with other manual tasks). He can express his humour. [Teacher aide]

Had the Use of the Computer Equipment Altered the Behaviour of the Children?

In both 1997 and 1998 most of the educators and parents had noticed changes in the children's behaviour that they attributed to the use of computers. As shown by table 4, the most common change noticed was an improvement in the child's attention span. Other common changes mentioned were increases in communication and computer skills, and improvements in self-esteem. Educators reported fewer general improvements in behaviour in 1998.

Table 4

How Computer Use Altered Children's Behaviour

Behaviour change	1997 Parents N = 11 n	1997 Educators N = 11 n	1998 Parents N = 12 n	1998 Educators N = 11 n
Improvement in attention span	9	6	6	6
Increase in computer skills	5	4	7	4
Increase in communication skills/vocalisations	4	5	3	3
Increase in self-esteem	4	5	2	4
Increase in self-management behaviours	3	2	2	2
General improvement in behaviour	2	5	1	1
No changes noticed	1	3	2	2

In 1997, 2 teacher aides who had noticed no differences in behaviour reported that they had not been working with the equipment in the classroom long enough to observe changes, e.g.:

> No changes yet—it's too soon to tell. [Teacher aide]

Other comments made, by those who had reported no changes in both 1997 and 1998, were that the equipment the child was using was not suitable, or that the child was already computer literate, e.g.:

> He has had access to a computer at home for ages—I can't really attribute changes to computer use. [Teacher aide]

Parents and Educators Learning Skills by Using the Computer Equipment

Home

In 1997 and 1998 the majority of parents reported that they had learnt skills from using their child's computer equipment. The most common skills mentioned by the majority of parents were learning how to use the software and hardware. Another skill mentioned less frequently was gaining general knowledge about available software and equipment. Skills that were mentioned by only a couple of parents included how to match the use of software to their child's IEP goals, and how to enhance their child's learning through the use of computer equipment, e.g.:

> We are in the process of talking to the school about how to match programs to IEP goals and general ways to enhance learning. [1997]

School and ECE Centres

In 1997 all but one and in 1998 all but 2 of the educators had learnt skills from using the children's computer equipment. As with the parents, the most commonly mentioned skills learnt were how to use the software and hardware, e.g.:

> Until I started here, I hadn't put in disks before or used this type of computer.

> I've learnt heaps. I did a report on the computer and learnt about writing programs.

Four 4 educators in 1997 stated that they had acquired knowledge about how to match software to the curriculum and 3 had learnt how to match the use of software to the children's IEP goals. These areas were only mentioned by one person in 1998, which suggests that this was a skill the educators considered they had mastered. In contrast, gaining general knowledge about available software and equipment was an area that educators considered they had gained knowledge about in both 1997 and 1998.

Some educators (3 in 1997 and 2 in 1998) acquired general knowledge about how to enhance children's learning through the use of computer equipment.

One person who had not learnt any skills commented:

> I haven't learnt anything I didn't already know.

Communication Between Home and School

Home

Parents were asked if they understood how the computer equipment was used at school to enhance their child's learning. Seven parents in 1997 felt that they had a clear understanding and

3 did not.[2] One parent commented:

> No, not at the moment—it is just new and we haven't been going for very long.

This was still the case in 1998 with 8 parents reporting that they understood how the computer was used at school and 3 that they did not or were unsure. Of these 3 parents, only one had held the same opinion in 1997—this was a parent who was not satisfied with the equipment allocated. For the others, one child had recently started at school and therefore a regular pattern of use had yet to be established. Another parent had changed her viewpoint since 1997.

Parents and educators were asked if they exchanged knowledge about how the children used the computers. Eight parents in 1997 discussed their experiences with educators and 3 did not. The parents who exchanged information with their child's educators tended to be more satisfied with the level of contact between home and school, e.g.:

> We are very close to the teacher aide—we have lots of contact.

The parents who did not exchange information tended not to be satisfied with the level of contact, e.g.:

> This is not invited [contact with the school]. There are some issues here.

Ten parents in 1998 discussed their child's computer use with educators and one did not. In contrast to 1997, in 1998 all parents were satisfied with the level of contact between home and school.

School and ECE Centres

Educators were asked how frequently they had contact with the families in the study. The amount of contact varied widely. In 1997, 3 educators were in touch every day, 4 talked to family members approximately once a week, 3 stated that they hardly ever had any contact, and one commented that they discussed the unsuitability of the equipment allocated.

In 1998 the degree of contact between home and school lessened; 2 educators were in touch every day, one talked to family members approximately once a week, 2 were in touch on a monthly basis, and 6 stated that they hardly ever had any contact.

A number of educators commented that they exchanged a notebook between home and school to keep each other updated, e.g.:

> Several times a week. We ring one another if there's anything happening. We use a notebook too.

> I don't see them (my hours don't match with the beginning and end of the day). Only at IEP meetings. We have discussed software, especially earlier on. I comment in his notebook about what he is doing today.

---

[2] One child was not using a computer at his ECE centre therefore this question was not applicable to him.

Seven educators in 1997 thought that they had a clear understanding of how the computer equipment was used at home and 4 did not or were unsure, e.g.:

> I'm not sure how she uses it, she knew her way around it.

In 1998 only 3 educators felt that they knew how the computer equipment was being used at home and 8 did not.

> I would like a little more contact and I would like the chance to look at all the programs and plan some structured activities.

> He uses a different computer at home and at school.

Eight educators in 1997 thought that they had enough contact with the families and 3 did not. These 3 were likely to see parents only at IEP meetings, or were supporting the 2 children who were having problems with their computer equipment.

In 1998 the number of educators who thought that they did not have enough contact had increased to 5. These 5 were likely to see parents only at IEP meetings.

A Comparison Between Home and School

On the whole in 1997 those parents and educators who were in frequent personal contact, either by phone or in person, and who had no equipment problems seemed to be more content with the level and type of interaction between home and school.

Between 1997 and 1998 there was a drop in the amount of contact between home and school. This was not viewed as a positive change by educators who felt that they did not have an understanding of what was occurring at home. Parents, on the other hand, were satisfied with the level of home and school contact. One possible reason for this is that parents may have felt that more initial contact was necessary to assist them to use the new equipment; once they felt more confident with the equipment, less contact was necessary.

Children's Problems Using the Computer Equipment

Home

In both 1997 and 1998 only 3 parents noted that their child had no problems using the computer equipment. In 1997, of the other 8 parents, 3 stated that the software was not always suitable for their child to use, e.g.:

> MSWorks isn't appropriate, Office is more appropriate.

> The letters are too small—can't make them bigger.

Three noted that the nature of their child's disability affected some of the computer-based activities they undertook:

> His lack of concentration means shorter sessions. But I think this will improve.

Three parents commented that computer equipment was easy for their child to break:

> She's a bit naughty—she turns the computer off and puts things in the disk drive.
>
> He clicks the mouse too much—too soon or too many times—this cracks it.

In 1998 parents mentioned different concerns from those expressed in 1997. Only one parent still considered that the equipment allocated to her child did not meet her needs. For the other 2 children this issue had been resolved. Unlike 1997, in 1998 parents did not make any comments on equipment breakages but reported that most children had learnt how to look after their equipment. Four parents commented that the nature of their child's disability affected some activities, e.g.:

> He can get fixated on one program.
>
> It is only limited by his physical disability.

Two parents noted that the operation of programs was an issue for their child:

> He isn't able to get to all of the software. He is dependent on me for writing.
>
> The keyboard is still hard for him for spelling.

One parent commented that the lack of computer knowledge by their child's educators was an issue for them:

> The lack of computer knowledge applies to the people who support him [at school], he wants to use a disk to transfer work between home and school.

School and ECE Centres

Four educators in 1997, and 3 in 1998, thought that the child they worked with had no problems using the computer equipment. The others noted similar problems to parents, that is, in 1997, 4 commented that the software used was not always suitable for the child:

> The slow speed of Text Help. It seems to take a while.
>
> She is not enthusiastic. The screen size is too small, it is not colourful with no auditory feedback. This is not very motivating for her.

Three noted that the nature of the child's disability affected some activities:

> Keeping him using a program when he wants to do something else! We need to separate the work box and the fun time box and work on one first to earn the latter.

One teacher aide commented about broken equipment. Another issue mentioned by a teacher aide was:

> Other children muscling in.

In 1998, 2 teacher aides commented on accessing programs:

> We have trouble getting into programs if instructions are required—he won't listen.

Two other teacher aides were concerned about the arrangement of the equipment:

> I am concerned about seating—he slouches over it close to the screen.

One teacher aide commented on problems experienced with the printer.

Parents', Teacher Aides', and Psychologists' Level of Training

Home

The level of computer knowledge of the parents and siblings who worked with the children in this study varied considerably. In both 1997 and 1998 mothers were most inclined to rate their knowledge of computers as average or basic. Fathers were more inclined to rate their knowledge at a higher level—average to very good. The level of computer knowledge of the siblings who worked with the children was rated by their parents as varying from very basic to very good.

In 6 homes at least one family member had learnt to use computers at work (including one parent who learnt through personal study). In 1997 one parent had been shown how to use the equipment by their child's teacher aide. The others stated that they had no training on the present system. This situation had not changed by 1998. Approximately half the siblings had acquired most of their computer knowledge at home and the other half at school.

School and ECE Centres

The teacher aides, teachers, and psychologists who worked with children in this study all had little formal computer training.

In 1997 teacher aides tended to rate their knowledge of computers as basic. Only one had attended a formal training session, one had a computer at home, and the others had all learnt on the job. Two teacher aides were shown how to operate some aspects of the hardware and software by the students they were assisting.

In 1998 teacher aides were more confident computer users than in 1997, mostly rating themselves as good or average. This change in ratings seemed to be due to the increased length of time the teacher aides had spent using the equipment and changes in some of the people who worked with the children. Little formal training appeared to have occurred.

The psychologists who worked with students at ECE centres rated their computer knowledge as very good due to their extensive on-the-job training and experience.

Did Parents and Educators Have Any Problems with the Computer Equipment?

Home

Four parents in 1997, and 6 in 1998, had no problems using the computer equipment with their children. In 1997 the main problem was not having enough knowledge about how the hardware and software worked:

> I haven't mucked it up but I'm not confident of getting it to do what I want.

One parent thought that the equipment needed to be adapted to suit the needs of her child who could not read the small print on the screen, and another commented on the lack of knowledge at her child's school about how to operate the computer equipment:

> Getting the school computer to come home. He did a project [started at home on the home computer] and put it on a disk to complete it at school. Yet the teacher made him write it by hand as he didn't know how to use a disk.

Six parents in 1998 commented that they did not know enough about computer operation, or have enough time to find out more about what was available:

> I am not confident on it.

> There are some things I don't know how to do—I just leave it.

School and ECE Centres

Three educators in 1997, and 6 in 1998, had no problems using the computer equipment. In 1997, 5 considered that they did not have enough knowledge about how the hardware or software worked:

> I have very basic computer knowledge which needs building on.

> The concept keyboard program is not very user-friendly. I have to learn this.

> I had no training until yesterday. The trainer had to come from another school. I am unsure of what programs are available.

Three noted that they needed time to learn how to fit the software into the curriculum:

> Getting familiar with what it can do. Having time away from student to play around with programs and organise what to do next.

One had more basic concerns about the equipment not working:

> Actually having it functioning!

In 1998 educators appeared to be more confident in using the computer equipment, fitting its use to the curriculum, and using software to enhance the children's learning. Only 2 commented on their lack of knowledge about how computers operate:

> The only problems that we do have are my own lack of knowledge.

Availability of Technical and Learning Support

Home

In 1997 approximately half the parents interviewed stated that they would like more technical or learning support so that they could fully utilise their child's computer equipment. In 1998, 4 stated the same.

Technical Support

Six parents in 1997, and 9 in 1998, thought that they received enough technical support. These parents were usually those who had a good knowledge of computers based on their experiences and training at work:

> This is our own individual competencies rather than supplier support.

Three parents in 1997 would have liked more technical support, and 2 parents were unsure as to whether they had enough technical support:

> The computer can do more than we're aware of. But it costs for them to come and show you.
>
> We did have one training thing—but it was way above us. It might have been better if we had it now.

Three parents in 1998 still wanted more technical support:

> We still haven't had any training yet.

Learning Support

Three parents in 1997 thought they had enough support to help their child's learning through the use of computers:

> I am quite capable of sourcing the information and support I need.

Two parents thought that they did get enough support to help their child's learning but that they would still like more, and 6 thought that they did not get enough support:

> Not many people are sure about exactly how to use it. It is new of course, but I would like to know more—I feel a bit on my own.
>
> There is very little discussion between school and home. Those at school seem reluctant.

In contrast to 1997, by 1998 there were 8 parents who felt that they had been given enough support to help assist their child's learning.

Further Training

In both 1997 and 1998 most of the parents (8) stated that they would like more training and support on either the technical side of computer use or to assist their child's learning. The training most often mentioned by parents was on the hardware and software they were using, e.g.:

> There is training needed for Alphasmart. [1997]
>
> I would like to do a course on loading programs. [1998]

A couple of parents in both 1997 and 1998 stated that they would like more information about how to assist their child's learning:

> We would like information or updates on programs for Down's syndrome kids, etc. [1997]
>
> I would like more training on how to help her. [1998]

Two parents in 1997 thought that the software and equipment their child had been given needed to be reassessed:

> I think the biggest problems are not being answered. We're told she's got something so she's no longer a priority.
>
> I would like to have someone who can assess him and give guidance re what he should be doing and appropriate software.

This was still the case in 1998:

> As he gets older and wants to do more—he'll get bored just turning the pages.

One parent thought that their child's teachers needed to be given more training to support their child:

> Communication with school and training for the teachers at school. To show him how to use the computer to its full potential.

School and ECE Centres

Technical Support

In 1997 around half (5) of the educators thought that their school had enough technical support for the use of computers. By 1998 nearly all the educators (10) thought that the school had enough technical support. Those who were satisfied with the level of support were either confident about their personal level of computer skill or had someone on hand whom they could call on for support:

> I have lots of backup; his father, the class teacher, and the resource teacher. [1997]
>
> The supplier has been very helpful—they set up everything, gave me training, then came back the next week when I had a problem. [1997]
>
> Yes we do [have enough support] but it was not good last year. [1998]
>
> It hasn't been a problem—we have our own technical person. [1998]

Five educators in 1997 thought that their school did not have enough technical support. These people tended to rate their computer skills as basic to average. They commented that:

> None really available apart from an ex-parent who comes in voluntarily.
>
> I haven't had much training at all yet. It's still coming.

In 1998 only one person thought that the school did not have enough technical support—this was due to budgetary constraints.

Learning Support

The educators were asked if they thought that everyone who worked with the children in this study had been given enough training to assist the students' learning. In both 1997 and 1998 over half thought that this was not the case, e.g.:

> Probably only resource teachers [have enough training]. The school staff have been shown how to work it but mum and dad haven't had any training. [1997]
>
> There has been no training which focuses on his needs. [1998]

Two teacher aides in 1997 indicated that they would be receiving training soon or that they needed some time to adjust to the new equipment.

Further Training

Eight of the educators in 1997 and 10 in 1998 indicated that they would like more training and support. As with parents, the educators wanted more assistance with the software (6 in 1997 and 4 in 1998) and the hardware they were using (4 in 1997; 2 in 1998).

> The disk side of things—loading work on to a floppy to use between home and school. How to access information. [1997]

It seems that once educators had mastered the basics of using the equipment, they focused on developing further ways of assisting students' learning through the use of computers. In 1997, 3 educators wanted more support on how to assist learning, and by 1998 there were 8 who felt the same, e.g.:

> Ideas to extend the use of the program once it was initially mastered and adapt his progress with learning, e.g., when and how to move to a more advanced level. [1997]
>
> Just more training—objectives for using the equipment to access the curriculum. [1997]
>
> Help in matching the programs with his needs. [1998]
>
> I would benefit from more help about learning. Observing others would be good. [1998]

Summary of the Interviews

Home

All but one of the parents interviewed thought that the use of computers was a positive experience for their child which enhanced their learning. The major benefits parents reported their children acquiring were increased:

- written, oral, or visual language skills,
- motor skills,

- computer operation skills,
- concentration skills,
- communication skills, and
- self-management and independence skills.

Parents commented that the use of computer equipment had helped raise their child's self-esteem by providing them with something to share with their peers, giving some children "successes" that they did not always have in the classroom. As one parent noted, the provision of computer equipment had helped her child's inclusion at school as he taught other children how to use the software:

> Having the computer has greatly empowered our child not only to access the curriculum, but become a special member of the class. As it is the most sophisticated machine in the school all the kids like to work with him on it.

Others were looking forward to the time when computer equipment would become more portable:

> I am fully supportive of it. I can see the benefits of the use of technology for people with disabilities. I can see the benefit of technology more and more in the future. I can't wait for them to be more portable.

The parent who did not think that her child had benefited from using the computer commented that the choice of hardware and software was unsuitable for the child's needs:

> Her physical disability inhibits its use and she can't see what she is writing . . . The letters are too small and you can't make them bigger . . . I think it has set her back. We have been going for 3 years and there have been changes in the system and staff. She is a year behind now. She won't catch up now.

School and ECE Centres

The majority of the teacher aides, teachers, and psychologists also viewed the use of computers as extremely beneficial for the children. As one educator commented:

> He is a completely different child [when he uses the computer]. It is difficult to get work done otherwise.

A number of personal milestones for the children, which were due to the use of computers, were reported by educators, e.g.:

> We told his parents when he used his first 2-word utterance "bye boat" which came directly from a computer program.

The major benefits educators identified were the same as those reported by parents, except that educators reported more enhancement of skill in completing work. For some children the computer was the main communication channel available to them as they were unable to access other modes of communication (that is, they could neither speak nor write). As one educator put it:

> It's a tool for him to communicate with others so the stress is off him . . . It's his main hotline!

The use of computer equipment by children who were computer literate seemed to provide them with more opportunities to participate in the classroom programme and to interact with their peers. These children were able to communicate more effectively through their use of computers, were teaching their peers how to use software, and were able to complete their class work and homework in the same way as their peers, e.g.:

> It makes his life easier, especially for writing. He loves to have things printed. It gives him kudos in class. His work is the same as his classmates'.

> It is one of the most enjoyable times he has at school—especially with his peers.

When benefits were not observed by educators, this was for a number of reasons (also noted by parents) usually associated with the type of equipment selected for the child, e.g.:

- The computer equipment was broken and needed to be fixed.
- There were other types of software or hardware that appeared to be more suited to the child's disabilities.
- The speed of the software was too slow and therefore did not increase the pace of the child's work.
- The child processed information very slowly and therefore typing on the keyboard took time.
- The child was already computer literate and therefore it was not so possible to observe benefits related to ability to manipulate the software and hardware.

It is possible to remedy some of these issues. For all but one of the children, the first 3 problems were remedied by the time of the second interview.

Aside from the issues mentioned above, a major concern for teacher aides in 1997 was their own lack of knowledge about software and hardware.

Knowledge Transfer

Children in this study were in the middle of an interconnected and complicated web of knowledge transfer which occurred within and between home and school. This was especially so for those students whose parents were highly computer literate. All students worked with at least 2 or 3 different people on their computers at the 2 main locations in the study. The main direction of knowledge transfer occurred from teacher aides, psychologists, and parents to the children. Siblings and classmates also had some part in this. Some of the children in this study returned this assistance by showing their teacher aides, parents, and classmates how to use their computers. An interchange of knowledge also occurred between parents and educators. Sometimes this knowledge was transported by the child, and on other occasions it was transferred directly between the educators and parents as they trained each other.

Changes Over Time

By 1998 both at home and at school some changes were evident in the children's level of independence when using computers. In 1998 the pattern of home use for most children stayed relatively constant, although the time taken for each session on the computer was slightly longer over all. Only 2 children worked with others nearly all the time. Most were using their computers more independently.

At school in 1998 most children were working with others for less time than they were in 1997, although nearly all spent some proportion of their time working with their educators or peers. In 1998 the activities the children completed at school with teacher aides were similar to those in 1997. One new use was reported in 1998—information gathering—using CD ROMs at school and computers at a public library. As in 1997, in 1998 the younger children in the study worked on activities to develop their cognitive skills.

Similar benefits and positive changes in the children's behaviour, stemming from the use of computers, were reported by parents and educators in both 1997 and 1998. In 1998 parents were more likely to report that the use of computers had increased their child's self-esteem, ability to work independently, and self-management skills, e.g.:

> He is able to look after his computer.

Educators were more likely to report increases in skill in completing work, e.g.:

> She enjoys it when things are completed and printed.

In 1998 the frequency of contact between home and school had lessened. Most parents felt that they understood how the computer equipment was being used at school, and all parents were satisfied with the level of contact between home and school. It seems that when the new equipment was provided, parents required more contact with educators. Once they had been using the equipment for a while, less contact was needed.

In both 1997 and 1998, half of the parents thought that they did not have sufficient knowledge of computers to utilise the computer equipment fully, although over time more parents considered that they had enough technical support.

In contrast to the parents, the majority of educators did not know how the equipment was being used at home. The 5 who saw parents only at IEP meetings were not satisfied with the level of contact between home and school.

From 1997 to 1998 educators had increased their confidence in using computers; by 1998 only 2 felt that they still did not have enough knowledge about how to use the equipment. Comments about learning support gave a different picture. In 1998 the majority of educators still felt that not enough training on learning support had been provided, and 8 would like more help in this area.

When the equipment was first provided educators focused on learning how to use the software and hardware. Once the basics of computer operation had been mastered, educators' attentions shifted to focusing on how they could further enhance the children's learning through the use of computers. This shift has implications for the future planning of training programmes.

HOME AND SCHOOL VIDEO OBSERVATION AND SKILLS PROFILES

Introduction to the Profile Section

In this chapter the content of the profiles is outlined, and the main conclusions drawn from them are summarised. Full profiles for each child[3] are contained in appendix A. The profile of each child is presented in 4 sections, starting with a description of the child's situation, then a summary of the child's Individual Education Plan (IEP). Following this is a description of the video observations of the child at home and at school and a summary of the information collected from the video observation schedule and the child's skills profile. A summary of changes over time for each child is included at the end of each profile.

The Profiles

Situation of the Children

At the start of each profile is a description of the child's situation provided by the child's SES field worker. This description includes the child's age recorded at the end of November 1997 (the time of the first data-gathering round) and information on the child's:

- communication and social interaction,
- learning,
- mobility, and
- level of independence in daily living activities.

At the end of the description a summary statement is provided which outlines the child's Ongoing Resourcing Scheme verification (if available) or the child's classification as having high or very high needs using the criteria provided earlier in this report.

IEP Summaries

One IEP was collected from each child. The IEP summaries are divided into a number of categories, most of which existed in some form in the original IEPs. If a category did not exist in the original, this is noted in the summary as "not listed". For the younger children in the study, cognitive skills were listed as a precursor to their development of oral language, reading, writing, and mathematics skills. The categories included in the IEP summaries are:

- oral language,
- reading,
- written language,
- mathematics,
- social development,
- cognitive skills (for younger children), and
- computer.

---

[3] Names have been changed to protect confidentiality.

Some IEPs contained sections on physical and motor skills, and self-care. These skills were not included in our summary unless they were specifically related to the child's computer use.

In some of the IEPs the use of computers was integrated into each category, in others it was specified in a separate section, and in some it was barely mentioned, or was not included at all. If computer use was not specifically mentioned for a category, this has been indicated as "no specified computer goals".

The construction of the IEPs varied widely. The more comprehensive IEPs listed:

- the child's current attainments or level of functioning,
- long-term goals for the child,
- short-term goals for the child,
- the resources and strategies used to achieve these goals,
- the people responsible, and
- how attainment of the goals would be evaluated.

Most of the IEPs had some but not all of these categories. In order to present the IEPs in a comparable format, we have collapsed some of the categories. In the summaries "current" refers to the child's current level of functioning. "Goals" refers to both long- and short-term goals and, in the cases where it was available, the computer resources and strategies used to achieve these goals. The person responsible for actioning aspects of the IEP (usually the teacher aide, the psychologist, or the family members who worked with the child), and evaluation methods used were not included in our IEP summary.

