Computer-assisted learning and self-esteem at a city technology college

ABSTRACT

Computer Assisted Learning and Self-esteem at a City Technology College by Rosi Cross

An investigation of computer assisted learning (CAL) and the self-esteem of students at a city technology college (CTC). This paper explores the student's previous micro experiences, their attitude responses to micros and their knowledge and usage of micros. It goes on to examine the effect CAL had on student self-esteem between two samples of high IQ and specific learning difficulties (sld) students; and looks at the differing learning situations and the uses of micros at the CTC. The final piece of research compares the information technology (IT) provision and practice at the CTC with that of a l.e.a. maintained school (soon to become a grant maintained school) and a grant-maintained school. The data suggests that there are four positive indicators of the value and effectiveness of equipping a secondary school with information technology hardware and software on a scale more extensive than is normal in the maintained sector, namely:

- higher than average frequency of micro use by the students
- the majority of students were confident and positive about using micros
- the CTC is better equipped in non-teaching, information technology dedicated, specialist staff as well as hardware and software terms than the other two surveyed schools
- the CTC is more successful at internally and externally assessing its students' IT competence than the other two surveyed schools

There were two negative indicators:

- a limited understanding of the potential applications of IT by the students
- a failure to teach a whole year group the necessary skills to competently use newly purchased (and different) micros

Therefore the value of the extra hardware and software is questionable. The short-term effects have been minimal. However, certain alterations have taken place which have improved the situation.

The study on the effect of computer-assisted learning (CAL) on student self-esteem between two samples of students showed two main indicators:

- the high IQ students showed an increase in feelings of self-esteem when working with micros between the two years whereas the specific learning difficulties (sld) did not
- the 1991 combined student levels showed a correlation between high self-worth and high self-esteem when working with micros

The major conclusion from this study is that computer-assisted learning (CAL) can help raise the self-esteem of all students but only when part of a well-thought out, effectively taught and adequately resourced educational programme.

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by

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CHAPTER ONE

OUTLINE OF LITERATURE SEARCH AND PRESENT KNOWLEDGE

Information Technology (IT) began its invasion of the British education system in the late 1970s. It has grown and grown ever since, until every school in the country, from the humblest, one-roomed primary to the largest inner-city comprehensive, has at least one microcomputer (an electronic device that can receive a set of instructions, or program, and then carry out this program by performing calculations on numerical data or by compiling and correlating other forms of information (Encarta, 1994) on their list of educational resources.

The funding and distribution of all the hardware and software was mainly accomplished through government-funded initiatives. Kenneth Baker, the then Minister for Information Technology, launched the first schemes "Micros in Schools" in 1981 with £16 million from the Department of Trade and Industry. This was then exceeded by the Department of Education and Science with their "Microelectronics Education Programme" in 1986, which spent £23 million. Various other educational initiatives (Microelectronics Support Unit, Department of Trade and Industry Modem Scheme, the Technical and Vocational Educational Initiative, Educational Support Grant, etc.) until the end of the 1980s released some further £40 million to be spend on micros in the classroom, purchasing software, installing modems, etc. By 1995 the UK was several years ahead of Europe in equipping schools with computers and other information technology (IT) equipment, trailing only the US in terms of complexity, usage and spending on information technology (IT) for education. (Taylor, 1995)

Kenneth Baker's words when launching the first scheme were: "I want youngsters, boys and girls leaving school at sixteen, to actually be able to operate a computer". (Thatcher, 1982)

Obviously his intentions were to enable the school pupils of today to become the computer operators of tomorrow. Perhaps he was anticipating Giuliano (1982), who estimated that by the end of the century more than 40% of workers will deal daily with a computer. Although probably Kenneth Baker was more concerned about the economic downfall of a country where the demand for computer literate people was currently outstripping the supply. The resultant effects of which could be an influx of computer literate immigrants to this country or an outpouring of investment to other countries where computer literate workers were more readily available. Either alternative could not be risked so the education system was resourced and called in to save the day.

The effect of all this frantic and unprecedented central funding on the curricula of Britain's schools in the 1980s was inconsistent and hesitant.

The first result was the introduction of a new subject at external examination level: Computer Studies. Although this became a new major growth subject with entries in excess of Spanish, Geology and Music; it was, unfortunately, a male dominated one. In 1984, the "O" level Computer Studies entry was 2.4:1 male to female ratio. The course content was not considered educationally worthwhile or vocationally relevant.

(Wellington, 1990) The Alvey Report (1982:62) suggested that school computer education of the wrong kind would "merely produce a generation of poor BASIC programmers".

Many schools cancelled their Computer Studies courses in the 1980s in favour of Computer Appreciation or Awareness courses for all students, often at Years 7, 8 and 9. However by 1992 this move was being questioned by the HMI: "For more than ten years computer and IT in secondary schools meant that computer studies for interested, sometimes dedicated, students. The emphasis shifted during the 1970s from programming and computer logic to a broader, and increasingly practical, treatment of applications of IT and information systems. At the same time the range of pupils opting for the subject broadened. The processes of analysing problems, devising algorithms and carrying through computer solutions to workable and tested conclusions often involve students in very demanding and sustained intellectual activity. It is perhaps inevitable that more recent moves to introduce IT as an integral part of learning for all pupils have been accompanied by a feeling that specialist courses have had their day. The danger is that in pursuing the entirely laudable aims of making IT accessible to all students, and working to create a population with the confidence to accept and embrace technological change, much that was good is being rejected. The two approaches should not be thought to be incompatible. It is often the case that more coherent and informed learning with IT exists where there is a cadre of interested and informed pupils, and staff with an understanding of computing which goes beyond the utilitarian. It is often said that IT is just a tool: it is a very useful tool but not just that". (para 36, Great Britain (1992))

In an article in Computer Education 79, reviewing all the research over the last decade, Nigel Carr concludes that : "Research over the last decade has produced unassailable evidence for the value of teaching children to program, starting in primary schools. The evidence has illustrated cognitive benefits including how the act of running and testing a program develops abstract thinking in children as young as five" and "The conflict between the teaching of programming and the non-programming use of the computer is a matter of time available to teach and the nature of the subject". (p. 24, Carr, 1995)

Alongside this was the more cross-curricular growth of the computer as a teaching and learning aid, to be used by the whole school. This is when terms such as CAL (Computer Assisted Learning) and CAI (Computer Assisted Instruction) began to become current educational jargon. However, this was not an easily accomplished innovation either. There were problems of a physical nature whereby the computers tended to be put in one room, locked away and remained the province of one subject/department. There was also the mental problem of getting access to them, both for the teacher and the student. They were often networked together and the difficulty of access to them meant they didn't enter the teachers' planning or practice, and weren't seen as readily available learning tools by the students.

The final problem from this wave of frantic and unprecedented central funding, was that most schools found that once they had abolished the Computer Studies course and began to use the computers as cross curricular tools they discovered that they had no means of acquiring technical support. How could one teacher become a technician, an in-service trainer and a software provider as well as teach ? The funding for such a role was not provided for until the late 1980s, when, under LMS (Local Management of Schools),

school became responsible for their own budgets and could allocate part of those monies for such a job.

By this time a new government initiative, the National Curriculum, was beginning to have an effect on information technology IT) across the curriculum. The National Curriculum meant that every maintained school will be required by statute to provide a wide range of information technology (IT) experiences for every student. This would accelerate the use of information technology (IT) in subject areas and necessitate information technology (IT) experiences for all students throughout the age range.

The first document appeared in 1990 (Technology in the National Curriculum, DES/WO, 1990). Information Technology was AT5 - Information technology capability. There were five strands: Communicating Information, Handling Information, Modelling, Control and Measurement and Evaluation. The first two strands were easy to find, especially in specific information technology (IT) lessons. In contrast the other three information technology (IT) strands seem harder to find with schools making very limited use of important applications such as using computers to measure and control. (Bowen, 1995).

"The apparent weakness of IT across the curriculum is supported by frequent written comments in the OFSTED reports like the following:

- "IT resources are not used systematically across the curriculum"
- "most departments have some computer equipment but its use is not well developed"
- "the use of IT in subject areas is very limited"." (Bowen, 1995)

In 1994 SCAA issued Draft Proposals for Information Technology which continued to stress the use of information technology (IT) across the curriculum. At Key Stage 4, for example, "A programme of study has been produced which allows pupils to develop their IT capability in other areas of the curriculum as an alternative to specialist IT courses". (SCAA, 1994) Information technology (IT) appears in the subject orders for other National Curriculum subjects. This provides opportunities for information technology (IT) capability to be taught in the context of another subject. Information technology (IT) can aid the delivery of many aspects of any curriculum as information technology (IT) is now an essential part of much of the subject curriculum.

However, Becker (1984) emphasised, given the organisation and responsibilities of schools, simply grafting microcomputers onto a school will not result in extensive or effective use. The most appropriate and sophisticated software packages will be useless "in a school context without a means of using them with a current ratio of students to computers, without a plan for mutually reinforcing learning at the computer terminal and learning away from the computer, and without an appropriate model of what instruction should be provided to which students at what age". (p.15, Becker, 1984)

The school was not the only place where students had access to a microcomputer. In a survey carried out in the mid 1980s by the University of Surrey (Fife-Schaw et al, 1986) of some 1747 suburban, state-sector, comprehensive students, the results "do not present a glowing picture of a nation of teenagers all eagerly grasping the opportunities that the microcomputer revolution has brought. More teenagers appear to get experience of

computers at home than they do at school. Though some 58% report never having used the school computers (80% if less than monthly usage is also considered), only 44% actually report never having used a computer in any context (from a separate question)". (p.158, Fife-Schaw, 1986)

This makes particularly depressing reading after some £100 million had been spent by the government on making access to information technology (IT) possible in all British schools. No wonder that the most desired and oftimes purchased Christmas present of the 1980s was a microcomputer. This was bought by parents who felt sociologically and economically pressured by their offspring and the community at large.

By 1989 a Times Educational Supplement Survey (MacDonald and Wellington, 1989) reported better access to the microcomputer in secondary schools: 28 students to 1 microcomputer, than in the primary schools: 69 students to 1 microcomputer. The difference in access is due probably to the greater economic curriculum pressure on information technology (IT) in the secondary school where the perceived vocational significance of microcomputers played a major role.

Although access to the microcomputer was limited, the development of information technology as a pedagogic tool was not. Teachers began to realise it was an interactive medium which can involve active and enjoyable participation. Far more teachers now saw the microcomputer as a valuable learning resource or vehicle which had spread into existing disciplines promising great potential for their own subject. Information technology (IT) was now seen a a cross curricular issue rather than the province of the expert.

By the end of the 1980s access to the microcomputer was not the only measure by which the effectiveness of the microcomputer was judged. The quality of that access i.e. what software packages were being used; what use the microcomputer had in that particular subject or area of the syllabus; how they were being used, collaboratively in groups in order to interrogate the text or the subject matter, etc. became more important. It was beginning to be realised that "Some of the most fruitful applications of computer technology derive from its capacity to present educationally powerful dynamic visual images. This is particularly true in science and mathematics, where knowledge can be represented in many ways". (p. 22, Educational Technology Centre, Harvard Graduate School of Education, 1990)

The micro was now being used more indirectly as a teaching and learning aid across the whole curriculum. The term CAL (Computer Assisted Learning) was now in ascendance and was rapidly growing in popularity. Many more 'child-directed' types of software packages (i.e. those which put the child in more control) were being used. These software packages encompassed many different micro applications i.e. problem-solving; drill and practice; data-handling; word-processing; simulations; designs; games; and programming or Turtle graphics. These software packages were cross-curricular in nature and not very often rigorously subject-specific. Some teachers were sceptical of the role of computer assisted learning CAL and claimed it was simply the 1980s version of programmed learning. However, it is more sophisticated in its forms and functions of feedback.

Heywood (1986) outlined four basic types of feedback which could be said to exist in current software applications: the Judgemental, the Corrective, the Congratulatory and the Intrinsic. They are not mutually exclusive and can all be found within one educational piece of software.

" 1. The Judgmental - with or without the personalisation of the user's name, this form delivers to the child the bare fact as to whether his/her response was correct or incorrect. Often no inclination is given as to why an answer is wrong.

2. The Corrective - in a tutorial mode, this feedback would be sensitive in varying degrees to responses by the child and indicate errors with some form of remediation. Often this would be followed by a re-testing of the original exercise or one similar to it.

3. The Congratulatory - this type of feedback could also be either of the above types with the additional feature of motivational graphics, sounds and verbal encouragement. Often an incorrect answer elicits a more colourful or comic display than a correct one and children may deliberately avoid correct answers by guessing or pressing inappropriate keys in order to hear a rude noise or see the better screen display.

4. The Intrinsic - quite separate from the other types, this relies upon the child gaining enough satisfaction from involvement in the exercise to ensure his/her continuance in it and ultimately learning thereby. Being right or wrong is not as much the immediate concern as is the process of participation in the learning experience.

It could be maintained that all four in the same form need to be present in order, not only to effectively provide feedback, but also to maintain the child's interest in the exercise". (p.85, Heywood, 1986)

Surveys now began to look at computer assisted learning (CAL) and its effects on the curriculum. What were the advantages and disadvantages over the traditional materials and methods.