The date of the IEPs varies from March 1997 to March 1998. One IEP was not dated.

Video Observations

Following on from the IEP summary in each profile is a description of the home and school video recordings from rounds 1 and 2. The video observations were used in 2 main ways. First, they provided a picture for both rounds of the research of each child's ability, situation, activity, and interaction at home and school. Second, the video recordings were matched against the video observation schedule completed at the time of recording and the skills profile to provide data triangulation.

The video descriptions that precede the results from the observation schedules and skills profiles provide information on the activity that the child was doing at the time the recording and observation schedule were completed, and illustrate the interaction between the child and others around him or her.

The limits of the video observation are that not all the activities covered in the CVs and discussed in the interviews were covered by a video recording—for instance a child may not have been using the computer to work on a mathematics topic during recording. However, the video was an extremely useful addition to the written information gained for each child, as it provided the context of the child's work on the computer and interaction with others.

Observation and Profile Data

For most of the children in the study, we obtained in both round 1 and round 2:

- an observation schedule completed during the home video recording,
- a home skills profile,
- an observation schedule completed during the school video recording, and
- a school skills profile.

The questions were similar in the observation schedules and skills profiles to enable cross referencing of information. Each profile contains a presentation of each child's level and ability, as indicated from the observations and skills profiles, in relation to:

- language,
- mathematics,
- social development,
- cognitive development, and
- computer skills.

These areas of learning are relevant to all of the students' learning goals, and were evident in many of the IEPs.

Each child's profile includes a listing of specific tasks that the child could achieve either with or without help from a parent, teacher, or other person. A 4-point scale (never, sometimes, often, or always) was used to indicate if a child was able to do a task without the assistance of another person. The profiles therefore indicate, in detail, a student's capability and level of independence. The reporting is divided into 4 columns, 2 listing information from home and 2 from school. The first is the video observation ("Ob" column) and the second is the skills profile ("Rpt" column). The skills profile has the title CV. To show the source of information, a distinction is made between the home and school CVs by using the letters "HCV" and "SCV". Most of the CVs were completed by parents or teacher aides.

The summary of each profile introduces the information gained in round 2, to examine the changes from the first round. New developments are put into 2 categories. The first was of behaviour reported in round 1 but not observed then, and the second describes changes in behaviour and actions observed in round 1. The final section of the profile summarises the changes and developments made by each child in relation to their IEP goals, and describes improvements that were not specified in the IEP but were observed during the research.

The study instruments are given in appendices B to E.

Over the period of this study all students demonstrated improvements from their round 1 observation to their round 2 observation. Most of these improvements were in the areas of language, cognition, self-management, social and communication skills, and in how to operate the computer. To a lesser extent, advances were noted in mathematics.

Summary of Profile Data

Individual Education Plan (IEP) Goals and Achievements

All students made progress toward their IEP goals to varying extents. This ranged from some children who made only a few advances related to their goals—for example one student:

- had some increase with his independence of computer use, and
- an increase in his oral language skills, with him answering more questions put to him—

to students at the other end of the range who made many improvements relevant to their IEP goals. For example one student experienced:

- an increase in the ability to recognise objects and sounds which furthered cognitive development, and
- improvements in communicating with his peers, which was a major social development goal listed in his IEP.

Another student had met most IEP goals. The improvements were:

- greater letter and word recognition,
- increased recognition and understanding of mathematics symbols, and
- increased social interactions, such as answering questions, following directions, and asking for help when needed.

Only one student's observed improvements all matched his IEP goals. The child whose improvements were all covered by his IEP had the most comprehensive IEP in the survey. All the other students 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.

Most children were seen as making improvements in the IEP objectives that were the reason for using a computer, and in the operation of the computer itself. Advances in skills in using a computer took such form as:

- being more able and confident to use the mouse to operate a software program,
- making a selection from among program choices,
- choosing an object or item on the screen, and
- moving on to the next exercise.

For example, one student who was using a single switch as his form of interface with the computer had gained a greater realisation of cause and effect by the second round. He only clicked on the switch when necessary to operate the program rather than continual and random clicking observed during round 1.

Home and School

There was much commonality regarding the activities the children worked on at home and school. This extended to the same software being used such as Story Book Weaver for writing, reading, and spoken language work, and James Discovers Math, which provided activities relating to shapes, numbers, and other aspects of mathematics.

The younger children used computer programs that provided exercises on:

- cause and effect,
- shape recognition,
- number recognition,
- alphabet comprehension,
- drawing pictures, or assembling them from images stored in the software, and
- recognition of objects and animals in the real world around them.

The older students were mostly working with word-processing software and concentrating on spelling, punctuation, and managing their story on the computer by operating such functions as saving and printing.

There was a roughly equal division between the home and school in terms of where the observed improvements in the child's skills and ability occurred. Five children were reported as enhancing more skills from round 1 to round 2 at home rather than school. Four children were observed and reported as achieving more of their IEP goals and attaining other improvements at school. Two children were noted as having about the same rate of improvement at home and school, while one child who was attending an ECE centre did not use a computer there, so no comparison was possible.

Nearly all the computers were taken home during school holidays, and many students had computers at home as well as at school. The opportunity for learning existed and was taken up at both sites. The role of parents and family members needs to be highlighted here to show that the school environment was most certainly not the only place the child could learn.

Motivation and Independence

An important area of improvement for many of the children was in their motivation to work on the computer and their independence in being able to do many tasks on their own. Specific improvements in this area included:

- being able to start the computer, load software, and operate the machine;
- showing more pride in their work and being more willing to call attention to their work, which demonstrates a greater confidence in what they can do on the computer; and
- paying more attention to the work on the computer and being more willing to complete tasks without encouragement.

From the video observations it was apparent that, for some children, typing on a standard keyboard was a difficult procedure. For these children a specially designed keyboard could have been beneficial. Once this keyboard had been mastered, children could move to a standard keyboard at a later stage, should there be no physical impairment.

Supportive interaction between the children, their family, and teachers provided a means of guiding the children to solve more problems on a computer by themselves and so encouraged them to attempt more work. Achieving an increased level of independence was often a goal of the IEP, as gaining independence to continue learning is integral with overcoming a child's disability and the difficulties it presents for the child.

Most interaction was of a supportive nature, which sought to reinforce good effect by the children, motivate them to continue, and help them overcome problems. Examples of such interaction include:

"What's the computer doing now?"	to encourage a child's realisation and ability to explain current activities,
"What are you going to draw?"	to encourage the child to begin, and
"What colour are your eyes?"	as a prompt to move to the next element of the picture-drawing process.

When a child was working on a language exercise on the computer, the exercise often included reading, oral, and written language. The videos showed a complex interactive environment with a parent, sibling, teacher, or teacher aide working alongside the child, both concentrating on the computer screen. Discussion of what would be the next word or sentence written, or how a word on the screen should be spelt or a punctuation mark added was thus easily facilitated, and common to nearly all the observations of the children.

Coaching Strategies

The coaching strategies used by the people who worked with the child varied. Differences were observed in educators' and parents' knowledge of:

- how to operate the computer hardware,
- the options and exercises in a piece of software, and
- how best these options and exercises might help the child's learning.

During the video observations it was apparent that some of the adults, parents in particular, had only partial knowledge of the capability of the software program they were working with. One parent, for example, was uncertain how to operate the computer in terms of opening and closing programs. Such unfamiliarity with computer operation was unusual however; most parents, all teacher aides, and all teachers observed could start the machine, open the software, and guide the child through the exercises. On several occasions it was the child who took the parent to an unfamiliar piece of the software. This would be indicated by a comment from the parent such as:

> I haven't seen this part of the program before.
>
> I have not seen this part of the program before—you will have to show me how it works.

The second statement above includes a request for the student to lead and enables the child, if he or she can, to demonstrate to another person how to operate a part of the program. This is an empowering action for the child and illustrates another coaching strategy that may be used.

Those who were trained educational professionals, and who rated themselves as confident computer users (*see* Interview section), tended to use more positive strategies such as modelling and frequent praise. Some strategies which appeared to assist the children were:

- Using modelling to teach the child new tasks with the software and hardware.
- Repeating tasks with the child until they were mastered, using hand-to-hand facilitation if necessary.
- Using frequent praise and positive encouragement and reinforcement; focusing on what the child was achieving rather than what they were not.
- Actively, rather than passively, engaging with the child to encourage mastery of existing skills and development of new skills, e.g., by demonstrating, prompting, and questioning.
- Dividing tasks into manageable chunks relative to the child's skill level (e.g., encouraging the child to type a word at a time rather than a sentence).
- Selecting tasks which encouraged the children's creativity (e.g., typing stories created from the child's ideas).
- Encouraging independence and self-empowerment by ensuring that the child was not prompted or assisted unnecessarily (e.g., checking with the child if they could spell a word before assisting them).

Educators tended to use more of the strategies listed above than did parents. Parents were less likely to actively engage with children to encourage their learning, e.g., using questioning as a means to enhance the child's learning whilst using the computer. A few people who worked with the children used phrases such as "no", and "don't do that", rather than positively encouraging and modelling the behaviour they wanted by phrases such as "good waiting", "good checking", "well done, you did it" upon completion of a story and picture to illustrate it, and "what goes at the end of a sentence?" to prompt the child to place a full stop at the end of a sentence.

Both parents and educators sometimes over-prompted the children, or typed or read for them in order to get a task done in a shorter time. This could be disempowering for some children who were prompted for activities they had already mastered.

In the publication *Managing the Special Education Grant: A Handbook for Schools* (Ministry of Education, 1998a), it is suggested that, if properly trained, family members can be partners in the teaching process for students. This publication also comments on the need to provide educators with individual teaching techniques and behaviour management skills applicable to the needs of the children they are working with. The research discussed here supports these statements and highlights the necessity for ongoing needs-focused training for **all** the people who work with children either at home, in an ECE centre, or at school.

Language Learning

As all the older students during observations were engaged in word-processing activities, and many of the younger students participated in letter-recognition exercises, it is clear that as the children get older their increasing need for language skills is at least partially met with the capability a computer offers. The capacity of the computer to handle stored word presentation, word creation by writing and corrective assistance, word identification through audio output of the computer, and the printed words as a source for further use are of great value to language learning.

The language work that children were observed doing included:

- word recognition and reading from the computer screen,
- fitting missing words into a sentence from a given selection,

- matching naming words to objects,
- and writing words and sentences.

One example of writing—

> On Saturday I went to a cub camp. That night there was a hail storm. In the morning there was a pile of hail still there. Then we had breakfast then we went back to the camp site then a couple of minutes later we went home.

As language formed a major part of the IEPs, the significant use of computers to facilitate language programmes indicates the value of the computer as a tool to assist children with disabilities to learn language.

The Benefits of Enjoyment

One further benefit of using computers that greatly contributed to the children's learning was that most of the students enjoyed using computers. This enjoyment should benefit their overall learning activities. As an example, it was noted about one student that:

- during round 1 he was not considered to have pride in the work he completed on the computer, but when observed in round 2 he often displayed pride in achievements,
- he was "often" confident when using the computer instead of only "sometimes" confident,
- he was more willing to call attention to his work,
- he was more willing to try out new programs, and
- he moved from "often" showing enjoyment in his computer work to "always" enjoying it.

This represents an increase in the overall confidence of the student who is now more willing to try out new activities and expand the number of people included in his learning.

CONCLUSIONS

Educational Goals and Benefits

All the children in this study were observed or reported to be either meeting, or making progress towards meeting, their educational goals as defined in their IEPs via the use of computers. All children (apart from the child with the most comprehensive IEP) were also making educational improvements, facilitated by their use of computers, outside the areas stated in their IEP.

Nearly all the parents and educators interviewed for this study considered that the use of computers was a beneficial and positive experience which enhanced the children's learning. The benefits most often reported and observed for the children were increased:

- written, oral, or visual language skills,
- motor skills,
- computer operation skills,
- concentration skills,
- communication skills,
- self-management and independence skills,
- motivation and self-esteem, and
- work completion skills.

The use of computer equipment provided most of the children in this study with more opportunity to function in the mainstream as, through the use of computers, they participated more in classroom programmes, interacted with their peers, operated independently, and had more control over their environment. An increased ability to communicate was the major factor which encouraged this participation. Similar enhancements in communication and participation for children with special needs, via the use of technology, are reported elsewhere (Viadero, 1997; Semmel & Lieber, 1990). Important improvements in children's overall learning also occurred with a rise in the motivation to learn and the enjoyment from doing so via a computer. Language development in particular is assisted through using a computer. The combination of both visual and audio presentation of text enhances children's ability to recognise, read, and use language and to share their communications with those around them. Word-predictive software and audio-output hardware are examples of technology that greatly enhances this language learning.

For the children for whom fewer enhancements in their functioning was observed over the course of this study, there were a number of reasons, e.g.:

- there were other types of software or hardware that appeared to be more suitable for the child,
- the speed of the software was too slow,
- the child processed information very slowly, or
- the child was already computer literate.

Knowledge Transfer

The children in this study were in the middle of an interconnected and complex web of knowledge transfer which occurred within and between home and school. All children worked with at least 2 or 3 people either at an ECE centre, at school, or at home. By 1998 the range of

locations in which the children were using computers was increasing. Knowledge about how to use the software and hardware was transferred in all possible directions between educators, parents, children, siblings, peers, the children's friends, extended family members, and caregivers.

The main direction of this transfer of knowledge was from educators and parents to the child, although some children also showed their teacher aides, peers, and parents how to operate aspects of the software and hardware they were using. In this study, transfer from other locations such as community services was not observed to occur.

A theme which emerged in this study was the vital role that parents and the home environment had to play in encouraging and supporting the children's learning. Both sites proved to be influential for the child, that is, the teaching experience from school and the knowledge gained in the home. For many children the same activity, using the same software, was carried out at both sites. Therefore it seems that more consideration needs to given to providing parents with adequate training, and to developing communication links between home and school to ensure that both parties are aware of the child's educational goals, and are working together to achieve these goals.

Support and Training

One recurring theme which surfaced throughout the interviews in both 1997 and 1998 was a lack of confidence by some parents and educators in using the equipment provided. Some educators were concerned about their technical skills, and the majority of teacher aides thought that more training on how to support the children's learning was required. A lack of training and computer confidence were 2 factors which influenced educators' ability to support the children they were working with.

In this study, in the school environment, teacher aides had the main responsibility for using computer technology with the children. This situation was also reported by McCarthy (1995) in her study of teachers of students with special needs. In addition she commented on the dearth of individualised training provided for educators in this area.

Conditions for Maximum Utilisation

Some themes emerged for the 12 children in this study in relation to the conditions that assisted them to utilise their computer technology fully. These were that:

- The child had daily access to functioning computer equipment.
- The people who worked with the child saw themselves as knowledgeable and confident computer users.
- The people who worked with the child used positive teaching strategies.
- The people who worked with the child were trained in the use of teaching strategies to encourage independence and enhance the communication ability of the child.
- The software and hardware used by the child were seen as appropriate by both educators and parents.
- Computer use was integrated into the IEP strategies for oral language, reading, writing, mathematics, and cognitive and social development rather than focused on as a separate section or not included.

- There was an awareness between home and school of the programme of computer use occurring in the other setting.
- Both parties were satisfied with the level of contact between home and school (that is, there was more contact than solely at IEP meetings).

Most of these themes are supported by other research on the conditions necessary for the effective use of technology with children with special needs (Hutinger et al., 1996).

Recommendations

- Both the families, and the people who are supporting students at school or at an ECE centre, appeared to need more advice and information on software and hardware which is useful for students with special needs. The students in this study used a wide range of different software and therefore it was difficult for parents and educators to keep abreast of all the developments in this area. It seems that the people in this study would benefit from a newsletter, or some form of regular information dissemination, which periodically listed:
  - available software and hardware for students with special needs,
  - software upgrades,
  - the age groups and/or level of need the software is useful for,
  - the level of functioning required to use the software,
  - how this software fits into the curriculum or can be used to enhance students' learning, and
  - information on teaching strategies.

- A lack of training and computer support was an issue for both parents and teachers. Indeed, the major source of formal training appeared to be parents' workplaces! Informal training occurs in the school environment, but many educators perceived this as inadequate to fully meet students' needs. To maximise the benefit of using computers, more training for both parents and educators would be beneficial, especially when the equipment is first provided. Further training on how to enhance children's learning would benefit both educators and parents once they had mastered the use of the equipment.

- The parents and educators in this study identified a couple of issues concerning the unsuitability of some of the equipment and software allocated. The people in this situation would like to see a mechanism by which the computer equipment allocated to the child could be rapidly and/or periodically reassessed to see if it was functioning as intended.

- In this study the amount of time students worked on their computer per week varied widely. Older students who used their equipment daily seemed to benefit more from this use. There appears to be a minimum threshold under which computer use is seen as less beneficial. Users could be provided with general guidelines concerning frequency of use for the equipment. Most of the children in this study used their computer daily both at home or at school, and worked with others (either at home or at school) for an average of 8 or 9 hours a week when they were learning to use the equipment and 5 or 6 hours a week once they had mastered the basics.

- Children for whom computer use was an integrated part of their IEP goals and strategies for language, mathematics, and social and cognitive development appeared to have more focused use of their computers at school and at home. Therefore it seems that guidelines for integrating the use of computers into IEP strategies, which included the depth of coverage expected, would be useful for those engaged in IEP development and review. The clearest IEPs contained broad goals split into achievable subgoals. Each of these subgoals had a strategy for implementation, a list of the resources to be used, and a person who would be responsible for this, for example, to achieve the goals listed below both children worked with their teacher aides:

  - To use Maths Blaster and computer games to develop basic numeracy, for example, understanding of basic facts for numbers 0 to 10, simple addition and subtraction, and counting in 1s and 10s.

  - To find letters on the keyboard independently. He will choose letters to write his name. He will initiate the ideas and illustrations for stories using the computer or by hand. To be achieved through daily use, practice, and reinforcement of his name, alphabet cards, printing, and computer stories.

  IEPs which were less focused than the above contained broad goals but no subgoals, and did not include reference to how the computer software was to be used. For example one IEP simply stated that the child would work with support people, within the class programme, to gain reading fluency.

- For most children, educators and parents were working together on jointly established educational goals. For some children, either the parents or the educators were not aware of the activities occurring in the other setting. These educators and parents would like more personal contact and communication about the children's learning. Those who kept in constant contact with each other, and who were aware of the activities occurring in the other setting, seemed to report more benefits from the use of computers. One way to establish joint goals and regular communication would be to get the family members, the educators, and the children together for training sessions. This would enable exchanges to occur, and relationships to be developed. These training sessions need to focus initially on the technical details of how to use the software and hardware and then proceed to teaching strategies.

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APPENDIX A—Profiles

Note: Names have been changed to protect confidentiality.

(Ned—5 years 7 months)

Communication and social interaction: Ned uses both signing and verbal means to communicate. His verbalisations are mostly at the single-word level but he sometimes uses 3- and 4-word phrases. Ned enjoys being part of the class, e.g., showing his work, etc. He is beginning to listen and follow teacher instructions. He often requires assistance when instructions are not familiar and are not part of a learned routine.
Learning: Ned is becoming increasingly familiar with school routines. He uses pictures and objects as a basis for story writing. He requires hand-to-hand assistance for printing. Ned is familiar with a small number of basic sight words and he recognises some upper and lower case letters of the alphabet. Ned responds well to home-made books which use repetition of familiar basic sight words and sentence structures. He participates in the maths class programme as appropriate, and adapted or alternative activities are provided as needed.
Mobility: Ned is independently mobile.
Daily living activities: Ned requires assistance for some living activities such as toileting.

Under the Ongoing Resourcing Scheme Ned has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: Ned can put 2 words together.
Goals: To increase Ned's word verbalisation.

READING (without specified computer goals)
Current: One-to-one word correspondence has been established for Ned.
Goals: Ned will attend to texts and verbalise words. He will increase his basic vocabulary.

WRITTEN LANGUAGE
Current: Ned shows some reluctance towards story writing. He will not hold a pencil but he will use a Concept Keyboard.
Goals: To find alternatives to current resources. To use music and interactive software for positive reinforcement.

MATHEMATICS (without specified computer goals)
Current: Ned is developing number and colour recognition. He can rote count to 10 and recognise number values.
Goals: To provide successful experiences for Ned. To continue with number recognition and matching, rote counting up to 10, and forming sets of up to 10 objects. To recognise and copy the primary colours. To identify and classify 2-dimensional shapes. To copy and create repeating patterns.

SOCIAL DEVELOPMENT (without specified computer goals)
Current: Ned responds to directives but does not continue interactions. He will interact with the computer. He does not develop friendships.
Goals: Ned will be encouraged to continue interactions with people and to develop more independence.

Home Video Round 1

Length of computer use at home: 30 months.
Home site: In the dining room.
People with Ned: Mother.
Activity: Selecting letters, and looking at words which start with that letter.
Sunshine CD ROM collection—ABC.
Matching shapes exercise in the software James Discovers Math.
Ned got them all correct.
Interaction: Mum "Can you find the W?"
Ned finds it.
Mum says "Clever boy".
Ned is very keen to display what he has achieved on the computer and displays pleasure verbally and physically. He interacts enthusiastically with his mother and the computer (e.g., waving at a departing boat on the James Discovers Math software).

Home Video Round 2

Length of computer use at home: 36 months.
Home site: In the landing.
People with Ned: Mother and brother.
Activity: Ned is using the interactive game The Lion King which also includes reading activities; Ned is clearly paying attention, concentrating, showing signs of enjoyment, and operating the game via the mouse.
Interaction: Ned's Mother sets up the software, Disney's The Lion King, saying "Do you like it? It's your favourite at the moment".
Ned pays attention constantly to the program, vocalising his enthusiastic response to the story of the Lion King that is being played back with sound and vision.
The second program he uses is the Living Books—Little Monster at School—which has shape-recognition exercises.

School Video Round 1

School site: At the back of the classroom.
People with Ned: Teacher aide (TA) and one other student.
Activity: Matching maths shapes using the James Discovers Math software; TA guides Ned through the program, naming the shapes.
Interaction: A student came and worked with Ned, greeting him and then pointing out information on the screen such as the shape needed for the current exercise. She touches Ned by way of greeting and offering encouragement.
TA types in Ned's name, and operates program, i.e., opens and closes it, and changes disks.
Ned's interaction with the computer is verbal with simple words, e.g., "egg" when one appears on the screen, and after prompting by the TA "It's an egg isn't it?"
Frequent "good boy" from the TA, and instructions, e.g., "Can you find the square that will fit the shape?"

School Video Round 2

Length of computer use at school: 12 months.
School site: At the back of the classroom.
People with Ned: The study observer only.
Activity: Reading and word recognition with the software Reader Rabbit.
Interaction: Ned is concentrating on the activity and is vocalising his enjoyment of the program.

Computer Use

- Ownership/source of computer:
  School—Ministry of Education funded via Specialist Education Services.
  Home—private family ownership.

- When computer is used:
  Ministry of Education computer at school except for Christmas holidays when at home.
  Private family computer during school year.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt[4]
Oral	Always reads/uses in speech some letters	✔			
	Often reads/uses in speech all letters	✔			
	Often (H) Sometimes (S) reads/uses simple words, with help (HCV)	✔	✔	✔	
	Sometimes reads/uses simple sentences without help		✔	✔	
Visual (reading)	Always understands the concept of letters	✔	✔		
	Recognises some letters	✔	✔		
	Sometimes recognises all letters without help	✔			
	I can read my name with help		✔		
	I can read use simple sentences using the Concept keyboard with help		✔		
	Often recognises simple words			✔	
Written	I can use some keys with help		✔		

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Understands shapes	✔			
	Understands number symbols with help		✔		
	Can recognise the numbers 1–20 with help		✔		
Oral	Sometimes reads/speaks simple numbers 1–5			✔	
	Computer use prompting oral language via matching and counting activities			✔	
Written	NA				

Key: (H) = Home
(S) = School
(CV) = Skills Profile
Never, sometimes, often, always, NA are from the Video Observation
With and without help are taken from the children's CVs

[4] No Skills Profile was reported for Ned for Round 1.

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Always confident when using computer	✔	✔	✔	
	Always (H) often (S) calls attention to his performance	✔	✔	✔	
	Always shows pride in actions and achievements	✔	✔	✔	
Self-management	Always (H) often (S) pays attention when working on the computer	✔	✔	✔	
	Always completes tasks without encouragement	✔	✔	✔	
	I can show I am annoyed when using the computer both physically and verbally		✔		
Motivation	Always enjoys using the computer	✔	✔	✔	
	Always (H) often (S) expresses pleasure when task is completed	✔	✔	✔	
	I like to try out new computer programs, games, ideas		✔		
Social and communication	Always (H) sometimes (S) recognises familiar people	✔	✔	✔	
	Greets people while using computer (CV); never at (S)		✔	✔	
	Always indicates which program/game wanted by body language	✔	✔	✔	
	Often (H) always (S) listens to skill-appropriate directions/ questions	✔	✔	✔	
	Always (S) follows skill-appropriate directions, and imitates actions but (H) sometimes follows and does not imitate	✔	✔	✔	
	Often responds to "yes", "no" questions using the computer	✔	✔	✔	
	Always (S) often (H) uses vocalisation to respond to skill-appropriate directions and questions	✔	✔	✔	
	Often (H) always (S) indicates program/game options wanted by vocalisation	✔	✔	✔	
	Can in HCV; never (S) uses body language to indicate an answer to skill-appropriate questions		✔	✔	
	Can in HCV; never (S) asks for help while using the computer or takes turns using the computer		✔	✔	
	I can show my classmates, family, and teacher how to do things on the computer		✔		
	I can play co-operatively with my brother and sister		✔		
	Always responds to look at the statements		✔	✔	
	Can in HCV; never (S) responds to "what", "why", "how many" questions		✔	✔	

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always fixates on stationary and moving objects, responds to sound and recognise shapes without help	✔	✔	✔	
	Can recognise common size without help		✔		
	Can recognise common colours on screen with help		✔		
	Always recognises, matches, and groups objects on screen		✔	✔	
	Recognises images on screen represent ideas			✔	
	I can remember songs in programs		✔		
	Never recognises common colour without help		✔	✔	
Matching and classifying	Always recognises matching objects without help	✔		✔	
	Always generalises objects to real life objects without help	✔	✔	✔	

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always finds programs without help (H) never (S)	✔	✔	✔	
	Never loads a program/game without help (H) sometimes (S)	✔	✔	✔	
	Always uses a standard keyboard without help	✔		✔	
	I can use a trackball, return key, without help	✔	✔		
	I can use a mouse without help always		✔		
	With help I can use a standard keyboard and Concept Keyboard	✔	✔	✔	
	I can change volume without help		✔		
	I can print from the computer with help	✔			
	If something does not work with the computer, I can solve it with help	✔			
	Always (H) often (S) selects and operates programs/games	✔	✔	✔	
	Always understands that actions on keys or switches cause effects	✔		✔	
Software	Sunshine CD ROM collection ABC (learning to read)	✔		✔	
	James Discovers Math			✔	
Hardware	Desktop PC, mouse	✔			
	A Big Mac		✔		

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however stated in the round 1 CVs* (i.e., reporting). **Computing** Can operate a single switch. Social and communication: sometimes responds to "what", "how", "which", "why" questions. Often uses body language to indicate general responses to skill-appropriate questions. Often gives family directions about using the computer. Always likes to try out new programs and ideas. Can unjumble short sentences now (CV stated improvement).	 ✔ ✔ ✔	 ✔ ✔ ✔	 ✔	
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **Computing** Sometimes at home uses a standard keyboard without help. **Social and communication** Now always responds to "yes" and "no" questions at school (up from often).	 ✔		 ✔	
Summary	**Improvements noted against the IEP** Ned increased his independence in his computer use. The goal to increase his verbalisation has had some success with Ned responding more to questions put to him. **Other improvements** Ned increased his communication via verbalisation and through body language, gesture, and vocalisation. His reading improved—he could unjumble short sentences to achieve a better command of words in sequence.				

(Sid—6 years 8 months)

Communication and social interaction: Sid uses a few nouns and gestures to indicate his needs. His poor articulation makes other words difficult to understand, and his difficulties with fine motor skills have resulted in a limited success with signing. He processes language very slowly though he can sometimes process instructions which include 3 information words. Although Sid wants to be around other children, his limited communication makes interactions with peers difficult. He is beginning to learn the structured social routines of the classroom, e.g., greetings.
Learning: Sid requires all instructions to be broken down into simple steps. He responds well to modelling and hand-over-hand guidance. He has developed considerably since he has been at school and now participates in some way in most classroom activities.
Mobility: Sid is gradually building his strength, and can now jump with support but still has difficulty with skipping and hopping. His poor balance and a lack of confidence make gross motor skills difficult.
Daily living activities: Sid requires assistance with clothing but is now able to manage some familiar routines, e.g., putting away his coat and lunch box. He has difficulty with eating. He is now bladder trained, and bowel training is under way. He requires reminders to complete the routine, e.g., flush the toilet and wash his hands.

Under the Ongoing Resourcing Scheme Sid has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: Sid verbalises nouns and adjectives. He is attempting to communicate verbally and through signing when directed and independently.
Goals: Sid will add verbs into sentences, and build his speaking and signing vocabulary by modelling and echoing. He will have daily conversation practice.

READING
Current: Sid recognises and reads his family name. He recognises some high frequency and high interest words if he is given an initial consonant. He shows one-to-one correspondence with guidance.
Goals: Sid will increase his word recognition vocabulary. He will match letters and use key and high frequency words to form sentences. This will be achieved through activities such as computer programs, reading books, and games.

WRITTEN LANGUAGE
Current: Sid recognises letters with help. He uses computer programs to initiate pictures and ideas for stories.
Goals: Sid will find letters on the keyboard independently. He will choose letters to write his name. He will initiate the ideas and illustrations for stories using the computer or by hand. This will be achieved though daily use, practice, and reinforcement of his name, alphabet cards, printing, and computer stories.

MATHEMATICS (not included)

Contd . . .

SOCIAL DEVELOPMENT (without specified computer goals)
Current: Sid wants to do what other children are doing. He is learning not to touch other children all the time.
Goals: Sid will learn appropriate social behaviour by reminders and reinforcement. He will sign "sorry" and "shake hands", and verbalise "please" and "thank you". He will learn to gain a person's attention before interacting with them.

COMPUTER
Current: Sid uses his computer daily and shows excellent mouse control. He is able to make independent choices using the computer.
Goals: Through daily practice Sid will become competent using new software.

Home Video Round 1

Length of computer use at home: 6 months.
Home site: In the dining room.
People with Sid: Mother.
Activity: James Discovers Math—the exercise with the program is to use shapes to build a house. There is also a matching shape exercise, i.e., fitting the correct shape to the outline. After drawing the picture Sid goes on to a written exercise to add words to the picture to describe it. Sid shows his understanding of words such as airport by playing the motion of an aircraft.
Interaction: Sid's mother opens the program. Sid is frequently prompted by his mother "Click on the arrows and you will find the train" and "You'll need a bigger rectangle for that part of the picture".
He repeats some words back to her such as "background" when discussing a background to be selected for a picture.
He quite clearly responds through verbal and physical responses. He says "NO" to an attempt to change a picture, and "yep" to the question "Do you want to print it?"
Sid follows instructions sometimes, as shown by his following some of the directions for making his picture, but ignores some suggestions.

Home Video Round 2

Home site: The computer is actually situated at school and is being used after hours.
People with Sid: Mother.
Activity: This is an exercise in letter recognition in which Sid selects the letters of his name and places them in the correct order. He often recognises the letters. This is the introduction to a set of program options which include a tour of a zoo with video and sound of a variety of animals which Sid selects by clicking on their name. Sid enthusiastically selects the animals he wants to see, and with prompting by his mother says the name of the animal.
Interaction: Sid's mother asks him about what choice he would make using the program, and after Sid selects an animal, she asks him to say the name of it. Questions are also asked by her and answered by him about how to operate the program. For example, when a particular animal video was selected, e.g., for a zebra, two buttons are visible in the lower portion of the screen. Sid's mother asks "What happens when you press on the blue button?". Sid replies it "Stops it", referring to the pause in the video that the blue button controls. Sid then presses the blue button to demonstrate the action and effect.

School Video Round 1

Length of computer time at school: 6 months.
School site: At the back of the classroom.
People: TA and a student watching Sid work on the computer.
Activity: Sid is using James Discovers Math to distinguish matching shapes, different sizes, and different colours (finds these with help).
In his expression, he displays eye and hand movement beyond the screen to show understanding of the moving concepts.
Interaction: The TA opens the file and selects which program to go to. Sid does not participate. Sid follows verbal prompts, and the TA gives physical prompts such as moving the trackball to do some selection of options, and moving Sid's hand on the trackball.
Sid interacts by pointing to the screen and looking to the TA to see if she has seen his accomplishment.
As an example of his feedback to the TA, he said "NO!" clearly when he did not want an option selected by the TA. Sid does show enjoyment when using the programs.
Said "I want more" as an indication of enthusiasm for the computer work.

School Video Round 2

School site: The back of the classroom.
People with Sid: TA.
Activity: Sid is using the James Discovers Math program and doing the shape-matching exercise.
Interaction: His TA gives him help when he needs guidance to match the correct shape. He verbally and physically responds to questions, although is clearly distracted by what is going on with the rest of class while working with the TA.

Computer Use

- Ownership/source of computer:
  Ministry of Education via SES.
- When computer is used:
  Ministry of Education computer is used at school for term time and at home for most holidays.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Often in speech uses simple words	✔	✔	✔	✔
	Sometimes can use complex words	✔			
	Always reads/uses own name in speech			✔	
Visual (reading)	Always understands the concept of letters	✔	✔	✔	
	Always recognises, reads, uses, types own name with help		✔	✔	✔
	Always (H) sometimes (S) recognises some letters with help	✔	✔	✔	✔
	I can recognise all letters with help (never in school ob)			✔	✔
	Can recognise simple words with help		✔		✔
	Can recognise and read simple sentences using standard keyboard with help		✔		✔
	Can recognise complex directions or stories with help				✔
Written	Types some letters without help	✔	✔		
	Never types whole alphabet without help	✔			
	Never types simple words without help (CAN type in CV)	✔	✔		
	Never types complex words without help	✔			
	Never types short sentences or story without help	✔			
	Can use other keys, e.g., delete		✔		✔
	Never leaves spaces and full stops without help	✔	✔		
	Can unjumble short sentences with help		✔		
	Can correct mistakes on the computer with help		✔		

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Always understands the idea of numbers without help (CV with help)	✔	✔	✔	✔
	Always recognises simple numbers (1–5) without help (CV with help)	✔	✔		✔
	Can recognise any number without help				✔
Oral	NA				
Written	NA				

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Always enjoys and is confident using computer	✔	✔	✔	✔
	Always (H) sometimes (S) calls attention to performance	✔	✔	✔	✔
	Always (H) often (S) shows pride in actions and achievements	✔	✔	✔	✔
Self-management	Always pays attention when working on the computer	✔	✔	✔	✔
Motivation	Always completes tasks without encouragement	✔		✔	✔
	Often (H) sometimes (S) expresses pleasure when task is completed	✔	✔	✔	✔
	Never (H) sometimes (S) expresses displeasure physically	✔	✔	✔	
	Sometimes expresses displeasure verbally	✔	✔	✔	
	Likes to try out new programs/games/ideas		✔		✔
Social and communication	Recognises familiar people		✔	✔	✔
	Greets familiar people		✔		✔
	Always (H) sometimes (S) listens to skill-appropriate questions	✔	✔	✔	✔
	Often (H) sometimes (S) follows skill-appropriate directions	✔	✔	✔	✔
	Can imitate actions on the computer		✔		
	Often (H) always (S) responds to "yes", "no" questions	✔	✔	✔	✔
	Often responds to "look at" questions	✔	✔	✔	✔
	Sometimes respond to "what", "how many" etc. questions	✔	✔	✔	✔
	Sometimes use body language to answer questions		✔	✔	✔
	Often (H) always (S) vocalises/verbalises response	✔	✔	✔	✔
	Often (H) always (S) indicates options by body language	✔	✔	✔	✔
	Always indicates program options by vocalisation	✔	✔	✔	✔
	Often (H) sometimes (S) asks for help or indicates need	✔	✔	✔	✔
	Always takes turns and shares with others	✔	✔		✔
	Sometimes can show classmates and family how to do computer things		✔	✔	✔

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always and without help able to fixate on static objects and track moving objects on screen	✔	✔	✔	✔
	Responds to sound always and without help	✔	✔	✔	✔
	Recognises common sounds without help		✔		
	Sometimes recognises common shapes without help (SCV)	✔	✔		✔
	Often recognises common size without help (SCV)	✔	✔	✔	✔
	Sometimes recognises common colours without help		✔	✔	✔
	Always recognises common picture objects without help	✔	✔	✔	✔
	Sometimes groups objects on the screen with help		✔	✔	✔
	I can recognise out-of-order picture with help		✔		✔
	I understand what symbols represent		✔		✔
	Always (S) often (H) identifies use of objects/pictures on screen with help	✔	✔	✔	✔
	Always generalises sounds/objects to real life without help	✔	✔	✔	
Matching and classifying	Often matches objects without help		✔		
	Matches sound and objects without help		✔		

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always uses a trackball without help	✔	✔	✔	✔
	Can use a standard keyboard with help		✔		✔
	Always (H) never (S) finds programs/games without help	✔	✔	✔	✔
	Often (H) sometimes (S) selects options in program/game without help	✔	✔		
	Always (H) often (S) operates the program without help	✔	✔	✔	✔
	Always prints from the computer if prompted, with help	✔	✔	✔	✔
	If something does not work, can solve it with help		✔		✔
	Can use a standard mouse with help				✔
	Never loads program without help			✔	
	Always understands that actions with keys cause effects without help	✔	✔	✔	✔
Software	James Discovers Math	✔			
	Paint, Write, and Play	✔			
	The Computer Classroom			✔	
	The Playroom			✔	
Hardware	PC desktop operated via a trackball	✔			

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however stated in the round 1 CVs.* **Social and communication** Now observed giving teacher/TA directions about the computer. **Visual language** Sometimes can recognise simple words without help.	✔		✔	
Probable new skills and successes	*A change in observations from round 1 to round 2.* **General cognitive** Always recognises colours now instead of sometimes. **Social and communication** Often uses body language to indicate general responses to skill-appropriate questions (up from sometimes). Now always asks for help when needed (up from often). **Self-management/self-esteem** Now always expresses pleasure when the task is completed.	✔ ✔		✔ ✔ ✔	
Summary	**Improvements noted against the IEP** Language goals have been met somewhat with Sid's increasing word recognition. **Other improvements** Communication has increased with more questions being asked especially when help is needed, and a greater response made to questions put to him. Self-management and self-esteem have also increased due to his expression of enjoyment when completing work on the computer.				

(Mitch—10 years 3 months)

Communication and social interaction: Mitch is now using far more verbal language to express his needs and to comment although this still tends to be telegraphic speech. He can follow some simple instructions. Mitch enjoys playing close by the other children although he still finds it difficult to be in the centre of an active group.
Learning: Mitch requires considerable refocusing on to the task and is dependent on verbal and physical prompts for most activities. He has shown considerable progress in learning classroom routines and now joins the other students for discussions.
Mobility: Mitch is independently mobile and enjoys physical activities such as running and using the slide. Fine motor skills are still difficult for him and he requires some hand-over-hand assistance or facilitation for many fine motor tasks.
Daily living activities: Mitch requires supervision and prompting to carry out most daily living tasks.

Under the Ongoing Resourcing Scheme Mitch has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: (Not listed).
Goals: Mitch will increase his interactions with others. The length of his verbalisations and his vocabulary will be increased through peer prompting, repetition, and praise.

READING (without specified computer goals)
Current: Mitch has a high level of interest in reading.
Goals: Mitch will continue to enjoy reading. He will be provided with a choice of high interest material that is short in length and visual. He will read on a one-to-one basis.

WRITTEN LANGUAGE
Current: (Not listed).
Goals: Mitch will increase the length of his written work by using material of interest to him from his home notebook or his own ideas. New mediums possible on the computer will be explored. Mitch will increase his independent use of keyboard keys.

MATHEMATICS
Current: (Not listed).
Goals: Mitch will increase his functional maths understanding such as coin recognition and number choices through activities such as shopping, cooking, sharing, community visits, computer games, coin recognition sheets, and number choice boards.

SOCIAL DEVELOPMENT (without specified computer goals)
Current: (Not listed).
Goals: Mitch will follow instructions with assistance. His independence will be increased by encouraging him to spend the first 10 minutes of class by himself and to be independent at lunchtime. The day will be split into manageable periods of work followed by free choice activities. Mitch will have regular quiet withdrawal times.

Contd . . .

COMPUTER
Current: (Not listed).
Goals: To increase Mitch's access to the curriculum though computer use. To increase Mitch's interaction with peers through peer tutoring and through his peers requesting to work with him on his computer. He will become familiar with new software.

Home Video Round 1

Home site: In the lounge.
People with Mitch: Mother and brother.
Activity: Mitch only concentrates on the computer for a short time, while he plays an interactive game, Peter Pan. His objectives in this activity are "Want see the crocodile", in reference to one of the video sequences in the program.
Interaction: After Mitch achieves his objective of watching the crocodile he says, "Want to turn it off now" and "Want to shut it down".
He is very interested in the video camera used for this study and spent time looking at it and through it.
His mother opens and closes software for him, and his brother also starts software and makes selections for him. His brother offers some guidance such as "Don't click too much" referring to clicking more than twice when using the mouse to select an option on the screen.

Home Video Round 2

Home site: The school classroom during the weekend; the computer is taken and used at home during the school holidays.
People with Mitch: Mother.
Activity: A letter and word exercise program where Mitch listens to a story.
Mitch loads the disk with the program into the computer, and uses the mouse confidently to operate the program.
Interaction: Mitch is very vocal during the session, making requests about the conditions that he was to work in, such as saying "Can you keep the lights on?" and "That's too loud", referring to the sound from the computer. Mitch responds to some instructions, such as when he is asked to open the program. However, there is some reluctance to sit and work at the computer.

School Video Round 1

School site: At the back of the classroom.
People with Mitch: TA and itinerant resource teacher.
Activity: Working on the Peter Pan program, manipulating it with the mouse, reacting positively about it, and selecting program option effects that he likes.
Mitch loads a disk into the machine, and uses the mouse to operate the computer and program. His typing of letters on the computer is always assisted.
Interaction: He sometimes follows directions, but consistently says what he wants to do, showing pleasure and displeasure verbally and physically.
He recognises computer-related language by repeating back terms such as "shutdown" and "turn it on".
Mitch is very enthusiastic about the program, asking to go back to it at lunchtime.

School Video Round 2

School site: At the back or side of the classroom.
People with Mitch: TA.
Activity: Mitch is doing is a writing exercise. The typing in of the letters to form the words for his story was directed by the TA. Mitch shows very little independent operation of the keyboard, but he shows competence in operating the program by the mouse.
Interaction: Mitch answers the questions put to him by the TA and makes requests such as "I want to look at the video", referring to the video clips in the program. He is encouraged constantly by the TA to continue with the word processing.

Computer Use

- Ownership/source of computer:
  Ministry of Education via SES.
- When computer is used:
  At school during term and taken home during all holidays.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always reads/uses in speech own name without help			✔	✔
	Always reads/uses simple words in speech without help			✔	✔
	Sometimes reads/uses complex words without help			✔	✔
	Always reads/uses simple sentences/directions without help			✔	✔
Visual (reading)	Always understands the concept of letters			✔	
	Recognises own name with help		✔		✔
	Never recognises simple words without help		✔	✔	✔
	Never recognises all letters without help			✔	✔
	Never recognises complex words without help			✔	✔
	Never recognises simple sentences without help			✔	✔
	Never recognises complex directions without help			✔	✔
	Never recognises errors without help			✔	✔
Written	Never types own name, letters, words, short sentences, or stories without help			✔	✔
	Sometimes uses some keys such as delete without help			✔	✔
	Never punctuates (full stops, spaces) or capitalises without help			✔	✔
	Can unjumble sentences and correct mistakes with help				✔

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Can understand the idea of numbers with help				✔
	Can recognise the numbers 1–100 with help				✔
	Can recognise maths symbols and equations with help				✔
Oral	Can understand the idea of numbers with help				✔
	Can recognise/speak the numbers 1–100 with help				✔
	Can recognise/speak maths symbols and equations with help				✔
Written	NA				

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Often feels confident when using the computer	✔	✔	✔	✔
	Always shows people work done on the computer		✔	✔	✔
	Sometimes proud of things done on computer		✔	✔	✔
Self-management	Often (H) always (S) pays attention when working on computer (has trouble concentrating sometimes SCV)	✔	✔	✔	✔
	Sometimes (H) never (S) completes tasks without encouragement	✔	✔	✔	
	Always (H) often (S) expresses displeasure verbally	✔	✔	✔	✔
	Never expresses displeasure physically	✔			
Motivation	Often (H) always (S) enjoys using the computer	✔	✔	✔	✔
	Likes to try out new computer programs, games		✔		✔
	Sometimes expresses pleasure when task is completed			✔	✔
Social and communication	Can recognise familiar people for computer use		✔		✔
	Greets familiar people re computer use		✔		✔
	Often (H) sometimes (S) listens to skill-appropriate directions	✔	✔	✔	✔
	Sometimes follows directions from family/teacher/TA	✔	✔	✔	✔
	Sometimes imitates skill-appropriate computer actions	✔	✔		✔
	Often (H) sometimes (S) responds to "yes", "no" questions	✔		✔	✔
	Often responds to "look at" statements				
	Often responds to "what" and "why" questions on computer use	✔	✔		✔
			✔	✔	✔
	Always uses gestures/signs to indicate response	✔	✔		✔
	Always verbalises response to questions	✔	✔	✔	✔
	Always indicates program options by body language		✔	✔	✔
	Always indicates program options by verbalisation	✔	✔	✔	✔
	Sometimes (H) never (S) asks for help when needed	✔	✔	✔	✔
	Always takes turns and shares with others	✔	✔		✔
	Often gives family/classmates direction about computers	✔	✔		✔

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always fixates on stationary and moving objects and sounds without help	✔	✔	✔	✔
	Recognises common sounds from computer without help		✔	✔	✔
	Recognises common shapes with help (H) without help (S)		✔		✔
	Recognises common size without help		✔		✔
	Recognises colours with help (H) without help (S)		✔		✔
	Always recognises common pictures and objects without help	✔	✔	✔	✔
	Recognises out-of-order pictures with help				✔
Matching and classifying	Recognises matching objects with help		✔		✔
	Matches sounds and objects on screen with help (H) without help (S)		✔		✔
	Groups objects on screen with help				✔
	Understands symbols representing ideas with help		✔		✔
	Always identifies objects/functions on screen with help (CV)		✔	✔	✔
	Always generalises sounds/objects from computer to reality with help		✔	✔	✔

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always turns the computer on without help	✔	✔		✔
	Never turns the computer off without help (can in SCV)	✔			✔
	Can use switches without help (H) with help (S)		✔		✔
	Can use a trackball without help				✔
	Always (H) sometimes (S) uses a standard mouse without help	✔	✔	✔	✔
	Never uses a standard keyboard without help		✔	✔	✔
	Can use a Concept Keyboard with help				✔
	Always (H) never (S) finds programs without help	✔	✔	✔	✔
	Never loads program without help	✔		✔	
	Often (H) never (S) selects options without help	✔	✔	✔	✔
	Often (H) sometimes (S) operates program without help	✔	✔	✔	✔
	Can change volume without help		✔		✔
	Can change font with help				✔
	Can print with help				✔
	Never saves a file without help			✔	
	Can solve problems with the computer with help				✔
	Always understand that actions on keys cause effects	✔	✔	✔	✔
Software	Peter Pan interactive game, Reader Rabbit, Maths Circus		✔		
	Round 2: PM Reader kids story	✔		✔	
Hardware	Mac desktop computer		✔		✔

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however stated in round 1 CVs.* **Computing** Sometimes loads programs and games without help, improvement from never observed in round 1. **Language** Sometimes can recognise some letters. Sometimes can recognise simple words without help. **Mathematics** Now sometimes understands the idea of number symbols without help.			 ✔ ✔ ✔	
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **Computing** Selecting and operating computer programs has increased from often to always during observations. **Social** Often follows skill-appropriate questions and directions, (increased from sometimes). Always responds to "look at" statements (up from often). Always asks for help when needed (up from sometimes). **Self-management** Always confident when using the computer (up from often). Always shows pride in actions and achievements (up from sometimes). Often completes tasks without encouragement (up from sometimes). ********** *Possible reduction in ability* Often responded to "what", "why" questions in round 1, supported by SCV in both rounds yet not observed in round 2. Always uses body language and vocalisation to indicate general responses to skill-appropriate questions and directions in round 1 at school yet only observed as often at home and sometimes at school in round 2.	 ✔ ✔ ✔ ✔ ✔ ✔ ✔		 ✔ ✔ ✔ ✔	

Summary	**Improvements noted against the IEP** Language has improved with a reported increase in letter and word recognition. Mathematics may have had a slight increase in understanding maths symbology. Social development goals have been advanced with Mitch now often following directions and answering questions, and asking for help when needed. **Other improvements** Self-management has increased while using the computer in terms of confidence, pride, and completing tasks without encouragement. Computer-use goals have been met through increased selecting and operation of computer packages.				