In 1988, 328 fourteen and fifteen year old pupils from a comprehensive school in North Derbyshire, were involved in a survey which measured both general attitudes towards computers and affective reactions towards working with computers in relation to the sex of the subject, courses studies (computer related/non-computer related) and availability of home computer (Martin 1991). The results indicated that "their general attitudes are most related to gender and having a home computer, such that males who have a home computer have the most favourable attitudes. On the other hand affective reactions to working with computers tends to be related to courses studied at school, such as those doing computer courses have more favourable attitudes compared to those doing non-computer courses". (p.192, Martin, 1991) This is all reminiscent of the earlier 1980s when boys were the dominant force and Computer Studies courses were in the ascendant. However, another result showed "that those who had had a previous computer held more favourable attitudes. This may relate to a motivational factor, in that those who have had previous computers may be more interested in computing". (p.193, Martin, 1991)

Martin's findings about "those who had had a previous computer held more favourable attitudes" and "males who have a home computer have the most favourable attitudes" recur in a survey carried out by Kirkman in 1990. 199 12 year-old students (in first year of secondary school) were surveyed about their microcomputer use and their attitudes towards microcomputers. The results showed that the students who use a computer at home (55%) have gained significantly more time on the school computers and that this effect was almost entirely due to boys (70% boys, 38% girls). They were more aggressive/enthusiastic at capturing computer time in school. Furthermore they were "more confident with computers and rated themselves better at using computers" than girls (sic). (p.61, Kirkman, 1993)

Between 1985 and 1991 Oliver (1993) looked at upper primary and lower secondary students in a city district in Western Australia. The study compared the effectiveness of the informal computing curriculum in primary schools to formalised courses in junior classes of secondary schools.

In 1985 it was found that secondary students had significantly higher levels of knowledge about computers and computing. These levels of knowledge correlated with measures of academic achievement (literacy and numeracy) in primary and secondary schools. Gender differences were apparent: secondary boys had a significantly higher level of knowledge than the secondary girls whereas at primary level there was no gender difference. Access to computers outside of school was a factor that contributed significantly to levels of computer knowledge among both primary and secondary students. Secondary students saw significantly less value in the use of personal computers than their primary counterparts; girls less than boys at both levels. Access to home computers showed no difference in attitudes towards computers in both levels. Formalised programmes increased students' information technology (IT) skills but inequities still exist in levels achieved by lower achievers and girls at secondary level; this was not so evident among primary students.

By 1991 the level of knowledge among secondary and primary levels had increased significantly due to an increase in the resources of hardware and software as well as an increase in the levels of knowledge and application of information technology (IT) by the teachers. Most students still rate the use of personal computers positively even if they use them less enthusiastically. Girls in secondary schools wanted more access whereas their female primary counterparts were quite happy with their level of access. Another gender difference was still apparent, more males than females had access to computers at home. Oliver concludes that there were: "still many students who lacked a basic knowledge of computers and technology. It appeared that neither a formal course nor informal use of computers was sufficient to develop information technology (IT) skills among sections of the student population. There was no evidence of any measures being taken to over this problem. Unless specific moves are taken, such results will likely be found in a similar study in 1998". (p.61-2, Oliver, 1993)

In 1989 the Department of Education and Science, working with a team of researchers based at King's College, London began a three year "comprehensive and longitudinal study (The ImpacT Report, Watson,1993) of pupils' achievements using information technology (IT), addressing a broad range of issues across several subject and curriculum areas and levels. The evaluation was based on pupils' learning related to specific content and skills, and included a consideration of the effect on higher level thinking promoted by information technology (IT) focused classroom activities. With this aim in mind the project focused not on schools but on individual classes.

A major field study was designed involving over 2300 pupils in 19 LEAs in England and Wales. These pupils came from matched pairs of classes, one designated HiIT and the other LoIT users. The pupils were divided into a matrix of 12 cells; three age groups, 8-10, 12-14, and 14-16, and four curriculum subject areas, English, geography, mathematics and science". (p.7, Watson, 1993)

"The main findings focused on three key questions:

1. Did information technology (IT) make a contribution to pupils' learning ?
2. What can we say about the planning and practice of teaching to incorporate IT ?
3. What were the demands of IT on schools ?

" The answer to the first question was in the affirmative, IT did make a contribution to learning, but the contribution was not consistent across subjects or age groups. The results in support of this response were primarily from the mathematics and geography classes and to a smaller extent primary English. At the level of classes it was also the case that it was the results from a small number of the HiIT classes, including the case study classes, which provided the main evidence for this finding. IT access and use in these classes suggested there may well be some minimum threshold of IT use for the impact to be detectable. The achievement results for these classes were also found to be influenced by aspects of increased motivation and interest linked to the use of IT.

"The outcomes for pupils' learning were also substantially influenced by teaching. Selected aspects of organisation, management, teaching styles, philosophy as to the nature of the subject, and pedagogical practice and their links with the effective use of IT were found to be important contributors. This, of course, almost goes without saying as it holds for teaching with or without IT. However, in the case of the ImpacT research, the linking with IT included the additional demands associated with the teachers' understanding of, and willingness to experiment with, the underlying philosophy of the software considered for use by pupils. Other aspects were found to include the importance of group collaborative work and a process view of the nature of the discipline.

"Findings related to the demands of the schools, pointed to problems associated with distribution and sharing of often quite limited resources. While the existence of a policy at LEA, school, or department level was found to be important, this was not sufficient in itself to promote equitable use as it was found that the use made of computers was dependent upon the interest of individual teachers and/or departments, and this was particularly true for those cases where there was no whole school policy.

" Support from senior staff, the Head teacher and/or Head of Department, was viewed as important, but this typically reflected a facilitating role in the acquisition of resources rather than a pro-active stand in favour of the integration and implementation of IT.

"In service provision was also identified as a major concern. Results indicated that many teachers felt they needed an on-going programme of in service training if they were to make regular use of computers in their teaching and if they were to exploit the potential offered by some software. The research suggested that knowledge and awareness of software was not in itself sufficient for effective implementation, but that means, organisation, management, teaching styles and the need for on-going support were of critical importance". (p.153, Watson, 1993)

Motivation is a key element in education and its presence can have an enormous effect on a student's progress. Is the motivational aspect of educational software the most important element in computer assisted learning (CAL) ? In the 1986 survey of Hertfordshire primary schools (Jackson et al, 1988) most children (63%) were keen to use the micro in school and their attitudes to micro use were related to the type of software used. The more open-ended or 'child-directed' programs (e.g. problem-solving, data-handling, programming) appeared to be the more motivating than the drill and practice ones.

Clearly, the potentially motivational aspect of computer assisted learning (CAL) educational software is enormous. Nevertheless, we are reminded by R. Hooper, former director of National Development Programme in Computer Assisted Learning, that computer assisted learning (CAL) also seems to raise problems. "People are not only unfamiliar with the computer but are alienated by, amongst other things, its complexity. It may be difficult to get across basic points about computer-assisted learning, because people are distracted by the technological sophistication ... and sooner or later the CAL user has to realise this and get some technological initiation". (p.4, Hooper, 1990)

One group of people who were having problems with this "technological initiation" were the teachers who were an important factor in the successful delivery of information technology (IT) in the curriculum. Heywood and Norman (Heywood, 1988) investigated teachers concerns over microcomputer use (or in this study, what holds back that realisation) in primary schools in an outer London borough. The study found that the teachers had many reasons for not using the microcomputers, most of which could be attributed to their personal confidence and competence with micros. The teachers had individual difficulties using the micros and felt uneasy with the technology. They lacked the competence to perceive a place for computer-assisted learning within the ongoing curriculum. The research concluded that the design of in-service courses should be "teacher-driven, appropriate and contemplated ... and should promote school and teacher

self-evaluation in order to clarify what are the 'needs and relevance' associated with the change effort". (p.42, Heywood, 1988)

A similar scene emerges in the secondary school. Owen (Owen, 1992) investigated the implementation of the Non-statutory Guidance for Information Technology Capability and the information technology (IT) co-ordinator's key role in implementing this guidance across the whole school. The study took place on 52 secondary schools in Devon in 1990 and 1991. It found that the role of the information technology (IT) co-ordinator is extremely complex. In most of the schools the co-ordinator was expected to be focused more on the technical issues of running the network than on the aspect of developing the human resources of pupils and teachers or implementing whole curriculum objectives.

The formal status of the co-ordinator was within the realms of the lower to lower middle management level. This meant that they felt a lack of status and authority when carrying out negotiations with other members of the school's management team. They also had little designated time for strategic planning and a lack of technical support. Owen's investigations show that even the appointment of an information technology (IT) co-ordinator will not necessarily result in technological initiation or advancement for any or all of the students or teachers.

Further back down the line, teacher training establishments were having to respond to criteria (DES, 1989a) and recommendations (CATE, 1992) that students "are able to make constructive use of IT in their teaching, including the ability to incorporate the use of IT in their lessons plans". (p.54, Pratt, 1993) These establishments "began to realise that it was not enough to teach their students IT skills in a way that was divorced from the content of the conventional curriculum and the issues which surround any teaching and learning environment". (p.54, Pratt, 1993) To this end Pratt and his colleagues planned a course in which information technology (IT) would permeate a Geography course. The course was presented to the students as experimental and was enthusiastically received. Clearly, the course has begun to meet the DES 1989a recommendations that students are able to make constructive use of information technology (IT) in their teaching. Furthermore, the plans for improving the course by teaching the students how to use a particular desktop publishing package to produce some curriculum materials will enable the students to incorporate the use of information technology (IT) into their lesson plans.

Similarly Simmons and Wild (1994) found that 41% of students on a Postgraduate Certificate in Secondary Education (PGCE) had never used a computer in a private capacity and a further 25% had only a minimal acquaintance with a computer. The Education Department "set out in 1989 to find a way in which all one-year secondary PGCE students could, according to their level of ability, learn to word-process, desk-top publish or explore new computer software and, at the same time, reflect on the process of learning in a positive and educationally challenging way". (p.52, Simmons, 1994)

By 1993 there was a significant improvement in students' perceptions of their confidence and competence with computers. This shift occurs in a year with the information technology (IT) and learning assignment, professional studies courses and two teaching practices where students are called upon to apply their new knowledge and initiate activities in classrooms as yet unaccustomed to information technology (IT). However, there was little change in students' pre-course competence, except in word-processing.

There was also evidence from newly qualified teachers "that where the ethos of the schools in which the work positively favours IT they are able to develop their skills and use IT confidently". (p.63, Simmons, 1994) If the ethos is not positive then the students' experiences are limited and the newly qualified teachers will not reach their information technology (IT) potential.

Initial Teacher Training (ITT) is destined to become more school-based. However, teacher information technology (IT) competence is still being developed. One worry is that this lack in competence will impact negatively on trainee teachers learning to use information technology (IT) in schools.

In 1992 and 1993 Collison and Murray (1995) gathered observational data, tape recordings of planning and evaluation conversations, and interviews and questionnaires involving all participants on an extended school-based teacher training partnership in a pilot 3-year, accelerated BA (QTS)(early years) degree. They found that school-based work can give trainees a deeper, personal understanding of how and why to use information technology (IT), than they would have obtained from a solely college-based approach. However, the trainees need a mentor who can guide and challenge them. This mentor should provide a sound model of information technology (IT) practice: collaborative teaching, school-based planning and guidance for using information technology (IT). There was little evidence of this. Nevertheless a collaboration between the school and the college on in-service training could transform teacher information technology (IT) competence if the time and money were there.

The problems of Initial Teacher Training and In-Service Training and information technology (IT) competence are not unique to the UK. A brief perusal of world-wide developments sees the University of Alberta's Faculty of Education running a course "Introduction to Microcomputers in Education" which some 3,200 students have taken since 1980 (Wright, 1993). In 1986 the University "acknowledged the importance of computers to education by requiring all future graduates from its Bachelor of Education program to include at least one three credit computer course (36 hours of instruction not including laboratory component) in their programs". (p.45, Wright, 1993) He also refers to an innovative in-service training project for practising teachers run by the Edmonton Public Schools' system which offers "a comprehensive mentoring program to develop highly trained computer resource teachers for its schools". (p.50, Wright, 1993)

Two recent successful in-service teacher development programmes in New Zealand (Lai, 1993) have adopted the approach of encouraging teachers to learn actively and to participate in the construction of their own knowledge and skills with computer technology.

The first programme was called the whole school approach and placed the teachers at the centre of the learning process. All the teachers were asked to participate in a six week classroom-based development programme where teachers defined and accomplished their training aims. The project also aimed at creating a computer-learning culture in the school where the teachers could share information and help each other in computer use. The second programme, sponsored by the Ministry of Education, also gave teachers the opportunity to define their own learning goals and also receive training in their actual teaching environments.