(Yvonne—3 years 8 months)
Communication and social interaction: Yvonne tends to repeat back others' statements, but is beginning to generate 2- and sometimes 3-word sentences, although these are quite hard to understand for unfamiliar listeners. Yvonne is a generally happy energetic child who is very social. **Learning:** Yvonne picks up tasks fairly quickly but often requires repetition to ensure that she remembers the task. **Mobility:** Yvonne was slow to walk, can run and jump, and is just beginning to be able to hop. She has quite good fine motor control. **Daily living activities:** Yvonne likes to do things for herself. She can cope with most daily living activities but at a level below her age peers.
As Yvonne was under 5 at the time of this research she did not have an Ongoing Resourcing Scheme verification. Using the criteria outlined at the start of this report Yvonne has been classified as having high needs.

IEP GOALS
Due to Yvonne's age an IEP has yet to be developed for her.

Home Video Round 1

Length of computer use at home: 20 months.
Home site: Mother's study.
People with Yvonne: Mother.
Activity: During an exercise that links an object to its name her mother says "Where is the hat?". Yvonne points to the picture on the screen and says "Hat". Yvonne's mother replies "Very good" to reinforce Yvonne's accurate description.
Interaction: Yvonne reacts to what is wanted by her mother and answers questions such as "Where do you want to go now?" (in the program), and "What is that object?". Yvonne replies saying it is "A dog".

Home Video Round 2

Length of computer use at home: 24 months.
Home site: Mother's study.
People with Yvonne: Mother.
Activity: Yvonne is using the program Ready To Read with Pooh for reading, letter, and word recognition exercises. She vocalised her enjoyment by laughing and saying "Pooh Bear" in a happy tone when she first sees the character on the screen. Yvonne then goes on to the program section which presents words and offers a choice of images, with the objective of matching an image to the word. From the words, short sentences were put together in speech, from the computer voice output system.
Interaction: Yvonne responds to questions relating to her work, such as her Mother asking "Is the chair too high?". Yvonne replies "Too high". In interacting with the program, Yvonne sings along with some the words that are sung in the program.
Questions put to her in the context of completing the exercise are answered and she responds to instructions such as "Go over there on the screen to find more" in reference to images that may be selected to match the words that are presented in a storybook part of the program.
Yvonne showed her preference for her favourite program by saying "No" when asked by her mother if she wanted to do a different exercise.

School Video Round 1 (no video recording due to technical fault)

School site: In a separate room.
People with Yvonne: Psychologist.

School Video Round 2

ECE centre site: In a separate classroom.
People with Yvonne: Cognitive therapist.
Activity: Completing number matching and recognition exercise whereby Yvonne counts out the number of dots that would equal the number that was highlighted. Yvonne also works on a program whereby she has to recognise a rabbit shape in the image on the screen. Yvonne used a trackball to operate both programs.
Interaction: Yvonne is constantly getting directions, corrections, and encouragement from her therapist and followed the instructions. She vocalises several words including the numbers in the earlier exercise and the topic of the second shape-finding exercise, i.e., the rabbit.

Computer Use

- Ownership/source of computer:
  Home—private family computer.
  ECE centre—computer owned by the centre.
- When computer is used:
  Home and ECE centre computers always available at respective sites.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt[5]
Oral	Often reads/uses in speech some letters with help Always reads/uses in speech simple words without help (CV with help)	✔ ✔	✔ ✔		
Visual (reading)	Often understands the concept of letters without help Can recognise own name with help Sometimes can recognise some letters with help Can recognise all letters and simple words with help	✔ ✔ 	✔ ✔ ✔ ✔		
Written	Can use some keys on the keyboard with help		✔		

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Understands the idea of number symbols with help		✔		
Oral	NA				
Written	NA				

[5] No Round 1 School Skills profile was received for Yvonne.

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Often (H) always (S) confident when using computer	✔	✔	✔	
	Sometimes calls attention to performance, and is proud of actions and achievements	✔	✔	✔	
Self-management	Often pays attention when working on the computer	✔	✔	✔	
	Sometimes completes tasks without encouragement	✔	✔	✔	
	Can show when annoyed physically and verbally		✔		
Motivation	Often (H) always (S) enjoys using the computer	✔	✔	✔	
	Sometimes (H) often (S) expresses pleasure when task is completed	✔	✔	✔	
	Likes to try out new programs and ideas		✔		
Social and communication	Always recognises familiar people	✔	✔	✔	
	Always greets familiar people		✔	✔	
	Often listens to questions, and follows and imitates skill-appropriate actions (often H, sometimes S)	✔	✔	✔	
	Always responds to "yes", "no", and "look at" questions	✔	✔	✔	
	Always (H) often (S) responds to "what" and " why" questions	✔	✔	✔	
	Sometimes (H) often (S) uses body language to respond to skill-appropriate questions and directions	✔	✔	✔	
	Often (H) always (S) uses verbalisations to indicate a response to questions	✔	✔	✔	
	Often (H) always (S) indicates program options by body language and verbalisation	✔	✔	✔	
	Often indicates or asks for help	✔	✔		
	Will take turns on the computer		✔		
	Often gives family and teacher directions about computer use	✔	✔		

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always able to fix on stationary and moving objects, recognise and respond to sound without help	✔	✔	✔	
	Able to recognise common shape, size without help		✔		
	Always recognises common pictures or objects without help	✔	✔	✔	
	Always recognises colours without help		✔	✔	
Matching and classifying	Can match objects and sounds without help		✔		
	Can group objects on screen with help		✔		
	Understands that symbols on screen represent ideas		✔		
	Often able to indicate objects, functions without help	✔			
	Often generalises sound and objects to real life without help	✔	✔		

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Often (H) sometimes (S) able to turn computer off (on/off in CV) without help	✔	✔	✔	
	Always (H) often (S) can use a trackball (easyball) without help	✔	✔	✔	
	Can use a single switch without help		✔		
	Can use 2 switches and the keyboard return key with help		✔		
	Never finds, or loads, a program without help	✔	✔		
	Often operates a program without help	✔	✔		
	Often (S) never (H) selects options in a program without help			✔	
	Can change volume, print from a computer, solve things not working with the computer sometimes and with help		✔		
	Always understands that actions on keys cause effects (CV with help)	✔	✔		
Software	Winnie the Pooh and the Honey Tree, Reader Rabbit	✔		✔	
Hardware	Pentium PC and Trackball (easyball)	✔			

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1 but were observed in round 2.* *They were however stated in round 1 CVs.* **Cognitive and problem-solving skills** Now often recognises common shapes on the screen. Sometimes recognises matching objects on the screen. Often matches objects and sounds without help.	 ✔	 	 ✔ ✔ ✔	
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **Cognitive and problem solving** Now often can generalise objects and pictures into real life without help (round 1 with help). **Computing** Sometimes can find programs without help. Often loads programs without help now. Can select options in a program and operate a program now without help, needed help in round 1. **Self-management** Now often calls attention to performance (up from sometimes). Now always shows pride in actions and achievements (up from sometimes). Now always pays attention when working on computer (up from often). **Language** Now always understands the concept of letters (up from often). Now always reads/uses in speech simple sentences, up from not observed before. **Mathematics** Now often understands the idea of numbers. Now often recognises and uses in speech simple numbers 1–5.	 ✔ ✔ ✔ ✔ ✔ ✔ 	 ✔ ✔ ✔ 	 ✔ ✔ ✔ ✔ ✔	
Summary	Yvonne did not have an IEP prepared for her during the survey period. **Other improvements** Yvonne experienced improvements with her cognitive skills by increasing recognition and matching of shapes, and generalising screen objects into real objects. Computing skills improved with regards to finding, loading, and selecting programs. Self-confidence and management increased in terms of paying attention and having pride in her performance. Language skills increased to now using short sentences. Maths increased in a smaller measure with the numbers 1–5 now being used.				

(Nick—4 years 9 months)

Communication and social interaction: Nick vocalises, but these vocalisations do not appear to represent particular sounds. He makes eye contact and smiles and laughs when enjoying himself. He enjoys people playing games with him.
Learning: Nick learns after constant repetition of activities. He needs to relearn, with lots of repetition after a break.
Mobility: Nick gets around by crawling. He also uses a wheelchair/buggy and a standing frame.
Daily living activities: Nick can feed himself with assistance if his food is in front of him. He is not fully toilet trained and needs assistance.

As Nick was under 5 at the time of this research he did not have an Ongoing Resourcing Scheme verification. Using the criteria outlined at the start of this report Nick has been classified as having very high needs.

IEP GOALS

ORAL LANGUAGE (not included)

READING (not included)

WRITTEN LANGUAGE (not included)

MATHEMATICS (not included)

SOCIAL DEVELOPMENT (without specified computer goals)
Current: Nick has limited ability and skills in communicating his choices and needs. He uses body language, vocalisations, and one or two signs to express himself.
Goals: Nick will communicate indicating his choices, needs, or wants in an understandable way. He will join in and interact with lunchtime buddies and with his peers in syndicate activities. He will use signs to request help and to choose activities. This will be achieved by encouraging him to interact with his peers at mealtimes and fill in the blanks when story reading with peers. He will be offered choices using symbols, objects, and vocalisations.

COGNITIVE DEVELOPMENT
Current: Nick enjoys exploring differences in objects such as texture. He is able to use either hand to operate cause-and-effect toys. He is resistant to using tools such as scissors.
Goals: Nick will explore and interact with his environment through touch. He will appreciate the concepts of cause and effect and choices by using software including cause and effect daily. He will use either a switch or a touch screen.

Home Video Round 1

Home Site: The lounge.
People with Nick: Sister and mother.
Interaction: His sister says "Where is the grasshopper?" and "Touch the grasshopper" to Nick to prompt him to work on the word object recognition exercise he is doing on the computer. There is frequent verbal and physical help, guidance, and encouragement given to Nick.
Activity: Nick worked on associated word and image exercises; in particular he had to match the name to an object and sometimes got the correct association, and sometimes showed enjoyment. He often vocalised pleasure and displeasure.

Home Video Round 2

Home site: The lounge.
People with Nick: Mother and Sister.
Activity: Nick operating a touch game in which the objective is for him to touch an object on the screen which causes it to move in the way it would in reality. For example, a worm would crawl, a frog hop, an owl fly, and a car drive off. The touch screen was actually a pseudo touch screen with Nick's sister operating a mouse to click on the object when Nick touched the screen to mimic the actual operation of a touch screen. Nick often showed enjoyment and initiated the movement of the objects. He continually concentrated on the activity.
Interaction: Nick showed a mix of engagements with the exercise: he sometimes followed directions from his mother, was sometimes physically directed by his sister, and sometimes completed some of the exercises on his own. His most self-motivated action was apparent when his favourite images and movements were placed on the screen. He indicated this favouritism verbally and by joyful movements.

ECE Centre Video Round 1

ECE centre: Site in a separate room.
People with Nick: Psychologist.
Activity: Sometimes Nick pays attention and expresses pleasure when he has success with the program through making a correct choice of objects and shapes recognition.
Interaction: Sometimes Nick follows instructions when working on the computer, i.e., "sit back" so he can better operate the computer.
There is much positive reinforcement, both verbally and physically, to encourage Nick to continue with the exercise and to try again when he chooses an incorrect answer.

School Video Round 2 (Nick has moved from an ECE centre from round 1 of the research to a school in round 2)

School site: Classroom.
People with Nick: Teacher.
Activity: Nick is participating in an animal and machine recognition activity, using one and two switch selection to operate the program. On the first click an item is shown, and on the second it moves off the screen with its associated movement and sound. For example, a police car drives off with its siren sounding and an elephant walks off trumpeting.
Interaction: The teacher is very encouraging towards Nick, and he shows some interaction beyond operating the program by sometimes waving to the departing vehicles and animals. He followed instructions on the occasions they are given, e.g., "Push, Nick".

Computer Use

- Ownership/source of computer:
  Home—private family computer.
  ECE centre and School Education Institution's computer.
- When computer is used:
  Home and ECE centre/school computers always available at respective sites.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	NA				
Visual (reading)	NA				
Written	NA				

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	NA				
Oral	NA				
Written	NA				

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Sometimes confident when using a computer			✔	
	Sometimes calls attention to computer use	✔		✔	
	Often (S) sometimes (H) shows pride in actions and achievements	✔		✔	
Self-management	Sometimes (S) often (H) pays attention when working on computer	✔		✔	
	Never completes tasks without encouragement			✔	
	Sometimes expresses displeasure physically			✔	
	Sometimes expresses displeasure verbally	✔		✔	
	Never uses the computer program to help talk about feelings			✔	
Motivation	Always enjoys using the computer	✔		✔	
	Often expresses pleasure when task is completed	✔		✔	
Social and communication	Often (S) sometimes (H) listens to skill-appropriate directions/questions	✔		✔	
	Sometimes follows skill-appropriate directions	✔		✔	
	Sometimes responds to "yes", "no" questions and "look at" statements			✔	
	Sometimes uses body language and vocalisation to indicate response to questions and directions	✔		✔	
	Always indicates program option wanted by body language			✔	
	Sometimes indicates program option wanted by vocalisation/verbalisation			✔	

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always (S) often (H) fixates on stationary and moving objects and responds to sound without help	✔		✔	
	Sometimes recognises common objects or pictures without help	✔		✔	
	Sometimes generalises objects or pictures into real life			✔	
	Never able to indicate objects/functions without help			✔	
	Never understands that symbols represent ideas			✔	
Matching and classifying	NA				

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Never able to use a single switch, standard mouse, or trackball, without help			✔	
	Often able to use a touch screen and pseudo touch screen	✔		✔	
	Always understands that actions on switches/keys cause effects	✔		✔	
Software	Switch On, Touchgames, Make It Happen	✔		✔	
Hardware	HP PC, Touch screen, and trackball, single switch, and double switch	✔		✔	

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however stated in round 1 CVs.* **Computing** Often uses a single switch, and sometimes a double switch.			✔	
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **General cognition and problem-solving skills** Now can sometimes recognise common sounds without help. Now often, up from sometimes, recognises common pictures or objects. Sometimes recognises matching objects without help; he did not recognise matching objects in round 1. **Social and communication skills** Often, up from sometimes, follows age and skill specific directions and questions. Now sometimes responds to "what", "why", and "where" etc. questions, and not observed responding in round 1. **Self-management/self-esteem** Now often, up from sometimes, confident when using the computer. Sometimes completes tasks without encouragement, not observed in round 1. Sometimes likes to try out new programs/games and ideas, and this was not observed in round 1.	✔ ✔ ✔		✔ ✔ ✔ ✔ ✔ ✔	
Summary	**Improvements noted against the IEP** Nick has improved his communication skills in terms of answering questions which will help to indicate his choices and needs—a main goal in his social development. His increase in recognition and matching of common objects and sounds met some of his cognitive goals. **Other improvements** Recognition skills increased in terms of recognising common sounds and objects and matching those objects. His social and communication skills had some improvement in the areas of following directions and answering questions. Nick is more confident in using the computer, and has better self-management with completing more tasks without encouragement. He is also somewhat more willing to try out new things on the computer.				

(Dan—8 years 9 months)

Communication and social interaction: Dan is able to communicate his ideas and needs and hold age-appropriate conversations with his peers.
Learning: Dan presents some of the characteristics associated with spina bifida such as a short attention span, faulty spatial awareness, immature hand movements, and some lack of initiation. However, there was clear evidence that Dan has the capabilities to achieve some work completion similar to that of his peers.
Mobility: Dan is dependent on his wheelchair and walking frame for movement.
Daily living activities: Dan has assistance for many daily living tasks although he can do some activities such as eating, and face and hand washing, with some independence.

Under the Ongoing Resourcing Scheme Dan has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: Dan is able to express his needs well. He is confident in peer relationships and discussions.
Goals: To encourage Dan to ask questions and to clarify and follow instructions.

READING (without specified computer goals)
Current: Dan reads at age 10 to 11. He enjoys reading and he is good at identifying the meaning of words from the sentence meaning.
Goals: Dan will complete reading activities set for him with the assistance of his TA. He will be helped to follow written instructions, stay on task, and to be more mobile and independent. He will be asked to self-evaluate.

WRITTEN LANGUAGE (without specified computer goals)
Current: Dan uses little "i" for "I". He spells level 4 words. He has difficulty staying on task and completing written recordings.
Goals: Dan will work on 10 spelling words a week. He will identify sentences by being prompted to proofread for capitals, full stops, and spelling errors.

MATHEMATICS
Current: Dan is working on basic facts.
Goals: He will use the keyboard number pad to record the answer to basic fact questions.

SOCIAL DEVELOPMENT (without specified computer goals)
Current: Dan works well in discussion activities and co-operative groups. He has difficulty staying on task.
Goals: To negotiate with Dan to set work to be completed in achievable blocks. To give him consequences for uncompleted actions.

COMPUTER
Current: (Not listed).
Goals: To encourage two-handed keyboard use by using a coloured keyboard and setting goals to be achieved by a certain date.

Home Video Round 1

There is no home video and observation as no computer was currently operating at home; additionally only one CV was answered.
Reported home computer use: 6 months.

Home Video Round 2

Home site: The lounge.
People with Dan: Mother.
Activity: Using a word-processing exercise, Dan was summarising a character from a book he was reading.
Interaction: He discussed what he was doing with the people around him, such as the font size he was using. He answered questions about what he was writing such as "Who is the character in your story that you are writing about?", by replying with "Mark". They further discuss the other things that Dan will write about, and Dan questions them on the spelling of a word.

School Video Round 1

School site: In the library.
People with Dan: TA.
Activity: Dan shows proficiency using the mouse and letter and others keys on the keyboard to operate the program to open, work in, and shut applications.
Dan concentrates on the task on screen. For example, he methodically fitted together the pieces of a jigsaw in a matching shapes exercise.
Interaction: Dan vocalises his reaction and discusses options on the computer.
He asks questions and discusses what is going on.

School Video Round 2

School site: At the back of the classroom.
People with Dan: Study observers only.
Activity: Dan was continuing his character from a book-description exercise that was his activity in the home observation.
Interaction: He frequently asked questions of the observers about the spelling of some words and answered questions through vocal and physical communication about the activity on which he was working.

Computer Use

- Ownership/source of computer:
  Ministry of Education funded via SES.
- When computer is used:
  At school during term and at home during holidays.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always reads/uses in speech, own name, all letters, simple and complex words, simple sentences and stories	[6]	✔	✔	[7]
Visual (reading)	Always understands the concept of letters, recognises all letters, own name, and simple words Often recognises complex words without help Always recognises simple sentences and complex directions		✔ ✔ ✔	✔ ✔ ✔	
Written	Always types own name, all letters, and simple and complex words, and short sentences and stories without help Always can use the keyboard without help Often begins names with capitals, leaves spaces, includes full stops, and edits work without help		✔ ✔ ✔	✔ ✔ ✔	

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Always understands the idea of numbers and recognises simple numbers 1–5 without help Can recognise any numbers without help Can recognise maths symbols and equations without help		✔ ✔ ✔	✔	
Oral	NA				
Written	NA				

[6] No Home Round 1 Observation.

[7] No School Round 2 CV.

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Always confident when using the computer		✔	✔	
	Calls attention to his work done on computer		✔		
	Often proud of his work on the computer		✔	✔	
Self-management	Always pays attention when working on the computer		✔	✔	
	Often completes task without encouragement		✔	✔	
	Can show is annoyed when using the computer		✔		
	Can use computer programs to help talk about feelings		✔		
Motivation	Always enjoys using the computer		✔	✔	
	Is pleased when finishes tasks on computer		✔		
	Likes to try new computer programs, games, and ideas		✔		
Social and communication	Recognises and greets familiar people		✔		
	Always listens to skill-appropriate questions, and follows directions, imitates actions, and responds to "yes", "no" questions, and "what", "why", and "where" questions		✔	✔	
	Uses body language to indicate general response		✔		
	Always vocalises general response to questions		✔	✔	
	Always indicates options wanted by body language			✔	
	Always indicates options wanted by verbalisation		✔	✔	
	Always asks for help when needed		✔	✔	
	Can take turns and show people how to do things		✔		

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always fixates on stationary and moving objects, responds to and recognises sounds, recognises shapes, size, colour, pictures/objects, and symbols, without help, understands that symbols indicate an objects functions, and generalises objects functions to real life		✔	✔	
Matching and classifying	Matches sound and objects, recognises matching objects, groups objects, recognises out-of-sequence objects, classifies into groups (and can rotate shapes and recognise from various angles observed activity re matching)		✔	✔	

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always understands that actions on keys cause computer effects		✔	✔	
	Always turns the computer on		✔	✔	
	Always able to use standard mouse and keyboard		✔	✔	
	Often finds and loads programs without help		✔	✔	
	Always able to select options in programs and operate the program		✔	✔	
	Always able to change volume, font, and print from the computer without help		✔	✔	
	Can save a file and solve problems with help		✔		
Software	Microsoft Works, Magic School Bus			✔	
Hardware	Compaq presario desktop PC and mouse			✔	

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.*				
	They were however stated in the round 1 home CV.				
	Computing				
	Can always save a file without help, in round 1 needed help.	✔	✔	✔	✔
	Now often able to solve problems without help, in round 1 needed help to solve problems with the computer.	✔		✔	
	Now sometimes gives family directions about using the computer.	✔			
	Now always likes to try out new programs.			✔	
	Language				
	Often now can recognise errors in writing without help.	✔		✔	
Probable new skills and successes	*A change observed from round 1 to round 2.*				
	Computing				
	Now always finds and loads programs (up from often).	✔		✔	
	Language				
	Now always recognises complex words without help (up from often).	✔			
Summary	**Improvements noted against the IEP** Language goals have been achieved with an increasing recognition of complex words which is expanding vocabulary and spelling, and an increase in his recognition of errors in his writing. **Other improvements** Dan has increased his capability with computer usage in the areas of finding and loading programs, and also in fixing errors without help, saving files for future use, trying new things out on the computer, and giving family directions about computer use.				