Both projects concluded that active participation from the teachers is the key to success in in-service teacher development. Lai concludes with "computer-related technologies have great potential in education. But to utilise fully the potential of these technologies we need the support of the teachers. As long as we realise the importance of the changing roles of the teachers there is a future for the use of these technologies in education". (p.135, Lai, 1993)

In Holland, between 1989 and 1991 "an integrated set of four case studies was undertaken to describe the day-to-day practice of four teachers from a Dutch secondary school who were implementing the uses of computers in their classrooms". (p.139, Veen, 1993) The project found four consequences for information technology (IT) in-service teacher training programs:

- in-service training should aim at individual teachers and school needs as a whole
- differentiation in the school to spread innovation
- plan ahead to support change
- fit into teacher's beliefs and skills

Furthermore it offers these implications for Initial Teacher Training:

- the courses need to be longer to introduce any substantial change in the beliefs of student teachers and the use of information technology (IT)
- lots of newly qualified teachers feel unable to risk using computer assisted learning (CAL) as they are too busy improving their classroom management skills
- not enough hardware and software in schools
- the teacher trainers need to acquire the necessary knowledge to teach the applications in their field

In a special issue of the Journal of Information Technology for Teacher Education eleven articles looked at the idea: "identify aspects of information technology (IT) use that have a positive effect on students' learning and then show how this identification could and does inform teacher education". (p. 115, Collis, 1993) There were eleven articles from representatives of teacher education research and practice in nine countries. Collis suggested these common conclusions:

- Changing Role of the Teacher: "At least eight of the studies explicitly call for a change in the role of the teacher as a critical pre-requisite and co-requisite for realising the potential of IT for student learning". (p. 121, Collis, 1993) They mainly call for "a constructivist view of learning, wherein the teacher becomes a planner and manager, a participant and a guide". (p.122, Collis, 1993)

- Time and Support: "many of the authors agree on the need for time and ongoing support in order for such a role change to occur, and following this, to expect to see substantial impact on student learning to occur". (p.122, Collis, 1993)

- Teacher Education Must Respond: "All of the authors agree: teacher education must respond better, differently, earlier, in order to meet the challenge of more effective use of IT in education". (p.122, Collis, 1993)

Despite all of these problems computer assisted learning (CAL) continues to be a major motivational force in the progress of most students' learning. It offers an emotionally-secure and non-threatening learning environment. It provides rapid and informative feedback (sometimes with appropriate remedial teaching) which gives encouragement and a greater measure of control to the learner. All of these enhance the students' self-esteem and provide the effective climate for more successful learning.

The effects of computer assisted learning (CAL) on students' global affective development are currently being investigated world-wide.

Researchers at Queen's University, Belfast carried out a study into the potential of portable 'laptop' or 'notebook' computers in schools during 1991-2 (Gardner, 1993). Students in nine schools were provided with a personal portable computer for a whole school year. One aspect of the research was to assess the impact which the high access to information technology (IT) had on the students' learning. Five experimental/control class groups (with/without laptops) were matched for age, gender and ability. The performance of these students in mathematics, English and science test was measured before and after the 'treatment period' and the comparisons were analysed. In mathematics there was no significant difference in performance between experimental and control groups. Again in science no significant differences were found. In English again there was no significant impact on the amount or level of writing between laptop and hand writers. Although the laptop students wrote longer pieces of work than the teachers would have expected. There was a problem with the pupils' acknowledged lack of typing skills.

In Singapore (Sponder and Hilgenfeld, 1994) at the National Institute of Education they are working with educators to develop Computer-Assisted Instruction (CAI) aimed at teaching and reinforcing two emerging new basics of learning: comprehension and communication (which they see as the technological age's evolutionary replacement for the traditional three Rs). As part of their teacher preparation course they aim to train teachers to author interactive multimedia presentations using cognitive objectives as a key to program development and student assessment. They conclude: "that using a cognitively-based design strategy for Computer-Assisted Instruction can be a useful, effective and time-saving process for busy classroom teachers. It can help them to know where they want to go so that they, and their students, can eventually get there". (p.15, Sponder and Hilgenfeld, 1994)

Integrated Learning Systems (ILS) is a computer-based learning resource combining subject-specific software with a management system which monitors the progress of pupils' work on the system and records their performance. It is designed to be used on a regular basis for short intensive periods of activity. The National Council for Educational Technology (NCET) has evaluated ILS in British schools.(NCET, 1994 and 1995)

Phase 1 ran for 6 months in 12 schools. The primary schools put the computers in a central area and used an extraction approach, whereas the secondary schools put the resources in a room designated for ILS which was timetabled for use by a specific class. Each student used the resource for 15 - 30 minutes at least 3 times per week.

In the US "ILS has been found to bring under-achieving students up to their expected levels of attainment". (p.16, Spilsbury, 1995) In the UK the ILS Maths module showed students making gains of 20 months over 6 months of the project (Phase 1). They also found that ILS improved behaviour and motivation in some pupils. Pupils of lower ability seemed to be able to concentrate for longer periods of time. they also appreciated the privacy to make mistakes unobserved. More able pupils liked the privacy of the system also as it allowed them to progress at their own pace without being regarded as swots ! The teachers noticed pupils demonstrated increased responsibility for their own learning.

Phase 2 ran for a further 6 months and found that the numeracy gains made by students using an ILS system were sustained for over one year after the students had come off the system. It also found qualitative evidence that ILS systems develop positive attitudes to learning and that these are being transferred to other classroom activities. Most students with special needs made good progress in both mathematics and reading and showed a shift towards more independent and self-regulated learning. English as a second language students benefited from using ILS and their teachers reported greater independence in their learning. Disruptive behaviour was reduced in under-achieving students with significant improvements in motivation, self-esteem and confidence. Able students enjoyed using ILS because of its one-to-one interaction facility but found it irritating to have to adapt to a fixed learning style which did not recognise alternative problem-solving strategies. The best results from using ILS are gained by ensuring students have sufficient time on system, have regular and frequent access, are appropriately supervised and have teachers who are involved with the process.

The evaluation of the use of ILS in British schools is continuing in the DFEE's (Department for Education and Employment) Medium Term Plan for 1996-99.

Project CHILD (Computers Helping Instruction and Learning Development) is a research and development project which is being undertaken in Florida. (Butzin, 1992) It is designed to explore a new approach to the use of technology in the classroom and is a computer-integrated instructional program for grades K-5. It provides a systematic approach for integrating technology into the primary classroom. One of its findings was that multiple assessments are necessary as one of the difficulties associated with using computers intensively is the incompatibility of technology-based learning with current assessment techniques. Teachers need to learn new ways to assess children.

Several investigators have also noted that involvement in computer assisted learning (CAL) may result in the improvement of students' self-esteem. Brown (1986); Dalton and Hannafin (1984) and Waldrop (1984) suggested the mastery of subject matter content and the development of computer literacy may be potential sources of positive development. In addition, Clement (1981) and Dalton and Hannafin (1984) noted that the non-judgmental/neutral and consistent reinforcement offered by the microcomputer is an optimum reward situation. The freedom from embarrassment, disapproval and diminished status often accompanying a mistake in the classroom is reduced in the

privacy of the computer assisted learning (CAL) situation (Brown; Clement; Dalton and Hannafin; Waldrop). All of these suggest that computer assisted learning (CAL) reinforces positive attitudes which protect and enhance feelings of self-esteem.

A study to evaluate the effects of computer assisted learning (CAL) on learners' global self-esteem was carried out on 1,000 students enrolled in a home economics course in a southern state of the US in 1987 by the University of Alabama (Robertson et al, 1987) The results of the study indicated that the students who were in the experimental group, which had access to supplementary materials and the microcomputer, scored significantly higher on self-esteem than did the control group students, who did not have access to supplementary materials and learnt with the traditional educational resources.

Although the results of the study did not directly explain the reasons why computer assisted learning (CAL) had a positive effect on the self-esteem of the experimental group students, several explanations were offered. The self-esteem of the students "may have been enhanced as a result of the students developing proficiency with the use of the microcomputer". (p.316, Robertson et al, 1987) The students were excited about their work; and this was very important and satisfying for both the students and teacher. Also more individualised methods of instruction were used to teach the students the rudiments of using the microcomputer. Possibly "this one-to-one learning experience may have helped students to feel that they were valued as individuals". (p.316, Robertson et al, 1987) Further the teachers described the students' reaction as being personally rewarding.

Other areas or research investigated the effectiveness of computer assisted learning (CAL) in differing situations. Davidson (1990) is looking at the use of speech in computer-assisted learning programmes for beginning readers. Jackson, Fletcher and Messer (1986, 1988) looked at the use of microcomputers in Hertfordshire primary schools. They found that the micros "offered a focus for co-operative activity which had not been predicted. Interestingly, the type of software mainly used was found to be related to children's co-operative behaviour, and their motivation for work". (p.214, Jackson, 1988)

Gender issues and computing have been investigated by Pryor (1995) in the early 1990s. He concluded that: "Group work with computers is a very good area of the curriculum to look at gender issues because of the symbolic value of computers" and "group work was seen as a context where boys and girls could transcend gender stereotypes" (p.286, Pryor, 1995)

Wiburg (1994-5) looked at several studies which investigated gender issues, personal characteristics and computing. She concludes: "While males and females do tend to see the computer differently, this could be interpreted as an opportunity to expand the use of computers in educational settings rather than a barrier to female success". (p.10, Wiburg, 1994-5)

Computer Assisted Learning (CAL) and program quality was investigated by Johnston (1987). A questionnaire survey (supplemented by interview) of 144 pupils in two secondary schools was carried out in early 1985. The results indicated a general preference for computer-assisted learning; they were well-motivated towards the idea. "With the microcomputer, pupils feel able to control their own learning. However, they

have serious reservations concerning software quality, variety and availability, the social and economic costs and the appropriateness of the technology for assisting learning". (p.54, Johnston, 1987)

Tomlinson and Henderson (1995) surveyed the current work in the emerging area of Computer Supported Collaborative Learning (CSCL). This is where computer assisted learning (CAL) is taken a step further to involve communication between a team of learners. There are various CSCL systems all over the world. In order to explore some of the problems associated with CSCL applications development a simple distributed collaborative application was developed. Some of the points which emerged were: "the potential of network support for collaboration" and "much enjoyment and excitement was generated when children successfully completed words, and when messages were passed". (p.137, Tomlinson and Henderson, 1995) They finally suggest that: "Distributed CSCL can become the next generation of computer assisted learning (CAL) software". (p.139, Tomlinson and Henderson, 1995)

In Australia, Bailey and Weippert (1992) investigated the use of computers to improve the language competence and attending behaviour of deaf aboriginal children. The data collected showed that their self-confidence and autonomy as learners developed during the course of the project.

Frances Mueller (1992) reports on an electronic mail system used in two psychiatric units in two mid-western metropolitan area hospitals in the US. There were over 100 students aged between 8-17 years who corresponded with students in Michigan, Nevada, Ohio, Hawaii and Canada. Among the benefits reported was "improved self-esteem followed students' successful independent use of the computer. The personal growth paralleled their gains in technological skills". (p.11, Mueller, 1992)

In Turkey, Askar, Yavuz and Koksal (1992) studied students' perceptions of computer assisted instruction environment and their attitudes toward computer assisted learning (CAL). 137 fifth grade students from two private elementary schools in an upper-middle class area who had had no previous experience with micros at home or school were involved. The students' attitude towards computer assisted learning (CAL) was positive. They said learning from computers was an enjoyable and interesting way of learning. 63% stated that they would like to use computers in other courses.

A year long project funded by the National Council for Educational Technology (Loughrey, 1991) monitored the contribution made to the education of children with special educational needs, between the ages of 9-13, in four secondary and four primary schools, by the development and use of software suitable for the Apple Macintosh computer. The recently developed software was interactive in nature and proposed to encourage children's development in literacy. The software was considered interactive because the child would remain in control of the activity and be an active contributor in the production of ideas and text.

A significant percentage of the teachers commented on the change in the children's level of motivation with the introduction of computer work. Many of the teachers described how they observed a motley collection of children develop over sessions from a set of isolated individuals into collaborative and mutually supportive groups which worked

enthusiastically on assignments. The children also acquired status in the eyes of other children which lead to greatly enhanced self-esteem.

"Building self-esteem" is the title of an article by Howard (1993) in Micromath. The article is based on work carried out with boys in an emotional and behavioural difficulties boarding and day school. The boys had problems of low self-esteem, found difficulty in relating to others and had a lack of self-control. They were educationally average to below average but all were under-achieving.

They used computers in Maths to do some survey, investigation and database work. It would have been difficult to achieve the quality or quantity of this work without the use of computers. The boys worked as a group or singly and achieved work they couldn't have done otherwise. They felt proud of their work and felt the effort was worthwhile. They also thought they had extended their levels of knowledge. All of this enhanced their self-esteem and gave them some prestige. This set a platform for further achievement.

In the last few pages self-esteem has been mentioned with regard to computer assisted learning (CAL). Clearly, the writer and the researchers mentioned in the reported studies think that the two form an important link and computer assisted learning (CAL) in some way enhances students' self-esteem. However, before we can understand what self-esteem is and what its measurable qualities are, we have to take a side-step and first look at self-concept.