(Hector—11 years 9 months)

Communication and social interaction: Hector has no communication impairments. In talking with Hector, an individual would have no idea of his learning needs. He is a very capable sports person and has many friends.
Learning: Despite much intervention and assessment there has been no explanation as to why Hector struggles to learn basic concepts in mathematics, reading, and language. Hector now reads at the 8- 9- year level with the anticipation that he will need reader/writer assistance at secondary school.
Mobility: Hector is independently mobile.
Daily living activities: Hector is independent in all activities of daily living and self-care.

Under the Ongoing Resourcing Scheme Hector has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE
Current: Hector is competent and confident in expressing himself. Some sounds he expresses are not clear.
Goals: Hector will develop clearer speech through increased recognition of sounds, blends, and inflections through home and school reinforcement of sounds and speech therapy. He will work towards the independent use of voice-activated software.

READING (without specified computer goals)
Current: Hector is currently reading at a year 8 level with assistance.
Goals: Hector will continue to build his letter knowledge, core vocabulary, phrasing, and fluency. He will use improved knowledge to access unknown words and to self-check work. This will be achieved through individual sessions, weekly monitoring, and constant availability of texts at his level for reading time.

WRITTEN LANGUAGE
Current: Hector is interested in topic studies and develops content easily. He has difficulty with spelling.
Goals: Hector will become fluent with basic list 1 and 2 spelling words through using weekly lists and checks. His improved spelling ability will increase his speed of word processing. He will use the texts provided at an appropriate reading level for research in class. He will develop further ability to record sounds, blends, and inflections through home and school reinforcement.

MATHEMATICS (without specified computer goals)
Current: Hector has moderate scores on a problem-solving test. He is assigned to class group 2.
Goals: Hector will work positively, and be achieving successes at the group 2 level with support.

SOCIAL DEVELOPMENT (without specified computer goals)
Current: Hector has developed friendship with his peers.
Goals: Hector will be achieving in class. Buddies working with him will learn to adapt to his reading and writing levels.

Contd . . .

COMPUTER
Current: Hector uses Microsoft Word word processing.
Goals: He will use Office 97 and work towards the independent use of voice-activated software.

Home Video Round 1

Length of computer use at home: 6 months with laptop supplied by the Ministry of Education and 10 years with the family's personal computer.
Home site: Temporarily in the parents' bedroom.
People with Hector: Mother.
Activity: Writing a story, using the mouse and the keyboard to operate the program. Hector typed, highlighted, corrected (back typed), and printed.
Interaction: Mother helped Hector with spelling, and encouraged him by saying "Well done" when he completed correcting a word. They also asked each other questions relating to what to include in the story, such as what sports Hector liked.

Home Video Round 2

Home site: In the study.
People with Hector: The study observer only.
Activity: The exercise he is doing is word processing, writing a story about his participation in a rugby team. He enquires into the correct spelling of some words, and writes, self-corrects, and accepts given corrections.
Interaction: Hector interacts with his observer by answering questions such as "What can you write about?", to which he answers "Rugby", and in response to "What colours are your team?" Hector replies "White, red, and blue".
Hector answers questions about the software, so demonstrating his knowledge. For example, in reply to "Where is text help?", a question from the observer enquiring if the program is still working, he redisplays the program to show that it is open.

School Video Round 1

Length of computer use at school: 7 months.
School site: In a separate room.
People with Hector: The study observer.
Activity: Using the full range of keys, Hector writes a story and then highlights the text, changes the font size, and describes how he goes about printing it, if a printer was connected to the computer.
He pays constant attention when working on his story.
Interaction: He answered questions about whether he had used the software before this term, and replied "No" to the question whether he needed help in spelling a word. Upon getting the word right, the TA says "Well done". He talked about the story, describing the contents of the next sentence when asked about what it was going to describe.

School Video Round 2

School site: In a separate room.
People with Hector: TA.
Activity: Writing, and Hector concentrates on the words he is writing.
Interaction: The TA guides Hector by suggesting words he can use and he includes them in his work. The TA further suggests actions on the computer such as "Cancel that" in referring to an action with the file that Hector no longer wants; Hector complies and presses the cancel button for that action.

Computer Use

- Ownership/source of computer:
  School—Ministry of Education via SES.
  Home—private family.
- When computer is used:
  Laptop available at home and school, school PC at school.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always uses in speech all letters, own name, and simple words and sentences	✔	✔	✔	✔
	Always (H) sometimes (S) uses complex words and stories/directions in speech	✔	✔	✔	✔
Visual (reading)	Always understands the concept of letters, recognises all letters, own name, and simple words	✔	✔	✔	✔
	Sometimes (H) often (S) recognises complex words	✔	✔	✔	✔
	Always (H) often (S) recognises simple sentences without help	✔	✔	✔	✔
	Sometimes (H) often (S) recognises complex stories/directions without help	✔	✔	✔	✔
	Sometimes recognises errors without help	✔	✔	✔	✔
Written	Always types own name and all letters without help	✔	✔	✔	✔
	Sometimes (H) often (S) types simple words without help	✔	✔	✔	✔
	Sometimes (H) never (S) types complex words without help	✔	✔	✔	✔
	Sometimes types short sentences without help	✔	✔	✔	✔
	Never types a long story without help	✔	✔	✔	✔
	Always uses other keys such as delete without help	✔	✔	✔	✔
	Sometimes (H) often (S) uses capitals, spaces, full stops, and edits work without help	✔	✔	✔	✔

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Can understand the idea of number symbols, recognise all numbers and maths symbols and equations without help		✔		✔
Oral	Can understand the idea of number symbols, recognise all numbers and maths symbols and equations without help		✔		✔
Written	Can understand the idea of number symbols, recognise all numbers and maths symbols and equations without help		✔		✔

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Often (H) always (S) confident when using a computer	✔	✔	✔	✔
	Calls attention to performance and shows pride in actions and achievements		✔		✔
Self-management	Always pays attention when working on the computer	✔	✔	✔	✔
	Sometimes completes tasks without encouragement	✔	✔	✔	✔
	Shows when annoyed when using the computer		✔		
	Uses computer programs to talk about feelings		✔		
Motivation	Always enjoys using the computer	✔	✔		✔
	Pleased when finishes a task on the computer		✔		✔
	Like to try out new ideas and programs on the computer		✔		✔
Social and communication	Recognises and greets familiar people		✔		✔
	Always listens to and follows skill-appropriate questions	✔	✔		✔
	Imitates appropriate actions on the computer		✔		✔
	Responds to "yes", "no" questions and "look at" statements		✔		✔
	Always responds to "what", "why", "how many" questions	✔	✔	✔	✔
	Uses body language to indicate general response		✔		✔
	Always verbalises to indicate general response	✔	✔	✔	✔
	Indicates program options wanted by body language		✔		✔
	Always indicates verbally options wanted	✔	✔	✔	✔
	Always (H) sometimes (S) asks for help with computer	✔	✔	✔	✔
	Can wait and takes turns with computer		✔		✔
	Can show others how to do things on the computer		✔		✔

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Able to fixate on moving and stationary objects		✔	✔	✔
	Always responds to sounds from the computer	✔	✔	✔	✔
	Can recognise common sounds, shapes, sizes, colours, objects, and pictures, without help		✔	✔	✔
Matching and classifying	Can match objects and sounds on the screen without help		✔	✔	✔
	Can group objects on the screen and recognise out-of-order pictures without help		✔	✔	✔
	Understands that symbols on a screen represent ideas		✔	✔	✔
	Always able to indicate objects/functions on screen without help	✔	✔	✔	✔
	Always able to generalise object and pictures into real life	✔	✔	✔	✔

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always understands that actions on keys or switches cause effects	✔	✔	✔	✔
	Always turns a computer on/off without help	✔	✔	✔	✔
	Always uses a standard mouse and keyboard without help	✔	✔	✔	✔
	Can use a single and double switch without help		✔		✔
	Always finds, loads, selects options, and operates programs without help	✔	✔	✔	✔
	Always changes volume and font, saves, and prints without help	✔	✔	✔	✔
	Can solve problems on computer (as long as it's easy)		✔		✔
Software	Text Help Microsoft Works	✔			
	Microsoft Publisher			✔	
Hardware	Laptop	✔			
	Personal computer			✔	

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.*				
	They were however stated in the round 1 CVs.				
	Computing				
	Often now able to troubleshoot problems.			✔	
	Social and communication				
	Always imitates skill-appropriate actions now.	✔		✔	
	Uses body language to indicate answers.			✔	
	Always responds to "yes", "no" questions now.	✔		✔	
	Self-management				
	Now noted as often showing pride in work.	✔		✔	
	Now often shows pleasure when using the computer.	✔			
	Now always likes to try new programs.	✔			
	Mathematics				
	Always can type and use any number.			✔	
	Software usage				
	Expanded use of software, now using MS "Microsoft Publisher".				✔

Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **Self-management** Confident in computer use (up from often to always). Always completes tasks without encouragement (up from some times (S) and often (H)). **Language** Often can recognise stories (up from sometimes). Often can recognise simple words (up from sometimes). Sometimes writes complex words at school (up from never) (sometimes at home in rounds 1 and 2). Sometimes writes stories without help (up from never). Now always (H) often (S) uses capital letters, spaces, and full stops (up from sometimes).	✔ ✔ ✔ ✔ ✔		 ✔ ✔ ✔ ✔	
Summary	**Improvements noted against the IEP** Hector is using an expanded set of software to increase his options for work with language and images. **Other improvements** Hector is more confident in general computer use, and more likely to show pride in what he achieves on the computer. He is also much more likely to complete tasks on his own without encouragement. His language skills have increased. He can recognise simple and complex words and read stories. He also will now sometimes begin writing without being prompted, and uses punctuation in his written work.				

(Larry—10 years 3 months)

Communication and social interaction: Larry is verbally able with an amazing memory for number sequences.
Learning: Larry has poor fine motor skills which impact on his handwriting in terms of presentation and speed. Larry seems to learn from visual cues rather than words. Larry has always struggled and lost confidence in his ability for a while. He began to make some progress again in 1997.
Mobility: Larry is independently mobile.
Daily living activities: Larry is independent in all activities of daily living and self-care.

Using the criteria outlined at the start of this report Larry has been classified as having high needs in the areas of learning and cognition.

IEP GOALS

ORAL LANGUAGE (not included)

READING
Current: Larry uses the word processor for reading. He reads at age level 8.5 to 9.5. He enjoys reading and has good comprehension.
Goals: To use the word processor, text, and buddy reader to develop his reading level to age 10.

WRITTEN LANGUAGE
Current: Larry uses full stops and capitals. He enjoys writing stories and letters. His spelling is at age 7.
Goals: Larry will learn to use other forms of punctuation when word processing. He will explore a range of genre. He will learn new spelling words each week to be tested at home.

MATHEMATICS (not included)

SOCIAL DEVELOPMENT
Goals: A successful buddy reader relationship will be developed with Larry.

Home Video Round 1

Length of computer use at home: 20 months.
Home site: In a hallway.
People with Larry: Sister.
Activity: Larry is working on 2 programs during the observation; the first is a movement game and the second is exploring aspects of the human body.
Larry is consistently operating the computer, finding programs, and opening them for use.
Interaction: Between Larry and his sister interaction is occasional, such as her guiding him by showing a command to achieve an action on the computer, and sharing the disk handling when changing programs that are based on disk. They both concentrated on what was happening on the screen.

Home Video Round 2

Home site: In a hallway.
People with Larry: The study observer only.
Activity: Word processing a story about weekend activities. He concentrates fully on the writing and self-corrects some spelling errors and includes spaces and full stops in the sentences.
Larry opens up the software for word processing after turning on the computer and monitor, and displays competent use of both mouse and keyboard. He also operates the functions of printing, saving, font-size changing, and escaping from functions options that he changes his mind about or got into unintentionally.
Interaction: Larry interacted with the observer and answered questions that were related to what he is writing, such as "Can you find the word 'teach' in your story?" Larry went to that word in the text and was asked "Is it spelt correctly?" Answering that it was not, Larry went on to correct the spelling.

School Video Round 1

Length of computer use at school: 2 years.
School site: At the back of the classroom.
People with Larry: Study observer only.
Activity: Writing a story, during which he shows his ability to self-edit and correct words that he initially spells incorrectly.
Larry goes straight to turning on the computer, using mouse and keyboard to select the program and open it. After writing the story he knows some of the process for saving and printing his work.
Interaction: He always listens to suggestions and questions and acts on them in terms of correcting sentence structure, such as adding full stops.

School Video Round 2

School site: At the back or side of the classroom.
People with Larry: TA.
Activity: Word processing, and Larry is typing words fairly competently. He does not always begin sentences with capitals, but does self-correct some errors as well as fix mistakes after prompting by his TA.
Larry opens the program, saves his story when he is asked to, changes the font and font size, and finds and opens the file after saving it, to demonstrate his ability to manage his work on a computer.
Interaction: When asked by the TA, Larry reads out his story; the TA then reads it to demonstrate the correct pronunciation of all the words. He was asked "How do you finish a sentence?" when he had missed putting in a full stop. Larry goes to the end of the indicated sentence, sees that he had not placed a full stop there, and does so. Larry regularly follows instructions and answers questions.

Computer Use

- Ownership/source of computer:
  School—Ministry of Education via SES.
  Home—private family computer.

- When computer is used:
  Private computer at home always available.
  Ministry of Education computer at school during term and home during holidays.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always understands the concept of letters, all letters, own name and simple words		✔	✔	✔
	Uses complex words in speech without help		✔		✔
	Always uses in speech simple sentences without help		✔	✔	✔
	Always uses in speech complex stories, and directions without help		✔		✔
Visual (reading)	Always understands the concept of letters, all letters, own name, and simple words	✔	✔	✔	✔
	Always (H) often (S) recognises complex words without help	✔	✔	✔	✔
	Always recognises simple sentences without help	✔	✔	✔	✔
	Always recognises complex stories, and directions without help	✔	✔		✔
	Often recognises errors without help			✔	✔
Written	Always types own name without help	✔	✔	✔	✔
	Always types all letters and simple words without help		✔	✔	✔
	Always uses other keys such as delete without help	✔	✔		✔
	Often begin names with capitals, leaves spaces, and uses full stops without help (sometimes at school)		✔	✔	✔
	Sometimes can unjumble short sentences and correct mistakes on the computer with help		✔	✔	✔
	Sometimes can type complex words with help		✔	✔	✔
	Always types a short story with standard keyboard without help		✔	✔	✔
	Often able to edit work without help		✔	✔	✔

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Always understands the concept of numbers, and recognises simple numbers (1–5)		✔	✔	✔
	Recognises all numbers, and maths symbols and equations without help		✔		✔
Oral	NA				
Written	Types simple numbers without help		✔	✔	✔

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Always confident when using the computer	✔	✔	✔	✔
	Calls attention to performance and is proud of work		✔		✔
Self-management	Always pays attention when working on the computer	✔	✔	✔	✔
	Always completes tasks without encouragement	✔	✔	✔	✔
	Can show when annoyed when using the computer		✔		✔
	Uses the computer programs to talk about feelings		✔		✔
Motivation	Always enjoys using the computer	✔	✔		✔
	Always expresses pleasure when a task is completed	✔	✔		✔
	Often likes to try out new ideas or programs	✔	✔		✔
Social and communication	Can recognise and greet familiar people		✔	✔	✔
	Always listens to and follows skill-appropriate directions	✔	✔	✔	✔
	Always imitates skill-appropriate actions	✔	✔	✔	✔
	Always responds to "yes", "no", "look at", "what", and "how many" questions		✔	✔	✔
	Can use body language and vocalisation to answer skill-appropriate questions		✔	✔	✔
	Always indicates options wanted by body language and verbalisation	✔	✔		✔
	Often asks for help on the computer	✔	✔	✔	✔
	Can wait for turn with computer, and show people how to do things on a computer		✔		✔

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always able to fixate on stationary and track moving objects	✔	✔	✔	✔
	Alway recognises and responds to sound	✔	✔	✔	✔
	Always recognises shape, size, colour, pictures, and objects, without help	✔	✔		✔
Matching and classifying	Always recognises matching objects without help	✔	✔		✔
	Always matches sounds and objects on the screen, and classifies objects into groups without help	✔	✔		✔
	Can recognise out-of-order objects on screen without help		✔		✔
	Can understand that symbols on the screen represent ideas		✔		✔
	Can identify the use of objects/pictures on screen without help		✔		✔
	Can generalise sounds and pictures on the screen to things around him		✔		✔

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always understands that actions on keys cause effects	✔	✔	✔	✔
	Always turns computer on and off	✔	✔	✔	✔
	Always uses a standard keyboard and mouse without help	✔	✔	✔	✔
	Can use single and double switches without help (trackball S)		✔		✔
	Always able to find, load (including from CD), select, and operate programs	✔	✔	✔	✔
	Can change volume and font, print, save, and solve problems without help (alway saves and changes font at school)		✔	✔	✔
Software	The Logical Journey of the Zoombinis, The Magic School Bus (the Human Bus) (H)	✔			
	Clarisworks (S)			✔	
Hardware	Mac Performa 6360 (H)	✔			
	Apple Mac (S)			✔	

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however noted in round 1 CVs.*				
	Computing				
	Always recognises out-of-order pictures, generalises objects/ functions, generalises objects, pictures, and sounds to real life, and understands that symbols represent ideas.	✔			
	Always (H) often (S) able to troubleshoot problems with the computer without help.	✔		✔	
	Social and communication				
	Always able to give directions to family and teacher about computer use and always takes turns and shares computer use.	✔		✔	
	Self-management and esteem				
	Always calls attention to performance and shows pride in actions and achievements.	✔		✔	
	Language				
	Always uses stories and directions in speech without help.	✔		✔	
	Mathematics				
	Always recognises any number, maths symbols, and equation without help.	✔			✔

Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **Social and communication** Now always asks for help when using the computer up from often. **Self-management and self-esteem** Always likes to try out new programs, games, and ideas (up from often). **Language** Always uses complex words in speech without help, help was needed in round 1. Often writes complex words without help (up from sometimes).	✔ ✔ ✔		✔ ✔ ✔	✔
Summary	**Improvements noted against the IEP** Larry has expanded his vocabulary and is more often using a greater variety of words, including complex words. **Other improvements** Larry had expanded his social, communication, and motivation skills when using his computer. He is now more likely to ask for help when it is needed, explore new things on the computer, and in general communicate more about computer activities with the people around him.				

(Ellie—8 years 7 months)

Communication and social interaction: Ellie is outgoing and active.
Learning: Ellie is challenged by a reduced concentration span and a reduced ability to plan, organise her thoughts, and think abstractly. This has meant that developing a writing process has been difficult for Ellie and her support team. She is physically not able to produce print.
Mobility: Ellie is wheelchair-dependent around the community and within school. She is able to walk very short distances within the room. She requires support for transfers in and out of her chair.
Daily living activities: Ellie requires support for toileting and dressing.

Under the Ongoing Resourcing Scheme Ellie has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: Ellie's speech is clear but in a monotone and hesitant. She tends to lose fluency. She will self-correct if she is aware of errors.
Goals: She will develop speech structure, categorisation skills, intonation, and verbal expression through mind mapping and brainstorming of ideas, using categorisation resources, role playing, reading, and modelling of short phrases.

READING (without specified computer goals)
Current: Ellie is reading journals at an 8- to 9-year level. Her reading is not fluent.
Goals: She will gain fluency through working within the class programme.

WRITTEN LANGUAGE (without specified computer goals)
Current: Ellie has creative ideas for dictation. She occasionally uses handwriting. Her letter formations are excellent.
Goals: Ellie will stay on task, increase her output, and develop independence through working within the class programme.

MATHEMATICS (without specified computer goals)
Current: Ellie can count to 50. She is beginning to understand subtraction, addition, and multiplication.
Goals: To establish the basic facts for numbers up to 20 with Ellie. She will develop the ability to add and subtract up to 2-digit numbers. She will extend her rote counting to 100. This will be achieved through working within the class programme.

SOCIAL DEVELOPMENT (not included)

Home Video Round 1

Home site: In the kitchen.
People with Ellie: Grandmother.
Activity: Typing words to form a sentence.
Interaction: Ellie provides verbal responses to the questions, yet needs a lot of encouragement to write and spell correctly all the time.

Home Video Round 2

Home site: In the kitchen.
People with Ellie: Mother.
Activity: Writing a story about a family event.
Interaction: Ellie's mother is constantly guiding and prompting Ellie with the words to use next, their spelling, and the placement of spaces and full stops in sentences. For example, when Ellie misspells a word, her mother asks "Where's the letter 'S'?" to prompt Ellie into realising it was missing from the word.

School Video Round 1

School site: On a library desk.
People with Ellie: TA.
Activity: Typing words, and using caps, punctuation, and basic format (lines) in her writing.
Interaction: Ellie takes time to find the keys and needs encouragement to work on the writing. She responds verbally to the questions put to her by the TA.

School Video Round 2

School site: In a separate room.
People with Ellie: TA.
Activity: Writing about a holiday experience.
Interaction: The TA prompts Ellie by asking her what aspects of her holiday she would like to write about. Initially the TA writes down the things Ellie wants to write about so that Ellie can use this as a reference point during her writing activity. Ellie answers the questions put to her, and responds slowly to the prompting. There is some reluctance to use the machine for typing and her work over all is very slow and laborious.

Computer Use

- Ownership/source of computer:
  Ministry of Education via SES
- When computer is used:
  It is a portable and goes home with Ellie at night and with her to school each day.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always (H) sometimes (S) reads/uses own name without help	✔	✔	✔	✔
	Always (H) sometimes (S) reads some letters	✔	✔	✔	✔
	Always reads simple words and simple sentences	✔	✔	✔	✔
	Often (H) never (S) reads stories without help	✔	✔	✔	✔
	Often reads all letters	✔	✔		✔
	Often (H) sometimes (S) uses in speech complex words without help	✔	✔	✔	✔
Visual (reading)	Always (H) often (S) understands concept of letters, recognises own name, and some letters without help	✔	✔	✔	✔
	Often recognises all letters	✔	✔	✔	✔
	Often (H) sometimes (S) recognises simple words	✔	✔	✔	✔
	Often recognises simple sentences and directions without help	✔	✔		
	Sometimes recognises complex words, stories, and directions	✔	✔		✔
	Sometimes recognises and corrects errors with help	✔	✔	✔	✔
Written	Always (H) never (S) leaves spaces and uses full stops without help	✔	✔	✔	
	Often (H) sometimes (S) types own name	✔	✔	✔	✔
	Often types some letters, whole alphabet, and simple words without help	✔	✔	✔	✔
	Sometimes (H) never (S) types complex words without help	✔	✔	✔	✔
	Often (H) sometimes (S) begins names with a capital letter and uses other keys such as delete without help	✔	✔	✔	✔
	Sometimes (H) never (S) types short stories, and edits work	✔	✔	✔	✔

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	NA				
Oral	Often (H) sometimes (S) reads/uses in speech simple numbers	✔	✔	✔	
	Sometimes uses any number without help	✔		✔	
	Can recognise all numbers and maths symbols and equations		✔		
Written	NA				

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Sometimes shows confidence during computer use	✔	✔	✔	✔
	Sometimes shows pride in actions and achievements	✔	✔		
Self-management	Sometimes (H) often (S) pays attention	✔	✔	✔	
	Sometimes displays displeasure verbally re computer use		✔		✔
	Never completes task without encouragement	✔	✔		
	Never uses computer programs to talk about feelings	✔	✔		✔
Motivation	Sometimes shows enjoyment, and expresses pleasure from computer use	✔	✔		✔
Social and communication	Always recognises and greets familiar people	✔	✔	✔	✔
	Always (H) often (S) listens to and follows skill-appropriate questions and directions	✔	✔	✔	✔
	Always imitates skill-appropriate actions	✔	✔		
	Always responds to "yes", "no" questions, "look at" statements, "what", "how many", "which", "why" questions	✔	✔	✔	
	Always (H) often (S) uses body language and verbalisation to respond to skill-appropriate questions and directions	✔	✔	✔	✔
	Often indicates which program/game option is wanted by vocalisation, body language, and gestures	✔	✔		✔
	Sometimes gives peer, family, and teacher directions about the computer	✔	✔		✔

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always able to fixate on stationary objects, moving objects, and recognise and respond to sounds	✔	✔	✔	✔
	Always (H) often (S) recognises common shapes without help	✔	✔	✔	✔
	Always recognises common pictures without help		✔	✔	✔
	Can recognise common size and colour without help		✔		
Matching and classifying	Can classify, recognise, and understand symbols and objects, and group them by function		✔		

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always (H) sometimes (S) turns the computer on and off without help	✔	✔	✔	✔
	Often uses the return key and standard keyboard without help	✔	✔	✔	✔
	Often finds programs and games, selects options in a program and operates it without help	✔			✔
	Sometimes prints without help		✔	✔	
	Can save files and solve problems with the computer, with help		✔		✔
	Always understands that pushing a switch or key makes something happen with a computer		✔	✔	✔
	Always can use a standard mouse		✔	✔	
Software	Microsoft Word	✔		✔	
Hardware	Alpha smart	✔			
	Personal computer			✔	

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.*				
	They were however stated in round 1 CVs.				
	Social and communication skills				
	Often asks for help now when working on the computer.	✔		✔	✔
	Often now take turns when using the computer.			✔	✔
	Mathematics				
	Always recognises the numbers 1–20.	✔		✔	
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.*				
	Computing				
	Often confident when using a computer (up from sometimes).			✔	
	Often expresses pleasure and displeasure when using a computer (up from sometimes).	✔			
	Language				
	Always recognises all letters and simple words (up from often).			✔	
	Often recognises errors in her work and corrects them (up from sometimes).			✔	
	Always able to type some letters (up from often).	✔		✔	
	Mathematics				
	Always reads and uses in speech the numbers from 1–20 without help (up from often).			✔	

Summary	**Improvements noted against the IEP** Ellie has established the basic facts about numbers up to 20, meeting one of her IEP goals in mathematics. Ellie has gone some way towards meeting her language goals, through increasing her letter and word recognition and use, and through improving her independence during work by increasing her own recognition of errors made during typing. **Other improvements** In the area of social and communication skills, Ellie is more likely now to involve others in her work through sharing and asking for help. In regards to computer use, her confidence has increased, and she will express more often how she feels when working on a computer.				