There are many definitions of self-concept cited in various places including Rogers (1951) and Purkey (1970). Perhaps one of the simplest definitions of self-concept was given by Thomas (1980): "The self-concept is the image or picture the person has of himself, which has developed through childhood and adolescence under the formative influences of home, school and social environments and forms his behaviour". (p.24, Thomas, 1980)

If we believe that a positive self-concept is a necessary pre-requisite for human happiness in any situation, what are its determinants ? In order of importance as influences on self-development they are the home and the school. These two are greater determinants than social class.

In the home, Thomas (1980) writes, the parent child relationship is a very important determinant. If the spirit of the home is one of warmth, mutual respect and consideration then the child develops a realistic concept of himself. If the parents are indifferent, the children show low degrees of self-esteem. Also if the parents are too strict, insufficiently protective or over critical, this may interfere with the attainment by their children of a mature self-concept.

Obviously some of the determinants in the parent and child relationship can be transferred to the school; but at the school the child also meets fellow members of his peer group who place other pressures on his self-concept. One of these pressures is that of learning performance, which is affected not only by intelligence but also by personality; and personality also relates to levels of maturation and anxiety.

In adolescence levels of maturation and anxiety show the greatest disparity. It is the age of Erikson's notions of identity crisis and identity diffusion. At no other stage of human development are there signs of a greater disturbance or crisis than in adolescence (Coleman, 1974). This is when the human-being/adolescent "is conscious of self and the cherished image of what he wants to be accounts for his characteristic vulnerability to slight and shame. Self-esteem, writes Galdston, (1967) is the issue of adolescence". (p.44, Thomas, 1980)

Hemmings (1974) "has brought out the importance of self-concept in the dynamics of adolescent growth, where the perception of self determines the quality and extent of interaction with the external world and modifies personal development as a whole, including emotional and moral aspects. Adolescents who have a strong self confidence have this reinforced and those who feel failures tend to live up to their own expectations". (p.44, Thomas, 1980)

This idea is further supported in Rosenberg's (1965) work - a major cross-sectional study of 5,000 adolescents in the US and indicates the characteristics of teenagers with low and high self-esteem. "Self-esteem, as noted, is a positive or negative attitude towards a particular object, namely the self". (p.30, Rosenberg, 1965)

Rosenberg found that students with high self-esteem in their scale expressed the feeling that one is "good enough". The individual feels he is a person of worth; he respects himself for what he is but does not stand in awe of himself nor does he expect others to do so. He does not necessarily consider himself superior to others; recognises his limitations and expects to grow and improve. Whereas the student with low self-esteem implies self-rejection, self-dissatisfaction and self-contempt. The individual is disagreeable and he wishes it were otherwise. (p.31, Rosenberg, 1965)

Purkey (1970) went on to document self-concept and school achievement. In the preface of his book, "Self-Concept and School Achievement" it is noted that "contemporary research points insistently to the relationship between self-esteem and academic achievement". (p.vi, Purkey, 1970) His research cited various authors.

Kaplan (1994) carried out a three-wave panel study on 1,756 students in 1971, 1972 and 1973 in 36 junior high schools of the Houston Independent School District. A 201-item questionnaire was designed to measure psycho-social characteristics and self-reports of deviant behaviours plus 8 questions about sociodemographic characteristics.

The results supported the idea that school failure is motivated behaviour. (There was a "theoretically predicted relationship between self rejection and school failure through the adoption of contra-normative behaviors and attitudes". (p.171, Kaplan, 1994)) You can view "school failure as an adaptation to previous self-devaluing experiences within a school context, whereby students forestall further experiences of self-rejection by withdrawing effort and questioning the validity of evaluative standards based on school achievement. Students who are failing through lack of effort have a ready justification for their failure that does not reflect upon their intrinsic worth (they are only failing because they are not trying) and at the same time academic failure reflects the students' rejection of

school achievement as an appropriate standard for others to evaluate". (p.17, Kaplan, 1994)

One of Kaplan's recommendations was: "the need to plan regular school and remediation programs for students who have exhibited a lack of achievement motivation and a pattern of frequent failure during junior and high school. At that point, one has to provide students with frequent opportunities for participating in self-enhancing (self-esteem and academic) experiences at school". (p.171, Kaplan, 1994).

On the whole, the researchers agreed that students who under-achieve scholastically, or who fail to live up to their own academic expectations, suffer significant losses in self-esteem.

How is self-esteem measured ? After all it is not a concrete concept which can be measured by conventional means. Rather it is an abstract one which will require sound and sophisticated instruments of measurement. Purkey (1970) in fact warns us to "beware - the self is multidimensional and tremendously complex". (p.58, Purkey, 1970) Two major cautions that we need to be aware of in assessing or measuring self-esteem are our limitations and our biases. Despite these cautions he does offer a number of ways in which we can measure self-esteem.

His first suggestion for evaluation of the self is through self-reports. These are usually questionnaires or item-banks which contain a self-esteem scale. Allport (1955, 1961), Rogers (1951) and Strong and Feder (1961) all support the idea of self-reports. They agree that self-reports are valuable sources of information about the individual who has the right to be believed when he reports his feelings about himself . Whereas Combs and Soper (1957), Heilbrun (1965), Purinton (1965) and Wylie (1961) are self-reports' major critics. They feel that the accuracy of the self-report depends on the clarity of the individual's awareness of himself, the individual's command of adequate symbols of expression, how threatened the individual may feel, what he feels he is expected to say and repeated usage. However, Purkey does comment that "Used sensitively in conjunction with other evidence, self-reports give rich insights into how the child sees himself and his world". (p.61, Purkey, 1970)

Evaluating the self through observations is another method of measurement. There are two schools of thought on this: the traditional and the contemporary. The traditional one is like a camera wherein the more depersonalised and detached the observer became, the better. The contemporary idea (Combs, 1965) is one where the observer should be looking for reasons for behaviour rather than at the behaviour itself. However, Purkey (1970) reminds us that we can never view ourselves or anyone else with complete objectivity.

Structuring these observations is another method of evaluation. The individual can respond to stimuli in a structured interview where the questions are carefully organised and may be open-ended. They should be posed in an atmosphere of acceptance and permissiveness. Sacks (1966) reminds us simple quasi-projective techniques, such as the student evaluating himself by writing an autobiography, completing interest records or participating in play situations may also be useful.

Obviously the next stage after observation is to draw inferences. Inference is a valuable scientific tool whose reliability between and within observers has been demonstrated. (Courson, 1965) By asking a number of questions based on the observations we are able to find out what the individual student is like, how he feels about himself and the world, and why he behaves as he does.