(Tony—10 years 5 months)

Communication and social interaction: Tony's expressive communication is severely affected by a moderate dysfluency. As a result of a stutter he is reluctant to communicate with people with whom he is not familiar, or in front of groups. He is described by his family as shy with strangers. His receptive language level is functional.
Learning: Tony enjoys school-based activities. When he is interested in a task, he performs at a very impressive level given the limits of his disability. He enjoys imaginative interaction through drama, play, and singing. He learns best through a combination of visual and auditory instruction. He has the most success when writing and recording, using his computer.
Mobility: Tony is independently mobile.
Daily living activities: Tony is independent in all activities of daily living and self-care.

Under the Ongoing Resourcing Scheme Tony has been verified as having very high needs.

IEP GOALS

ORAL LANGUAGE
Current: Tony speaks clearly and fluently to his peers, teacher, and TA. He is less confident with people he does not know.
Goals: Tony's communication with children he doesn't know very well will improve by having a new computer buddy each term. He will use more complex sentences.

READING
Current: Tony reads at an 8-year level. He can self-correct at this level. He does not retell stories.
Goals: To improve Tony's reading comprehension to an 8- to 9-year level, story retelling, phrasing, and punctuation using interactive stories.

WRITTEN LANGUAGE
Current: Tony writes 1 or 2 sentences unaided, and he sometimes checks spelling.
Goals: To increase Tony's motivation to write longer stories. To write stories directly on to the computer using a word processor and to check his spelling.

MATHEMATICS
Current: Tony reads the numbers 1 to 20 confidently. He understands place value. He performs single digit addition and subtraction with concrete materials.
Goals: To use Maths Blaster and computer games with Tony to develop his basic numeracy, e.g., understanding of basic facts for numbers 0 to 10, simple addition and subtraction, and counting in 1s and 10s.

SOCIAL DEVELOPMENT
Current: Tony mixes with children in his own class and in other classes.
Goals: Extend the range of people Tony has contact with through working with others on the computer.

Contd . . .

COMPUTER
Current: Tony is using a standard keyboard, mouse, and story writing software.
Goals: To develop Tony's keyboard and fine motor skills towards using word-processing software.

Home Video Round 1

Length of computer use at home: 2 years.
Home site: Tony's room.
People with Tony: Father.
Activity: Tony is at home, in his room, with the computer on a desk, with his father encouraging him to write words and draw a picture.
Tony uses the computer comfortably and naturally, turning it on and off, and loading and unloading disks.
Interaction: Father asks "What's the computer doing now?" Tony answers "Loading".
Tony responds to operating instructions such as "Go down to select", in response to his father helping him find and choose a program option.
Tony operates the program by selecting and applying options to this picture he is building as part of his story.
In a maths program some errors are made, e.g., miscounting the number of petals on a flower exercise. His father asks if Tony would go back and count more carefully and slowly and count correctly, but Tony says "No" and carries on. He does follow some instructions from his father, Tony went to print a screen, his father said "No, do not print the screen", and Tony followed that instruction.
(Father comments he has only seen this program once.)
Father suggests "Put sound with that person" in a storybook picture. Tony associates a figure with a bell and when he clicks on the figure a bell sounds. His father encourages him with a "Well done—you did it".
Tony's father then encourages him to type the story sentence and helps his typing by assisting Tony with his spelling.

Home Video Round 2

Home site: Tony's room.
People with Tony: Father.
Activity: Drawing a picture for a story using the Story Book Weaver program. Tony shows competency with the equipment, turning on the computer, monitor, and printer, and placing the disk in the compact disk drive as part of loading the software.
Interaction: Tony begins the exercise by reading aloud a handwritten copy of the story. There is a lot of discussion between Tony and his father about the picture when Tony decides to include an image of a boy to represent himself in the story. Tony's father says "Find someone who looks like you" to place in the picture from the library of images that are part of the program. Tony's first selection is a boxer wearing boxing gloves; his father says "You don't go to the shop looking like a boxer" and tells Tony to select a new image. When Tony selects a boy in a surfing position, his father comments "Yeah are you happy with that?" Tony replies that he is, and they move on to add other elements to the picture.

School Video Round 1

Length of computer use at school: 5 years.
School site: On the student's desk.
People with Tony: TA and friend.
Activity: Tony, TA, and a friend are in a corner of the classroom, with a computer on a desk. They are seated beneath 2 signs which read:
"Welcome to N & J computer corner"
"Ask us for a demonstration. We'll show you heaps of cool stuff that you can try."
This an example of Tony's keenness to share and show how to use the computer.
Tony is completing a writing and drawing exercise. Tony operates the mouse and on/off switch to get the computer going. The program Story Book Weaver is opened so that a short story can be written and a picture added.
Interaction: When looking for a character from the options to include in the picture, which is a forest, Tony selects a butler. The TA asks "Do you usually find a butler in the forest"? Tony replies "No", so goes looking for a more suitable option.
The discussion about what sort of character fits into the background picture selected turns to an archer. Tony thinks he knows where in the options the archer is and scrolls down to it.
Tony agrees to write a story when the TA asks "How about a story Tony?"
"Yep" he replies.
During typing Tony spells men as "mn". TA says "What goes between the 'm' and 'n'?"
Tony calls out "e", finds it, and places it between the "m" and "n".
There is regular prompting for Tony to finish. When asked by TA if he is going to save it, again he replies "Yep" and Tony operates pull-down menus and click buttons to save and turn the machine off.
His friend shows Tony several operations on the computer during the session, including icons to explore to check whether the sound is going, and how to exit an earlier program they used at the beginning of the session.

School Video Round 2

School site: At the back of the classroom.
People with Tony: TA.
Activity: A writing exercise that includes selecting words, font size, and how the text will look on the page. Tony confidently uses the mouse and keyboard to operate the program.
Interaction: The TA is very encouraging of Tony's work. There is constant discussion throughout the exercise, with Tony answering the TA's questions paying attention to her questions and the exercise.

Computer Use

- Ownership/source of computer:
  School—Ministry of Education via SES.
  Home—private family computer.

- When computer is used:
  Ministry of Education/SES computer at school during term, at home during holidays.
  Home computer at home during term.

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always (H) often (S) can read/use in speech numbers 1–20 without help	✔	✔	✔	✔
Visual (reading)	Always (H) often (S) understands the idea of numbers	✔	✔	✔	✔
	Always recognises numbers 1–5	✔	✔	✔	✔
	Often recognises numbers 6–20	✔	✔		✔
	Can recognise numbers 21–100, any number, with help		✔		✔
	Can recognise maths symbols and equations without help		✔		✔
Written	Sometimes types the numbers 1–5			✔	

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Always understands the concept of letters, and recognises some letters	✔	✔	✔	✔
	Often (H) always (S) recognises all letters	✔	✔	✔	✔
	Often recognises simple words	✔	✔	✔	✔
	Sometimes recognises and reads complex words	✔	✔	✔	✔
	Often recognises simple sentences	✔	✔	✔	✔
	Sometimes recognises errors without help	✔		✔	✔
	Always reads his name without help		✔	✔	✔
	Can read complex stories without help		✔		✔
Oral	Often uses in speech all letters without help	✔	✔	✔	✔
	Always uses simple words without help	✔	✔	✔	✔
	Always (H) often (S) reads/uses in speech simple sentences/ directions	✔	✔	✔	✔
	Sometimes reads/uses in speech stories	✔	✔		✔
	Sometimes reads/uses in speech complex words			✔	✔
Written	Always types some letters without help	✔	✔	✔	✔
	Often (H) always (S) types simple words	✔	✔	✔	✔
	Sometimes types complex words	✔	✔	✔	✔
	Sometimes (H) never (S) types short sentences without help	✔	✔	✔	✔
	Never types a story without help	✔		✔	
	Always use other keys such as delete without help (H) with (S)	✔	✔		✔
	Sometimes uses capitals, and spaces	✔	✔	✔	✔
	Sometimes edits work without help	✔	✔	✔	✔

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Always confident when using the computer	✔	✔	✔	✔
	Often calls attention to performance on computer	✔	✔	✔	✔
	Often (H) always (S) shows pride in actions and achievements	✔	✔	✔	✔
Self-management	Always pays attention when working on computer	✔	✔	✔	✔
	Often completes tasks without encouragement	✔	✔	✔	✔
	Can show when annoyed while using the computer		✔		✔
Motivation	Always enjoys using the computer	✔	✔	✔	✔
	Always(H) often (S) expresses pleasure when task is completed	✔	✔	✔	✔
	Always uses computer programs to help talk about feelings	✔		✔	✔
	Often likes to try out new programs/ideas	✔	✔	✔	✔
Social and communication	Always greets and recognises familiar people	✔	✔	✔	✔
	Always (H) often (S) listens to and follows skill-appropriate directions/questions, and imitates skill-appropriate actions	✔	✔	✔	✔
	Always responds to "yes", "no" questions, look at statements, "what", "why", and "how" questions	✔	✔	✔	✔
	Always uses body language to indicate general responses to skill-appropriate questions	✔		✔	
	Always uses verbalisation to indicate general responses to programs, and options wanted.	✔	✔	✔	✔
	Always indicates by verbalisation program options	✔	✔	✔	✔
	Always indicates options by body language	✔		✔	
	Always asks for help if needed	✔	✔	✔	✔
	Often (S) always (H) gives directions about the computer	✔	✔	✔	✔
	Often can take turns waiting for the computer		✔	✔	✔

AREA	COGNITIVE DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always able to fixate on moving objects, stationary objects, responds to sound, recognises common sounds, shapes, sizes, colours, pictures, and objects without help	✔	✔	✔	✔
Matching and classifying	Always can match objects and sound	✔	✔	✔	✔
	Always understands that symbols represent ideas	✔	✔	✔	✔
	Always able to indicate objects/functions without help	✔	✔	✔	✔
	Always able to generalise objects, sounds, and pictures into real life	✔	✔	✔	✔
	Can group objects on the screen with help		✔		✔
	Always recognises out-of-sequence pictures on the computer			✔	

AREA	COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Computer skills	Always understands that actions on keys or switches cause effects	✔	✔	✔	✔
	Always turns computer on and off without help	✔	✔	✔	✔
	Always uses standard keyboard and mouse to operate computer without help	✔	✔	✔	✔
	Often uses *clicker plus* without help	✔			
	Always finds games and programs without help	✔	✔	✔	✔
	Always loads, selects, operates, and changes volume without help	✔	✔	✔	✔
	Always loads CD ROMs without help	✔			
	Can use single and double switches		✔		
	Can change font, print		✔		✔
	Often saves files		✔	✔	✔
	Sometimes solves problems on the computer without help		✔	✔	✔
Software	Story Book Weaver, James Discovers Math	✔		✔	
Hardware	Apple Mac 1600 performa, Apple Mac 6360 performa with mouse, and PC Pentium 200	✔		✔	

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however stated in round 1 CVs.* **Computing** Can now always print without help at school and change font often without help at home and school. **Language** Now observed as often being able to recognise complex stories.			✔ ✔	
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **Self-management/self-esteem** Tony always calls attention to his performance (up from often). **Language** Now always recognises simple words, up from often. Often now recognises errors without help (up from sometimes). Always, up from often, reads, types, and uses in speech all letters without help. Often begins names with a capital letter and leaves spaces and full stops. Often edits his own work without help (up from sometimes). **Mathematics** Always recognises the numbers 6–20 without help (up from often).			✔ ✔ ✔ ✔ ✔ ✔ ✔	
Summary	**Improvements noted against the IEP** Tony has developed language skills that go towards his IEP goals, and his reading has improved so that he can more readily read words and stories. His writing has improved through an increased recognition of errors he makes, and the self-editing and correction of his written work. Punctuation has also improved. In relation to his goals in mathematics, Tony has increased number recognition and use, such as knowing what size font was to be used in writing and how the font size would show on the screen for readability. Tony has developed his computer use skills, such as printing his work and selecting type face. Tony's social development has moved towards a main IEP objective, that of overcoming his shyness as stated in the observations; he now is more willing to call other people's attention to his work on the computer.				

(Will—10 years 10 months)

Communication and social interaction: Will has a moderate to severe communication delay affecting both his receptive and expressive communication. He is making slow but steady progress in these areas with ongoing support from a speech language therapy programme.
Learning: Will is challenged in all areas of learning, but is always keen to participate to his optimum level of functioning. He requires regular re-cueing to remain on task, and is supported by a teacher's aide in the classroom. The classroom teacher oversees an enriching inclusive programme based on social interaction and functional reading, mathematics, and writing programmes.
Mobility: Will is independently mobile.
Daily living activities: Will is independent in all activities of daily living and self-care.

Under the Ongoing Resourcing Scheme Will has been verified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: (Not listed)
Goals: To transpose some of Will's reading knowledge to his speech. He will read on to a tape so that he can listen to himself and improve fluency.

READING
Current: Will enjoys reading by himself. He is reading at a 5.5- to 6-year level. He can use syllables.
Goals: For Will to continue to enjoy reading. For Will to read for meaning and to cross check for visual or structural cues. The TA will assist Will with close reading and deciding between 2 word choices for sentences. He will read more independently using reading software.

WRITTEN LANGUAGE
Current: Will is able to write in sentences with support.
Goals: For Will to become more independent. He will practise writing daily using verb endings (especially "ing") and prepositions (in, on, etc.). He will complete homework tasks independently on his computer. He will use clipart software to illustrate and present his work in the same way as his peers.

MATHEMATICS (without specified computer goals)
Current: Will has made progress using the SES Social Maths programme.
Goals: He will continue with daily tasks using the SES programme. He will independently complete tasks.

SOCIAL DEVELOPMENT (without specified computer goals)
Current: Will has good social skills; he has made new friends and is keeping old friendships.
Goals: For Will to complete tasks independently. To achieve this he will complete one task independently each day. He will help decide which task, and monitor his completion of tasks. He will be rewarded if he completes 5 tasks independently each week.

Contd . . .

COMPUTER
Current: (Not listed)
Goals: For Will to use the computer daily so that he will become computer literate.

Home Video Round 1

Home site: The kitchen.
People with Will: Mother.
Activity: Will's mother prompts him to push the "On" switch to turn on the computer, which he does.
Will points to objects on the screen to show to his mother what he has achieved.
Will answers questions, and completes a drawing of a person, drawing parts in response to such questions as "What are you going to draw Will?", "What colour are your eyes?", "What else have you got?"
Interaction: Mother offers suggestions such as "Use the letter keys to write not the (computer) pencil" when it comes to writing a name for the picture. In response to the question "Can you write the story?", he responds by writing "I am 11", and is prompted to put in a full stop.

Home Video Round 2

Home site: In the study.
People with Will: Mother.
Activity: Writing a story using the software Story Book Weaver. Alongside the story, Will attaches a picture to his text. Will operates the mouse to open and operate the software. He uses the keyboard to type the letters for his story at a slow pace.
Interaction: Will's mother began by asking him "Should we write a story?" and then "What about?" Will replied "Water—a lake". Questions such as "How do you spell lake?" are asked as Will misspells it; the correct spelling is discussed, and then the word is retyped. Will replies to the questions, by saying "Yep" to "Do we use capitals for a title?" and responds by capitalising the title. He follows instructions when looking for an image from the software's library of pictures; his mother says "Keep going" as Will scrolls along the options.

School Video Round 1

School site: The back of the classroom.
People with Will: TA.
Activity: Will is drawing a picture and writing a title for a cover page of a classroom project on whales. His first objective is to draw freehand a picture of a whale on the computer, copying it from a book. Will uses the computer "Pencil" to write letters on the screen, realises an error he drew in one of the letters, and fixes it. In writing his own name, he makes an error in capitalisation and self-corrects it.
Interaction: The TA frequently prompts by pointing to the screen to indicate what to do and verbally suggests letters for words. Will answers "No" to the question "Do you want to start again?" as the figure drawn goes a bit "Funny"; instead he uses the computer rubber to erase part of the drawing. The TA does some of the editing and changing program tasks to help Will get past options and controls with the computer that are unfamiliar to him.

School Video Round 2

School site: The back of the classroom.
People with Will: TA.
Activity: Writing a story.
Interaction: Begins with the TA asking "What is the story about?"; Will answers "About a lighthouse". The writing continues with encouragement from the TA, and discussion about the correct spelling of words.

Computer Use

- Ownership/source of computer:
  Ministry of Education via SES.
- When computer is used:
  At school during term, at home during the longer duration of holidays.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Always uses in speech his own name	✔	✔		✔
	Often (H) sometimes (S) uses some letters and simple words	✔	✔	✔	✔
	Sometimes reads/uses complex words	✔	✔		✔
	Never reads/uses in speech simple sentences without help	✔			
Visual (reading)	Always (H) often (S) understands letter concepts, all letters, and own name	✔	✔	✔	✔
	Often recognises simple and complex words (with help)	✔	✔	✔	✔
	Sometimes (H) often (S) recognises errors without help	✔		✔	
	Often recognises simple sentences	✔	✔	✔	✔
	Sometimes recognises complex stories			✔	
Written	Always types own name, and some letters	✔	✔	✔	✔
	Often (H) always (S) types whole alphabet and simple words	✔	✔	✔	✔
	Often types complex words		✔	✔	✔
	Always (S) never (H) types short sentences	✔		✔	
	Often (S) never (H) types stories with standard keyboard	✔	✔	✔	
	Often uses other keys such as delete	✔	✔		✔
	Sometimes (H) often (S) leaves spaces and full stops	✔	✔	✔	✔
	Sometimes (H) often (S) uses capital letters	✔	✔	✔	✔
	Sometimes edits work without help	✔			✔

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Often understands number symbols	✔	✔	✔	✔
	Sometimes recognises numbers from 1–20	✔	✔		✔
	Can recognise maths symbols and equations, and the numbers 21–100 and any number with help		✔		✔
Oral	Often reads simple numbers 1–20	✔	✔	✔	✔
	Can use in speech maths symbols and equations and numbers from 21–100 and any number with help		✔		✔
Written	Often writes simple numbers 1–5	✔	✔	✔	✔
	Sometimes writes numbers 6–20	✔	✔	✔	✔
	Can write numbers from 21–100, and any number and maths symbols and equations with help		✔		✔

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Always shows enjoyment, confidence, and pride in actions and achievements when using a computer	✔	✔	✔	✔
	Likes to use a computer to help talk about feelings				✔
Self-management	Often (H) always (S) calls attention to performance and pays attention	✔	✔	✔	✔
	Often expresses displeasure verbally	✔	✔		✔
	Shows pleasure, asks for help, and takes turns when using a computer		✔		✔
Motivation	Sometimes completes tasks without encouragement	✔	✔	✔	✔
	Often likes to try new programs/games and/ideas	✔	✔		✔
Social and communication	Always recognises and greets familiar people, responds to "look at" questions, and uses body language to express general response and options wanted	✔	✔	✔	✔
	Often listens to, follows, and imitates skill-appropriate actions	✔	✔	✔	✔
	Often (H) always (S) responds to "yes", "no", "what", "how many", and "why" questions	✔	✔	✔	✔
	Often (H) always (S) uses vocalisations to indicate general responses to computer programs	✔	✔	✔	
	Often vocalises options wanted, takes turns, and asks for help	✔	✔	✔	✔
	Shows classmates how to do things				✔

AREA	COGNITIVE DEVELOPMENT AND COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Recognising	Always fixates on moving and stationary objects, recognises and responds to sound and shapes	✔	✔	✔	✔
Matching and classifying	Often recognises common sizes, colours, and pictures	✔	✔	✔	✔
	Always recognises matching objects (with help SCV)	✔	✔		✔
	Often understands that symbols represent ideas and is able to indicate an object/function	✔	✔		✔
Computer skills	Always understands that actions on keys/switches cause effects	✔	✔	✔	✔
	Always uses a standard mouse	✔	✔	✔	✔
	Often uses a standard keyboard	✔	✔	✔	✔
	Sometimes finds and operates program (if well known)	✔	✔	✔	✔
	Often (H) sometimes (S) selects program options	✔	✔	✔	✔
	Sometimes operates a program	✔	✔	✔	✔
	Never able to troubleshoot problems without help	✔	✔		✔
	Able to turn on/off, use single switch, trackball, keyboard, Concept Keyboard	✔	✔	✔	✔
	Able to change volume, font, print, and save		✔		✔
Software	KidPix Studio, Story Book Weaver, various computer games	✔		✔	✔
Hardware	Not reported				

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.*				
	They were however noted in the round 1 CVs.				
	General cognition				
	Now observed as often able to classify objects into groups without help.	✔	✔	✔	✔
	Now observed as always able to recognise out-of-sequence pictures without help.	✔		✔	
	Computer skills				
	Now observed as often turning the computer on and off without help.	✔			
	Now observed as often able to change volume and font, save work and print it, and troubleshoot problems.	✔			
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.*				
	General cognition				
	Always now recognises common sizes and colour, up from often.	✔			
	Always understands that symbols represent ideas, up from often.	✔		✔	
	Computer skills				
	Uses the standard keyboard now always without help (up from often).	✔			
	Often now finds programs (up from sometimes).	✔		✔	
	Often loads programs and previously did not.	✔		✔	
	Social and communication				
	Always, up from often, listens to, and follows skill-appropriate directions and questions.	✔		✔	
	Always imitates skill-appropriate actions (up from often).	✔		✔	
	Always responds to "what", "how many", "which", and "why" questions (up from often).	✔		✔	
	Always indicates which program options are wanted by verbalisations (up from often).	✔		✔	
	Self-management/self-esteem				
	Often completes tasks without encouragement (up from sometimes).	✔		✔	
	Language				
	Always recognises simple words (up from often).	✔		✔	
	Often recognises complex stories (up from sometimes).	✔		✔	
	Always uses in language all letters and simple words (up from sometimes).			✔	
	Often reads and uses in speech simple sentences and directions, up from never being able to do this.	✔			
	Mathematics				
	Often can read and use the numbers 1–20 (up from sometimes).	✔			

Summary	**Improvements noted against the IEP** Will has moved towards achieving his IEP language goals through increasing his verbal use of words and sentences. A slight improvement in numbers skills was also observed which will contribute to the mathematics IEP goals. In terms of Will's social development, he has become more independent. **Other improvements** Cognition and recognition skills increased, in terms of identifying and grouping objects, sizes, colours, and symbols. Computer skills have also increased with better keyboard use and more ability to find and load programs, organise his work on the computer, and solve problems. Social and communication skills have also been improved in terms of listening, following instructions, responding to questions and indicating wants.				

(John—4 years 6 months)

Communication and social interaction: John has reduced verbal communication. He operates at a single-word level and uses a wide range of nonverbal communications. His receptive language understanding is at a higher level, and he is able to follow 1- and 3-step commands.
Learning: John requires 1-to-1 instructional support. When he goes to school he is likely to have an individualised programme, supported by a teacher's aide. A great deal of support is provided by his home for his learning programme.
Mobility: John is able to walk short distances with assistance around the home. He uses a mountain buggy for mobility around the community.
Daily living activities: John can feed himself with his fingers but requires assistance with utensils. He is not toilet trained.

As John was under 5 at the time of this research he did not have an Ongoing Resourcing Scheme verification. Using the criteria outlined at the start of this report John has been classified as having high needs.

IEP GOALS

ORAL LANGUAGE (without specified computer goals)
Current: John has a vocabulary of about 100 words and 2 or 3 phrases, e.g., "more please".
Goals: He will be encouraged to use more verbalisations such as greeting people. He will be prompted by using one more words than the length of the phrase he uses. He will be given 2 options and encouraged to choose.

READING (without specified computer goals)
Current: People are reading books to John. He imitates others' phrases.
Goals: To use the illustrations in books to encourage John to make choices. This will be achieved by talking about the illustrations in short phrases. He will be given a 2-option choice, e.g., "What is this, juice or milo?"

WRITTEN LANGUAGE (not listed)

MATHEMATICS (not listed)

SOCIAL DEVELOPMENT (without specified computer goals)
Current: He is able to make choices and show his feelings. He mixes with other children and is good at taking turns.
Goals: John will work with other children and interact with them in some way to increase opportunities for him to respond in group situations.

COGNITIVE DEVELOPMENT (without specified computer goals)
Current: John plays with simple cause-and-effect toys and follows simple instructions. He has difficulty identifying pictures, sorting objects, and recognising colours, sizes, or shapes. He recognises and names familiar people.
Goals: For John to have more experience with cause and effect. John will learn more about concepts such as sizes, numbers, shapes, colours, and directions. He will be encouraged in creative play. John will be encouraged to solve problems by pulling a string to select a toy and choosing objects from a group.

Contd . . .

COMPUTER
Current: (Not listed)
Goals: A technology assessment will be done with John to ascertain how he might use the computer.

Home Video Round 1

Home site: In the kitchen/living room.
People with John: Mother.
Activity: Naming activities, such as talking about pictures.
John begins with an exercise counting fish on the computer screen program. He was prompted at all times by his mother into saying the number in the counting program and repeatedly told "No, no, only one click" to make a selection.
He then went on to a program on naming animals, and named the animals, with some help from his mother, that were on the screen.
Interaction: John's mother prompts him by holding his hand and directing it on to the switch. She stops him banging on the switch and sets up the program with the observer from SES. John's mother is unfamiliar with computer operations, such as the double click function that will open and close computer programs. When working with John, she says he is "getting a bit push-button happy", and needs to attain more control on the operation of the program.

Note: John does not use a computer at the ECE centre he attends, so no data gathering was possible.

Home Video Round 2

Home site: At the end of a hallway.
People with John: Mother.
Activity: John works on a shape and sound identifier program, which includes such options as "Going to the Beach" and the items and activities that would be found there, and "Old MacDonald had a Farm" which includes images of farm animals. Another part of the program shows pictures of animals and plays back their sounds, such as a cat meowing, when the switch is clicked. John operates the program via a single switch. His mother set up the program after turning on the computer, so that he can operate it. All finding, opening, and closing of the program, as well as turning on the computer, is completed by John's mother.
Interaction: John's mother asks "Which one would you like?"; John replies "On the farm". "OK" replies his mother and she selects and opens that part of the program. John is reminded by his mother to use only one click to make his selection. When John does click on the animal, its sound is produced. His mother encourages John by saying "Good waiting" and "Good boy" when John stops multiple clicking on an animal and uses the one which is sufficient to operate the program correctly.
John displays his enthusiasm for the animal programs by singing along with the vocalisation of the song from the computer, and stating a preference to go to the animal section.

Computer Use

- Ownership/source of computer:
  Funded by Equipment Management Services (EMS)—Health Funding.
- When computer is used:
  The computer is always used at home.

AREA	LANGUAGE	Home		School	
		Ob	Rpt	Ob	Rpt
Oral	Never uses simple words without help Recognises his name with help, such as copying the voice on the computer that says his name	✔	✔ ✔		
Visual (reading)	NA				
Written	NA				

AREA	MATHEMATICS	Home		School	
		Ob	Rpt	Ob	Rpt
Visual	Never recognises simple numbers without help	✔			
Oral	Never speaks simple numbers without help	✔			
Written	NA				

AREA	SOCIAL DEVELOPMENT	Home		School	
		Ob	Rpt	Ob	Rpt
Self-esteem	Often shows enjoyment Sometimes is confident Calls attention to performance Shows pride in actions and achievements	✔ ✔	✔ ✔ ✔		
Self-management	Often pays attention when working on the computer Sometimes expresses displeasure verbally and physically Shows patience and can wait for the next picture in the program	✔ ✔	✔ ✔ ✔		
Motivation	Often completes tasks without encouragement and expresses pleasure when a task is completed Sometimes likes to try new programs	✔ ✔			
Social and communication	Always recognises and greets familiar people Often listens to, follows, and imitates skill-appropriate actions Often responds to "yes", "no", "look at" questions Often responds to "what", "how many" questions Often uses body language and vocalisations to indicate general responses to skill-appropriate questions Sometimes indicates what is wanted in a program by body language Never asks for help when needed Can take turns and wait for the computer	✔ ✔ ✔ ✔ ✔ ✔ ✔	✔ ✔ ✔ ✔		

AREA	COGNITIVE DEVELOPMENT AND COMPUTING	Home		School	
		Ob	Rpt	Ob	Rpt
Recognition	Always able to fixate on stationary objects	✔	✔		
	Always responds to sound	✔	✔		
	Often tracks moving objects, and recognises sound	✔	✔		
	Often understands that actions on keys cause computer effects	✔	✔		
	Sometimes recognises common shapes, and generalises objects to real life objects	✔	✔		
	Never recognises common colour, picture, objects without help	✔	✔		
Matching and classifying	I can match sound and objects on screen with help		✔		
Computer skills	Sometimes uses a single switch without help	✔	✔		
	Sometimes operates programs, e.g., turns a page without help	✔	✔		
	Often understand that actions on keys cause effects on computers	✔	✔		
Software	Intellpic programs	✔			
Hardware	Apple Mac 6366 with single switch	✔			
	Uses a Big Mac with help		✔		

	SUMMARY	Home		School	
		Ob	Rpt	Ob	Rpt
Possible areas and skills enhanced	*The following skills were not observed in round 1, but were observed in round 2.* *They were however stated in the round 1 CVs.* **General cognition** Always recognises common pictures, and objects without help. Often now able to match sounds and objects.	 ✔ ✔	 ✔		
Probable new skills and successes	*A change in observed behaviour from round 1 to round 2.* **General cognition** Now always recognises common shapes and sounds without help. Often understands that symbols represent ideas. Often able to indicate objects/pictures functions without help. Often can generalise objects, pictures, and sounds to real life without help (up from sometimes). **Computer skills** Always understands that actions on keys or switches cause effects (up from often). Always able to use a single switch (up from sometimes). Often able to operate the computer programs, (up from sometimes). **Language** Often, up from sometimes, indicates program options wanted by body language and often indicates program options wanted by verbalisations (up from never). Often asks for help, and shares computer use with others (up from never). Often uses simple words in speech without help or prompting (up from never). Sometimes uses in speech simple sentences and directions (up from never). Sometimes recognise some letters (up from never). **Self-management** Always shows enjoyment from using the computer (up from often). Often is confident when using the computer (up from sometimes). Sometimes calls attention to his performance with the computer (up from never). Often shows pride in actions and achievements (up from never). Often likes to try out new programs (up from sometimes).	 ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔ ✔			

Summary	**Improvements noted against the IEP** John has made improvements in his oral language skills with more use of simple words and sentences. He is also now able to better recognise some letters. Improvements towards his IEP goals in the area of social development include his willingness to ask for help from others, and call attention to his work on a computer. John has moved towards a number of his IEP cognitive development goals, by increasing his recognition of shape and sound, understanding that symbols represent ideas, and understanding the function of objects and pictures. John also has increased his understanding of cause and effect through computer use of single switch and mouse. **Other improvements** John is now more able to operate the computer via the use of a single switch. He is more confident, gains greater enjoyment from using a computer, and is now more willing to try out new programs.				

APPENDIX B

Observation Checklist (Nov 97)

Observation notes **Observer initials:_____** **Code: [ ]**

a) When observing, you are looking to record the child's **maximum** skill level.

b) Depending on what type of hardware/software the student is using, you can select different sections of this observation guide. (e.g. *Concept* Keyboard or Word Processing use the language options).

Sections 5-8 and 16, that is, the **general cognitive and problem-solving skills, computer operating and information skills, social and communication skills, self-management skills and self-esteem,** and the **hardware and software** section needs to be completed for **EVERY** observation. For the other sections select the Not Applicable (N/A) option if the child is not using software that allows these skills to be observed.

c) Guide to observation categories:

0 - Not applicable (N/A): The child is not using software that allows this function to be observed.
1 - Never does without help: This function is being attempted. The child is **always** prompted verbally, or physically aided by others.
2 - Occasionally does without help: The child does this function once or twice by themselves, but less than 50% of the time. They are prompted or physically aided at least half of the time.
3 - Often does without help: The child does this function by themselves 50% or more of the time.
4 - Always does without help: The child always does this function by themselves. The child is **never** prompted verbally, or physically aided by others.

d) At the start and end of the session observe the child's computer operating skills.

e) Collect samples of any work that the child completes during the observation session.

Questions **Date:** _____ **Time:** _____ **Student:** _____

1) Location of computer equipment in room:

a) School/Early Childhood Centre
1 In the centre of the classroom
2 On student's desk
3 At back or side of the classroom
4 In a separate room
5 Library
6 Other _____

b) Home
1 Child's room
2 Lounge
3 Dining room
4 Kitchen
5 Study
6 Other _____

2) People working with child (circle all)

a) Father b) Mother c) Brother d) Sister e) Friend f) Family friend
g) Tcher h) Tcher aid i) Keyworker j) Students k) Other _____

3) Number of people at computer Maximum in session _____ Minimum in session_____

4) Nature of interaction with others (circle one)

1 Very positive 2 Positive 3 Neutral 4 Negative 5 Very negative 6 Varies

5) General cognitive and problem-solving skills (to do with computer use)	(Never does without help) Never	Some-times	Often	(Always does without help) Always	N/A
a) Able to fixate on stationary objects without help.....	1	2	3	4	0
b) Able to track moving objects without help.	1	2	3	4	0
c) Responds to sounds without help.....	1	2	3	4	0
d) Recognises common sounds without help.	1	2	3	4	0
e) Recognises common shapes without help.....	1	2	3	4	0
f) Recognises common sizes without help.	1	2	3	4	0
g) Recognises common colours without help.....	1	2	3	4	0
h) Recognises common pictures or objects without help.	1	2	3	4	0
i) Recognises matching objects without help.....	1	2	3	4	0
j) Matches sounds and objects without help.	1	2	3	4	0
k) Classifies objects into groups without help.....	1	2	3	4	0
l) Recognises out of sequence pictures without help.	1	2	3	4	0
m) Understands that symbols represent ideas (e.g. happy face = happy feeling) without help.....	1	2	3	4	0
n) Able to indicate objects/pictures functions without help.	1	2	3	4	0
o) Generalises objects/pictures/sounds to real life objects without help.....	1	2	3	4	0
p) Understands that actions on keys or switches causes effects.	1	2	3	4	0
q) Other skill_____	1	2	3	4	0
r) Other skill_____	1	2	3	4	0

6) Computer operating and information skills	Never	Some-times	Often	Always	N/A
Equipment					
a) Turns the computer on without help.....	1	2	3	4	0
b) Turns the computer off without help.	1	2	3	4	0
c) Uses a single switch without help.....	1	2	3	4	0
d) Uses two switches without help.	1	2	3	4	0
e) Uses a trackball without help.....	1	2	3	4	0
f) Uses a standard mouse without help.	1	2	3	4	0
g) Uses_____without help.	1	2	3	4	0
Keys					
h) Uses the return key without help.....	1	2	3	4	0
i) Uses the standard keyboard without help.	1	2	3	4	0
j) Uses the *Concept* keyboard/*Intellikeys* without help.....	1	2	3	4	0
k) Uses_____without help.	1	2	3	4	0
Programs/operating					
l) Finds programs/games without help.....	1	2	3	4	0
m) Loads programs/games without help.	1	2	3	4	0
n) Selects options in a program/game without help.....	1	2	3	4	0
o) Operates the program (e.g. turns page) without help.	1	2	3	4	0
p) Changes volume without help.....	1	2	3	4	0
q) Changes fonts type or size without help.	1	2	3	4	0
r) Prints from the computer without help	1	2	3	4	0
s) Saves a file without help.	1	2	3	4	0
t) Able to trouble shoot problems without help.....	1	2	3	4	0
u) Other skill_____	1	2	3	4	0
v) Other skill_____	1	2	3	4	0

7)	**Social and communication skills (to do with computer use)**	Never	Some-times	Often	Always	N/A
a)	Recognises familiar people without prompting.....	1	2	3	4	0
b)	Greets familiar people without prompting.	1	2	3	4	0
c)	Listens to skill appropriate directions/questions.....	1	2	3	4	0
d)	Follows skill appropriate directions/questions.	1	2	3	4	0
e)	Imitates skill appropriate actions.....	1	2	3	4	0
f)	Responds to yes/no questions.	1	2	3	4	0
g)	Responds to "look at the..." statements.....	1	2	3	4	0
h)	Responds to "what, how many, which, why" questions.	1	2	3	4	0
i)	Uses body language/gesture/signs/equipment to indicate general responses to skill appropriate questions/directions.....	1	2	3	4	0
j)	Uses vocalisations/verbalisations to indicate general responses to skill appropriate questions/directions.....	1	2	3	4	0
k)	Indicates which program/game/options are wanted by body language/gesture/signs/equipment.....	1	2	3	4	0
l)	Indicates which program/game/options are wanted by vocalisations/verbalisations.....	1	2	3	4	0
m)	Asks for/indicates help is needed.	1	2	3	4	0
n)	Takes turns/shares working with others.....	1	2	3	4	0
o)	Gives peer/family/teacher directions about computer.	1	2	3	4	0
p)	Other skill_____	1	2	3	4	0
q)	Other skill_____	1	2	3	4	0

8)	**Self-management/self-esteem (to do with computer use)**	Never	Some-times	Often	Always	N/A
a)	Shows enjoyment from using the computer.....	1	2	3	4	0
b)	Confident when using a computer.	1	2	3	4	0
c)	Calls attention to performance.....	1	2	3	4	0
d)	Shows pride in actions/achievements.	1	2	3	4	0
e)	Pays attention when working on the computer.....	1	2	3	4	0
f)	Completes tasks without encouragement.	1	2	3	4	0
g)	Expresses pleasure when task is completed.....	1	2	3	4	0
h)	Expresses displeasure physically.	1	2	3	4	0
i)	Expresses displeasure verbally.....	1	2	3	4	0
j)	Uses computer program to help talk about feelings.	1	2	3	4	0
k)	Likes to try out new programs/games/ideas.....	1	2	3	4	0
l)	Other skill_____	1	2	3	4	0
m)	Other skill_____	1	2	3	4	0

9) **Visual language using computer (to do with computer use)**	Never	Some-times	Often	Always	N/A
a) Understands the concept of letters without help.....	1	2	3	4	0
b) Recognises own name without help.	1	2	3	4	0
c) Recognises some letters without help.....	1	2	3	4	0
d) Recognises all letters without help.		1	2	3	4 0
e) Recognises simple words without help.....	1	2	3	4	0
f) Recognises complex words without help.....	1	2	3	4	0
g) Recognises simple sentences/directions (<5 words) without help.	1	2	3	4	0
h) Recognises complex stories/directions without help.....	1	2	3	4	0
i) Recognises errors without help.	1	2	3	4	0
j) Other skill_____	1	2	3	4	0
k) Other skill_____	1	2	3	4	0

10) **Oral language skills using computer**	Never	Some-times	Often	Always	N/A
a) Reads/uses in speech own name without help.....	1	2	3	4	0
b) Reads/uses in speech some letters without help.	1	2	3	4	0
c) Reads/uses in speech all letters without help.....	1	2	3	4	0
d) Reads/uses in speech simple words without help.	1	2	3	4	0
e) Reads/uses in speech complex words without help.....	1	2	3	4	0
f) Reads/uses in speech simple sentences/directions (<5 words) without help.	1	2	3	4	0
g) Reads /uses in speech stories/directions without help.....	1	2	3	4	0
h) Other skill_____	1	2	3	4	0
i) Other skill_____	1	2	3	4	0

11) **Written language skills using computer**	Never	Some-times	Often	Always	N/A
a) Types own name without help.....	1	2	3	4	0
b) Types some letters without help.	1	2	3	4	0
c) Types the whole alphabet without help.....	1	2	3	4	0
d) Types simple words without help.	1	2	3	4	0
e) Types complex words without help.....	1	2	3	4	0
f) Types short sentences (<5 words) using the *Concept* keyboard/ *Intellikeys* without help.....	1	2	3	4	0
g) Types story using the *Concept* keyboard/*Intellikeys* without help.	1	2	3	4	0
h) Types short sentences (<5 words) using the standard keyboard without help.....	1	2	3	4	0
i) Types a story using the standard keyboard without help.	1	2	3	4	0
j) Uses other keys such as delete without help.....	1	2	3	4	0
k) Begins names with a capital letter without help.	1	2	3	4	0
l) Leaves spaces and uses full stops without help.....	1	2	3	4	0
m) Un-jumbles short sentences without help.	1	2	3	4	0
n) Edits work without help.....	1	2	3	4	0
o) Other skill_____	1	2	3	4	0
p) Other skill_____	1	2	3	4	0

12) **Visual number skills using computer**	Never	Some-times	Often	Always	N/A
a) Understands the idea of number symbols without help.....	1	2	3	4	0
b) Recognises simple numbers (1-5) without help.	1	2	3	4	0
c) Recognises the numbers 6-20 without help.....	1	2	3	4	0
d) Recognises the numbers 21-100 without help.	1	2	3	4	0
e) Recognises any number without help.....	1	2	3	4	0
f) Understands maths symbols (e.g., - +) without help.	1	2	3	4	0
g) Understands maths equations (e.g., 2+2) without help.....	1	2	3	4	0
h) Other skill_____	1	2	3	4	0
i) Other skill_____	1	2	3	4	0

13) **Oral number skills using computer**	Never	Some-times	Often	Always	N/A
a) Reads/uses in speech simple numbers (1-5) without help.....	1	2	3	4	0
b) Reads/uses in speech the numbers 6-20 without help.	1	2	3	4	0
c) Reads/uses in speech the numbers 21-100 without help.....	1	2	3	4	0
d) Reads/uses in speech any number without help.	1	2	3	4	0
e) Reads/uses in speech mathematical symbols without help.....	1	2	3	4	0
f) Reads/uses in speech mathematical equations without help.	1	2	3	4	0
g) Other skill_____	1	2	3	4	0
h) Other skill_____	1	2	3	4	0

14) **Written number skills using computer**	Never	Some-times	Often	Always	N/A
a) Types simple numbers (1-5) without help.....	1	2	3	4	0
b) Types the numbers 6-20 without help.	1	2	3	4	0
c) Types the numbers 21-100 without help.....	1	2	3	4	0
d) Types any number without help.	1	2	3	4	0
e) Types mathematical symbols without help.....	1	2	3	4	0
f) Types mathematical equations without help.	1	2	3	4	0
g) Other skill_____	1	2	3	4	0
h) Other skill_____	1	2	3	4	0

15) **Other information technology skills**	Never	Some-times	Often	Always	N/A
a) Uses_____without help.	1	2	3	4	0
b) Uses_____without help.	1	2	3	4	0
c) Uses_____without help.	1	2	3	4	0

16a) Description of activity/interactions occurring.

_____

_____

_____

16b) Hardware used:

_____

_____

16c) Software used:

_____

_____

Check ALL categories are coded 0 to 4

APPENDIX C

Information Technology Skills Profile

Nov 97

This profile can be completed by the child participating in this study, and/or their family, their teachers, their classmates, or friends.

This profile is part of a study being done by the New Zealand Council for Educational Research (NZCER) and the Specialist Education Services (SES). This study is looking at how children with disabilities use computers.

The information collected on this profile will be seen only by NZCER and SES researchers.

The main purpose of this profile is to collect, over time, information on children's skills to do with computer use.

Actions

a) *With the child, complete a profile at the start of the project. Send a copy to NZCER.*
b) *Carry on recording skills as you notice them over the next 4 months.*
c) *At the end of the 4 months send a copy of the updated profile to NZCER. If necessary you will be supplied with a second copy of the profile nearer the end of the project.*

How to complete a profile

The following information lists skills that the child may be learning. These skills are a **guide** for the child's profile.

It is important that the skills you list are related **ONLY to the child's use of computers**, either by themselves or with other people. For example if the child can match sounds and objects generally, but cannot do this using computer software, this skill should **NOT** be recorded. The social and communication skills that the child learns from using the computer with others are important to record too.

This profile covers a wide range of skills involving a number of different types of software. This profile also covers a range of ages and abilities. It is likely that the child may not be using all the software or have attempted all these skills.

It is likely that there are other skills that the child has learnt that are not on this profile. Please include these skills in the spaces at the bottom of each section.

Please indicate which skills the child has by circling or ticking the face (☺). If the child has not tried this skill put a tick in the box (❒). In most cases you will need to indicate whether this skill can be done **with** or **without help**. **With help** includes both **verbal** and **physical** help. Options that you need to choose from are shown in brackets and in *ITALICS*. Draw a line through the options that do not apply.

Spaces are provided under each section for you to describe the type of help that the child requires, e.g., I need someone help me press the mouse.

In some cases spaces are left for you to complete, e.g., with the name of the software being used.

MY SKILLS PROFILE

☺ My name is _____
☺ The date is _____
☺ I have been using a computer for _____ months.
☺ This profile is being completed at [*home/school/early childhood centre*]

General and problem-solving skills using the computer

I can | Not tried

☺ ❒ I can look at non-moving objects on the screen [*with / without*] help.
☺ ❒ I can follow moving objects on the screen with my eyes [*with / without*] help.
☺ ❒ I can respond to sounds from the computer [*with / without*] help.
☺ ❒ I can recognise common sounds from the computer [*with / without*] help.
☺ ❒ I can recognise common shapes on the screen [*with / without*] help.

☺ ❒ I can recognise common sizes on the screen [*with / without*] help.
☺ ❒ I can recognise common colours on the screen [*with / without*] help.
☺ ❒ I can recognise common pictures/objects on the screen [*with / without*] help.
☺ ❒ I can recognise matching objects on the screen [*with / without*] help.
☺ ❒ I can match sounds and objects on the screen [*with / without*] help.

☺ ❒ I can group objects on the screen [*with / without*] help.
☺ ❒ I can recognise out of order pictures on the screen [*with / without*] help.
☺ ❒ I understand that symbols on the screen represent ideas (e.g., happy face = happy feeling) [*with / without*] help.
☺ ❒ I can identify the uses of objects/pictures I see on the screen [*with / without*] help.
☺ ❒ I can generalise the sounds/pictures/objects I see on the screen to things around me [*with / without*] help.
☺ ❒ I understand that if I push a switch or key something will happen [*with / without*] help.

☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

Computer operating and information skills

I can | Not tried

☺ ❒ I can turn the computer on or off [*with / without*] help.
☺ ❒ I can use a single switch [*with / without*] help.
☺ ❒ I can use two switches [*with / without*] help.
☺ ❒ I can use a trackball [*with / without*] help.
☺ ❒ I can use a standard mouse [*with / without*] help.
☺ ❒ I can use the return key [*with / without*] help.
☺ ❒ I can use the standard keyboard [*with / without*] help.
☺ ❒ I can use the Concept keyboard/Intellikeys [*with / without*] help.

☺ ❒ I can find the program/game _____ [*with / without*] help.
☺ ❒ I can find the program/game _____ [*with / without*] help.
☺ ❒ I can find the program/game _____ [*with / without*] help.
☺ ❒ I can load the program/game _____ [*with / without*] help.
☺ ❒ I can load the program/game _____ [*with / without*] help.
☺ ❒ I can load the program/game _____ [*with / without*] help.

☺ ❒ I can select options in the program _____ [*with / without*] help.
☺ ❒ I can select options in the program _____ [*with / without*] help.
☺ ❒ I can select options in the program _____ [*with / without*] help.
☺ ❒ I can operate (e.g., turn pages) in the program _____ [*with / without*] help.
☺ ❒ I can operate (e.g., turn pages) in the program _____ [*with / without*] help.
☺ ❒ I can operate (e.g., turn pages) in the program _____ [*with / without*] help.

☺ ❒ I can change volume [*with / without*] help.
☺ ❒ I can change font (type) size [*with / without*] help.
☺ ❒ I can print from the computer [*with / without*] help.
☺ ❒ I can save a file [*with / without*] help.
☺ ❒ If something I am doing on the computer does not work, I can solve it [*with / without*] help.

☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____

☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

Social/communication skills whilst using the computer

I can	Not tried	
☺	❒	I can recognise familiar people who use the computer with me.
☺	❒	I can greet familiar people when they come to use the computer with me.
☺	❒	I can listen to skill appropriate directions from my [*classmates / family / teacher*] related to computer use.
☺	❒	I can follow skill appropriate directions from my [*classmates / family / teacher*] related to computer use.
☺	❒	I can imitate my [*classmates' / family's / teacher's*] actions on the computer.
☺	❒	I can respond to yes and no questions when using the computer.
☺	❒	I can respond to "look at the..." statements when using the computer.
☺	❒	I can respond to "what, how many, which, why" questions when using the computer.
☺	❒	I can use [*body language / gesture / signs / equipment*] to indicate my answer to skill appropriate questions/directions when using the computer.
☺	❒	I can use [*vocalisations / verbalisations*] to show my answer to skill appropriate questions/directions when using the computer.
☺	❒	I can show which program, game or option I want by [*body language / gesture / signs / equipment*].
☺	❒	I can show which program, game or option I want by [*vocalisations / verbalisations*].
☺	❒	I can ask for help when using the computer.
☺	❒	I can take turns and wait for my turn when using the computer.
☺	❒	I can show my [*classmates / family / teacher*] how to do things on the computer.

☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____

☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

Self-management/self-esteem from using the computer

I can | Not tried

☺ ❒ I enjoy using the computer.
☺ ❒ I feel confident using the computer.
☺ ❒ I show people the work that I have done on the computer.
☺ ❒ I am proud of the things I do on the computer.
☺ ❒ I pay attention when I am working on the computer.

☺ ❒ I finish tasks on the computer without encouragement.
☺ ❒ I am pleased when I finish tasks on the computer.
☺ ❒ I can show I am annoyed when I am using the computer [*physically/ verbally*].
☺ ❒ I use computer programs to help me talk about my feelings.
☺ ❒ I like to try out new computer programs, games, or ideas.

☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____

☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

Language skills using the computer

I can	Not tried	
☺	❒	I understand the concept of letters.
☺	❒	I can [*recognise/use/read/type*] my name [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] the letters_____ [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] all letters [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] simple words [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] complex words [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] simple sentences (less than 5 words) or directions using the Concept keyboard/Intellikeys [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] simple sentences (less than 5 words) or directions using the standard keyboard [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] complex directions or stories using the Concept keyboard/Intellikeys [*with / without*] help.
☺	❒	I can [*recognise/use/read/type*] complex directions or stories using the standard keyboard [*with / without*] help.
☺	❒	I can use other keys (e.g., delete) [*with / without*] help.
☺	❒	I can begin names with a capital letter [*with / without*] help.
☺	❒	I can leave spaces and use full stops [*with / without*] help.
☺	❒	I can un-jumble short sentences [*with / without*] help.
☺	❒	I can correct my mistakes on the computer [*with / without*] help.

☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____

☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

Maths skills using the computer

I can | Not tried

☺ ❒ I understand the idea of number symbols [*with / without*] help.
☺ ❒ I can [*recognise/use/read/type*] the numbers 1-5 [*with / without*] help.
☺ ❒ I can [*recognise/use/read/type*] the numbers 6-20 [*with / without*] help.
☺ ❒ I can [*recognise/use/read/type*] the numbers 21-100 [*with / without*] help.
☺ ❒ I can [*recognise/use/read/type*] any number [*with / without*] help.

☺ ❒ I can [*recognise/use/read/type*] maths symbols (e.g.,+) [*with / without*] help.
☺ ❒ I can [*recognise/use/read/type*] maths equations (e.g., 2+2) [*with/without*] help.

☺ I can _____
☺ I can _____
☺ I can _____
☺ I can _____

☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

Other information technology skills

(for example using a Big Mac or the Internet to communicate between home and school)

☺ I can use _____
☺ I can use _____
☺ I can use _____
☺ I can use _____
☺ I can use _____
☺ I can use _____

☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____
☺ I am helped by_____

APPENDIX D

Parent/Caregiver Interview Nov 1997

a) Code: ..... b) Date of interview: ...../...../..... c) Time of interview: .....

d) Place of interview: ..... e) Interviewer initials: .....

f) Relationship of interviewee(s) to child (mother, father, sister, brother, aunt etc.):

.....

This interview is part of a study being done by the New Zealand Council for Educational Research (NZCER) and the Specialist Education Services (SES). This study is looking at how children with disabilities use computers. This interview should take about 30 minutes. Anything you say in this interview will be treated confidentially. You do not have to answer any questions you are not comfortable with.

The main purpose of this interview is to find out more about when and how your child uses her/his computer at home, what skills she/he is learning, and the computer support that is available to her/him.

NOTE: WRITE DOWN EVERY COMMENT - CODE LATER

Location/hardware/software

1) Could you tell me where _____'s computer equipment is located at home?

1 Child's room (own)
2 Child's room (shared)
3 Lounge
4 Dining room
5 Kitchen
6 Study
7 Varies
8 Other _____

Comment:_____

_____

2) Why did you choose this location?

1 No particular reason
2 Lack of alternative space
3 Near power jack
4 Near to other family members
5 Away from other family members
6 Other _____

Comment:_____

_____

3) Why was _____ provided with computer equipment? Prompt: What were the learning goals?

_____

_____

4) Does _____ use a computer anywhere other than at home or at school/ECC?

1 No
2 Parent's workplace
3 Child's friends
4 Relatives'/family friends' houses
5 Other _____

Comment:_____

_____

5) How often does _____ use the computer?

1 Every day
2 2-3 days a week
3 Once a week
4 Every couple of weeks
5 Once a month
6 Other _____

Comment:_____

_____

6) Approximately how long is an average session on the computer? _____ mins

7) Approximately how much time does _____ spend using the computer with other people?

1 No time/works independently (**goto q9**)
2 76 - 100% (all the time)
3 51 - 75% (about 3/4 of the time)
4 26 - 50% (about 1/2 the time)
5 11 - 25% (about 1/4 of the time)
6 10% or less
7 Other _____

Comment:_____

_____

Computer activities and interactions

8) **Could you tell me who, outside of school (or Early Childhood Centre) are the people who use the computer with _____ ?** What type of things they do together? How many hours per week would they use the computer together? How you would you describe their knowledge of computers? Do you know what training they have had (describe)?

Person	Activities?	How many hrs per week?	Knowledge of computers?	Training?
Mother	_____ _____ _____ _____	_____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Father	_____ _____ _____ _____	_____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Siblings	_____ _____ _____ _____	_____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Relatives	_____ _____ _____ _____	_____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Other _____	_____ _____ _____ _____	_____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	

Learning

9) Does _____ enjoy using the computer?

1 Yes
2 No (**goto q11**)
3 Varies
4 Not sure

Comment:_____

_____

10) How do you know that _____ enjoys using the computer?

1 Physical signs of enjoyment
2 Verbal signs of enjoyment (e.g., laughs)
3 Concentration
4 Repeats activities
5 More motivated to start/doesn't want to stop
6 Other _____

Comment:_____

_____

_____

11) What does _____ like about using the computer?

1 Sound/noise
2 Pictures
3 Movement
4 Increases quality of presentation of work
5 Increases communication possible
6 Interactive games
7 Interaction with others
8 Other _____

Comment:_____

_____

_____

_____

12) What programs does _____ mostly use?

_____

_____

_____

13) Do you think that _____ benefits from using the computer?

1 Yes
2 No (**goto q15**)
3 Not sure

Comment:_____

_____

14) How do you think _____ benefits? Prompt: What skills has _____ learnt? Or, What goals do you have?

1 Too soon to tell
2 Enjoyment
3 General computer operation skills
4 Motor skills/co-ordination
5 Communication skills
6 Social/interaction skills
7 Presentation skills
8 Written/oral/visual language skills
9 Mathematics skills
10 Cognitive skills (e.g., picture and object recognition)
11 Concentration skills
12 Work completion skills
13 Problem-solving skills
14 Self-management and independence skills
15 Increased self-esteem
16 Other _____

Comment:_____

_____

_____

_____

15) Have you noticed any difference in _____'s behaviour and skills since he/she started using the computer? Prompt: What changes have you noticed?

1 No changes
2 Behaviour improvement
3 Computer skills increase
4 Communication skills increase/more vocalisations
5 Better attention span/concentration
6 Increase in self-esteem
7 Increase in self-management behaviours
8 Other _____

Comment:_____

_____

16) If you want to teach _____ something on the computer, how do you do this? Could you describe what you do?

_____

_____

_____

17) What about _____'s siblings? If they want to teach him/her something on the computer, how do they do this? Could you describe what they do?

_____

_____

_____

18) Have you or your family members learnt skills from using the computer with _____, or from having the computer equipment at home? What skills have you learnt?

1 No skills
2 How to use software
3 How to use hardware
4 General knowledge about what computer equipment/software is available
5 Matching programs to _____'s learning goals (IEP)
6 General ways to enhance _____ learning
7 Other _____

Comment:_____

_____

Interactions with school/Early Childhood Centre

19) Do you think that you have a clear understanding of how the computer is being used at school/Early Childhood Centre to help _____ learning?

1 Yes
2 No (**goto q21**)
3 Not sure

Comment:_____

_____

20) How is the computer used at school/ECC to help _____'s learning?

_____

_____

21) Do you discuss what you have learnt about how _____ uses the computer with_____'s teacher aides/teachers?

1 Yes
2 No

Comment:_____

_____

22) Do _____'s teacher aides/teachers discuss what they have learnt about how _____ uses the computer with you?

1 Yes
2 No

Comment:_____

_____

23) Do you have enough contact with _____'s teacher aides/teachers, and school/ECC about _____'s learning using the computer?

1 Yes
2 No
3 Not sure

Comment:_____

_____

24) Does _____ show family members what she/he has learnt at school/ECC on the computer?

1 Yes - takes initiative
2 Yes - but only if prompted
3 No
4 Not sure

Comment:_____

_____

Support

25) Are there any problems _____ has when using the computer?

1 Lack of computer operation knowledge
2 Equipment needs to be adapted
3 Software not always suitable
4 The nature of _____'s disability affects some activities
5 Other _____

Comment:_____

_____

26) Are there any problems you have when using the computer with _____?

1 Lack of computer operation knowledge
2 Lack of knowledge about how to use the computer for learning
3 Equipment needs to be adapted
4 Software not always suitable
5 Other _____

Comment:_____

_____

27) Do you think that your family has enough technical support for _____'s computer?

1 Yes
2 No
3 Not sure

Comment:_____

_____

28) Do you think that your family get enough support to help _____'s education and learning using the computer?

1 Yes
2 Yes - but there are areas for which more information could be provided
3 No
4 Not sure

Comment:_____

_____

29) Is there any additional support or training that you would like?

1 No
2 More training/technical support on hardware
3 More training/technical support on software
4 More training on how to help _____'s learning through computer use
5 Other _____

Comment:_____

_____

30) Is there anything else you would like to say about _____'s use of the computer?

_____

_____

_____

_____

_____

Thank you for taking part in this interview.
Are there any questions you would like to ask?

APPENDIX E

Teacher/Teacher Aide Interview Nov 1997

a) Code: ..... b) Date of interview: ...../...../..... c) Time of interview: .....

d) Place of interview: ..... e) Interviewer initials: .....

f) Relationship of interviewee(s) to child (teacher/teacher aide/IT support etc.):

.....

This interview is part of a study being done by the New Zealand Council for Educational Research (NZCER) and the Specialist Education Services (SES). This study is looking at how children with disabilities use computers. This interview should take about 30 minutes.

Anything you say in this interview will be treated confidentially. You do not have to answer any questions you are not comfortable with.

The main purpose of this interview is to find out more about when and how ____ uses her/his computer at school/Early Childhood Centre (ECC), what skills she/he is learning, and the computer support that is available to her/him.

NOTE: WRITE DOWN EVERY COMMENT - CODE LATER

Location/hardware/software

1) Could you tell me where _____'s computer equipment is located at school/ECC?

1 On _____'s desk
2 In the centre of the classroom/room
3 At the back or side of the classroom/room
4 In a separate room
5 Library
6 Varies
7 Other _____
Comment:_____

2) Why did you choose this location?

1 No particular reason
2 Lack of alternative space
3 Near power jack
4 To be inclusive with other children
5 So she/he is not disturbed by other children
6 To not disturb other children
7 Other _____
Comment:_____

_____

3) Why was _____ provided with computer equipment? Prompt: What were the learning goals?

Comment:_____

_____

4) How often does _____ use the computer?

1 Every day
2 2-3 days a week
3 Once a week
4 Every couple of weeks
5 Once a month
6 Other _____

5) Approximately how long is an average session on the computer? _____ mins

6) Approximately how much time does _____ spend using the computer with other people?

1 No time/works independently (**goto q8**)
2 76 - 100% (all the time)
3 51 - 75% (about 3/4 of the time)
4 26 - 50% (about 1/2 of the time)
5 11 - 25% (about 1/4 of the time)
6 10% or less
7 Other _____

Comment:_____

_____

Computer activities and interactions

7) **Could you tell me who the people are who use the computer with_____?** What type of things they do together? How many hours per week would they use the computer together? How you would you describe their knowledge of computers? Do you know what training they have had (describe)?

Person	Activities?	How many hrs per week?	Knowledge of computers?	Training?
Teacher	_____ _____ _____ _____ _____	____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Teacher aide	_____ _____ _____ _____ _____	____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Classmates	_____ _____ _____ _____ _____	____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	
Other _____	_____ _____ _____ _____	____hrs	1 Very good 2 Good 3 Average 4 Basic 5 Very basic 0 Not sure	

Learning

8) Does _____ enjoy using the computer?

1 Yes
2 No (**goto q10**)
3 Varies
4 Not sure
Comment:_____
_____

9) How do you know that _____ enjoys using the computer?

1 Physical signs of enjoyment
2 Verbal signs of enjoyment (e.g., laughs)
3 Concentration
4 Repeats activities
5 More motivated to start/doesn't want to stop
6 Other _____
Comment:_____
_____

10) What does _____ like about using the computer?

1 Sound/noise
2 Pictures
3 Movement
4 Increases quality of presentation of work
5 Increases communication possible
6 Interactive games
7 Interaction with others
8 Other _____
Comment:_____
_____

11) What programs does _____ mostly use?

_____
_____
_____

12) How are these programs incorporated into the classroom programme or learning environment?

1 There is no incorporation
2 Fits with individual learning goals
3 Fits into the units the class are doing
4 Used for reading skills
5 Used for writing time
6 Access to the curriculum in general
7 Consolidating existing skills
8 Recreational use
9 Other _____
Comment:_____
_____

13) What learning goals do you have for _____ from her/his computer use? Prompt: For example in which curriculum areas, or for what types of social behaviour or skills development?

1 Enjoyment
2 Access to the English curriculum
3 Access to the maths curriculum
4 Communication/social skills development
5 Computer/technological skills development
6 Motor skills/co-ordination development
7 Increased concentration
8 Increased self-management/independence
9 Increased self-esteem/confidence
10 Other_____
Comment:_____
_____

14) Do you think that _____ benefits from using the computer?

1 Yes
2 No (**goto q16)**
3 Not sure
Comment:_____
_____

15) How do you think _____ benefits? Prompt : What skills has _____ learnt? Or, What goals do you have?

1 Too soon to tell
2 Enjoyment
3 General computer operation skills
4 Motor skills/co-ordination
5 Communication skills
6 Social/interaction skills
7 Presentation skills
8 Written/oral/visual language skills
9 Mathematics skills
10 Cognitive skills (e.g., picture and object recognition)
11 Concentration skills
12 Work completion skills
13 Problem-solving skills
14 Self-management and independence skills
15 Increased self-esteem
16 Other _____
Comment:_____
_____
_____
_____

16) Have you noticed any difference in _____'s behaviour and skills since he/she started using the computer? Prompt: What changes have you noticed?

1 No changes
2 Behaviour improvement
3 Computer skills increase
4 Communication skills increased/more vocalisations
5 Better attention span/concentration
6 Increase in self-esteem
7 Increase in self-management behaviours
8 Other _____
Comment:_____
_____
_____

17) If you want to teach _____ something on the computer, how do you do this? Could you describe what you do?

_____
_____
_____

18) What about _____'s classmates/peers? If they want to teach her/him something on the computer, how do they do this? Could you describe what they do?

_____
_____
_____

19) Have you learnt skills from using the computer with _____, or from having the computer equipment at school? What skills have you learnt?

1 No skills
2 How to use software
3 How to use hardware
4 General knowledge about what computer equipment/software is available
5 Matching programs to curriculum goals
6 Matching programs to _____'s learning goals (IEP)
7 General ways to enhance _____'s learning
8 Other _____
Comment:_____
_____

Interaction with family

20) What contact do you have with _____'s family about _____'s learning using the computer?

1 No contact
2 Every day
3 Once a week
4 Once a month
5 Hardly ever
Comment:_____
_____

21) Do you think that you have a clear view of how the computer is being used at home to help _____'s learning?

1 Yes
2 No
3 Not sure
Comment:_____

22) Do you discuss what you have learnt about how _____ uses the computer with her/his family?

1 Yes
2 No
Comment:_____
_____

23) Do you have enough contact with _____'s family about his/her learning using the computer?

1 Yes
2 No
3 Not sure
Comment:_____
_____

24) Does _____ show other students or staff what she/he has learnt outside school/ECC on the computer?

1 Yes - takes initiative
2 Yes - but only if prompted
3 No
4 Not sure
Comment:_____
_____

Support

25) Are there any problems _____ has when using the computer?

1 Lack of computer operation knowledge
2 Equipment needs to be adapted
3 Software not always suitable
4 The nature of _____'s disability affects some activities
5 Other _____
Comment:_____
_____

26) Are there any problems you have when using the computer with _____?

1 Lack of computer operation knowledge
2 Lack of knowledge about how to fit into curriculum goals
3 Lack of knowledge about how to use the computer to enhance learning
4 Equipment needs to be adapted
5 Software not always suitable
6 Other _____
Comment:_____
_____

27) Do you think that your school/ECC has enough technical support for _____'s computer?

1 Yes
2 Yes - but there are areas for which more information could be provided
3 No
4 Not sure
Comment:_____

28) Do you think everyone who works with _____ on the computer has had enough training to help enhance _____'s learning?

1 Yes
2 No
3 Not sure
Comment:_____
_____

29) Is there any additional support or training that you would like?

1 No
2 More training/technical support on hardware
3 More training/technical support on software
4 More training on how to help _____'s learning through computer use
5 Other _____
Comment:_____
_____

30) Is there anything else you would like to say about _____'s use of the computer?
_____
_____
_____

Thank you for taking part in this interview. Are there any questions you would like to ask?

APPENDIX F

Software Used Either at Home or at School

Software name	Software type	Publisher
ABC (Geddes Production)	Early childhood alphabet skills; mouse skills; signing	Geddes Production
Choices	Early childhood activities	Widgit
Clarisworks	Word processing	Clarisworks
ClickerPlus	Assisted word processing (on-screen keyboard with speech)	Crick Computing
(The) Computer Classroom Level 1	Range of early childhood interactive lessons	2N Education
Cowriter	Word prediction	Don Johnson
Encarta	Multimedia encyclopaedia	Microsoft
Fisher Price ABC's	Interactive early childhood activities	Davidson
Glider Pro	Problem-solving game (searching for objects)	Casaday and Greene
Heroes of Might and Magic 2	Interactive adventure game	Directsoft
Hyperstudio	Multimedia presentation package	Roger Wagner Publishing
Intellipic	Picture library including sounds	Intellitools
James Discovers Math	Interactive maths puzzles	Broderbund
Just Grandma and Me	Interactive reader	Living Books
Kevin Goes to the Zoo	Interactive choice making and reader	Geddes Production
KidPix Studio	Multimedia presentation package for younger children	Broderbund
Lemmings	Problem-solving game	Psygnosis
Lion King Activity Center	Interactive reader	Disney Interactive
(The) Magic School Bus	Interactive topic exploration	Microsoft
Make it Happen	Search organiser to assist with searching, organising, and processing information	Education Development Centre
Maths Blaster	Interactive maths	Davidson
Maths Circus	Interactive maths	Greygun
Maths House	Interactive maths	Edmark
Maths Rabbit	Interactive maths	The Learning Company
Maths for the Real World	Interactive maths problem-solving skills	Davidson
Microsoft Publisher	Pamphlet maker	Microsoft
Microsoft Word	Word processing	Microsoft
Microsoft Works	Suite of word processing, spreadsheet, and database applications	Microsoft

Millie's Maths House	Early childhood maths activities	Edmark
My First Incredible Amazing Dictionary	Multimedia ABC for early childhood	Dorling Kindersley
Paint, Write, and Play	Interactive word processing and graphics	The Learning Company
(The) Playroom	Interactive letters, numbers, and time	Broderbund
Peter Pan	Interactive reader	Imagery studios
Reader Rabbit	Interactive reader	The Learning Company
Sara Cohen Resource Programs	Early childhood curriculum resources	Sara Cohen School
Sesame Street	Early childhood letter and number activities	Creative Wonders
Simcity	Problem-solving game	Electronic Arts (Maxis)
Smart Alex	Interactive choices	Somorc
Story Book Weaver	Interactive story writing with graphics (or can be used as a reader)	MECC
Sunshine Readers	Early childhood literacy	Sunshine books
Switch On	Early childhood switch activities	Somorc
Text Help	Assisted word processing	Lorion
Touchgames	Early childhood activities	Somorc
Ultrakeys	Keyboard tutor	Bytes of Learning
Where in the World is Carmen Sandiego?	Interactive problem-solving and geography	Broderbund
Winnie the Pooh and the Honey Tree	Early childhood story and letter games	Computer Express
The Logical Journey of the Zoombinis	Interactive maths puzzles and logic	Broderbund