By looking at all the research on abilities and personality we are led to the belief that the key factor in educational attainment is that pupils must repeatedly experience success in schools. This builds appropriate abilities, study habits, attitudes and values and minimises those factors that inhibit successful performance. (p.67, Thomas, 1980) As Covington and Beery (1976) argue: "self esteem is not something separate from performance but rather integral to it. It is through achievement that academic self-confidence grows, and increased confidence in turn promotes achievement through inspiring further learning". (p.67, Thomas, 1980)

As we have already seen from the previously mentioned studies (Askar, Yavuz and Koksal, 1992; Bailey and Weippert, 1992; Brown, 1986; Clement, 1981; Dalton and Hannafin, 1984; Davidson, 1990; Howard, 1993; Jackson, Fletcher and Messer 1986; Loughrey, 1991; MacDonald, 1991; Messer and Light, 1991; Mueller, 1992; Robertson, Ladewig, Strickland and Boschung, 1987) some evidence is already beginning to emerge that computer-assisted learning (CAL) may have some positive effect on the students' global self-esteem.

The non-judgmental and consistent reinforcement offered by the micro is an optimal reward situation which must make the learner feel they have achieved in a positive way. This is particularly relevant for adolescent learners who feel very vulnerable to slight and shame in ordinary learning situations. The privacy of the computer assisted learning (CAL) learning situation must result in a freedom from the embarrassment or disapproval or diminished status which often accompanies a mistake in an ordinary learning situation.

The fact that the students are also developing proficiency in the use of the micros must also enhance their self-esteem. This must then spiral upwards into a desire to become more proficient and explore more functions of the micro and the accompanying software.

Some of the studies also noted that the students and the teachers felt valued for once as individuals (Loughrey, 1991; Mueller, 1992; Robertson et al, 1987). The teacher was able to be released from the class/teacher relationship to a one-to-one or small group relationship. This meant that there was more communication of a positive and supportive nature between the student and the teacher. Obviously this enhances affective development and encourages feelings of positive self-esteem.

To summarise, we have documented the introduction and development of information technology into the British education system and noted the resultant effects. One of these was the development of computer-assisted learning (CAL). The potential of computer assisted learning (CAL) as a motivational force is enormous. However, it was soon realised that this potential could only be released if individuals were taught how to become proficient microcomputer operators. Once this had taken place researchers noted that student levels of self-esteem would show significant signs of improvement. The non-judgmental and consistent reinforcement offered in the privacy of a computer assisted learning (CAL) situation seemed to reinforce the positive attitudes which protect and enhance the feelings of self-esteem.

If this is so then certain methods which have been developed for collecting and analysing information about opinions and attitudes - the questionnaire, the structured interview, self-esteem scales, observations, inferential analysis, etc. - might be profitably employed in a study to investigate the effects of CAL on the self-esteem of the adolescent student.

The study looked at the development of computer assisted learning (CAL) and its effects as a pedagogical tool. In particular, it investigated the effect of computer assisted learning (CAL) on student self-esteem between two samples of high IQ and specific learning difficulties (sld) students from the two intake years.

CHAPTER TWO

BACKGROUND TO THE RESEARCH AND RESEARCH METHODOLOGY

All the active research operations in this study took place at a city technology college (CTC). The city technology college (CTC) is one of a new breed of educational institutions developed in the late 1980s by the then incumbent Conservative government. The government's proposal was to work "with interested individuals and organisations to establish with financial assistance from the Department of Education and Science a network of City Technology Colleges (CTCs) in urban areas. Their purpose will be to provide a broadly-based secondary education with a strong technological element thereby offering a wider choice of secondary school to parents in certain cities and a surer preparation for adult and working life to their children". (D.E.S., 1986)

The curriculum of the CTCs would include "a large technical and practical element within the broad and balanced curriculum" and "will where possible also be used to establish the value and effectiveness of equipping a secondary school with Information Technology hardware and software on a scale more extensive than is normal in the maintained sector". (D.E.S., 1986)

This commitment to information technology(IT) is reiterated in the Statement of Intent made by the D.E.S.: "v. Particular attention will be given to effective teaching of cross curriculum themes, such as education in economic understanding and information technology". (D.E.S., 1988)

Details of implementation were also given and included the recommendation of the use of micros as tools throughout the education process. Provision would be made on a generous scale to enable this to take place. Technical support would be "of the quality found in a successful business enterprise handling similar tasks". (D.E.S., 1988)

The CTC opened officially in September 1989. There were 23 RM Nimbus186 microcomputers networked together in one "computer suite". The operating system was a small file server. The micros were used to teach the first Year 7 (first intake year) a basic computer awareness course. The software packages available were:

- a word processing package: Write
- a database: Oriel
- a DTP package: NewSPAper
- a graphics package: Paint
- some modern languages courses: Tictac and Penfriend

There was a qualified, full-time Systems Network Manager.

In September 1990, the second year of operation, there was a dramatic increase in both hardware and software resources. A total of 77 Apricot LAN (Local Area Network) Workstations were installed. These were discless machines and only 5% had a floppy disc system. These were connected to a thin Ethernet/Fibre LAN Network, consisting of 2 Apricot Fileservers with 2 gigabytes of storage. The network operating system was an industry standard Netware 3.11. The software was to include:

- word processing packages: Wordstar and Wordperfect
- a database: Dataease
- a Soutron Library System for accessing data in the library
- a Comptons Multimedia Encyclopaedia for referencing skills

A full-time Assistant Systems Network Manager was appointed.

The new Year 7 (second intake year) were taught the basic computer awareness course using the new Apricot LAN Workstations. Whereas the Year 8 were developing their computer skills across the curriculum using some generic and some subject specific software. The Year 8 students used both the RM Nimbus and Apricot machines although no formal lessons were given to develop their proficiency with the new Apricot LAN Workstations.

In November 1990 a new Systems Network Manager took over. The Windows 3 Software package was put on to the network operating system. The software was to include:

- a word processing package: Winword
- a database: Superbase 4
- a DTP package: Aldus Page Maker
- graphics packages: Coreldraw and Paintbrush
- a spreadsheet package: Excel

The 23 RM Nimbus186 micros were sold. The Apricot LAN Workstations were distributed around the college in groups of 12 in the Library, Communications Centre, Computer Aided Design Suite and the Computer Base; and separately in a variety of classrooms or staff work bases. All of the Workstations are connected to the 2 Apricot Fileservers.

In August 1991 the latest Year 7 (third intake year) were taught a new computer awareness course. They worked in groups of 12, with one student to one workstation, for one 45 minute lesson each week. They began with basic keyboard skills and moved through word-processing, graphics, database and spreadsheet software programs.

Against this background the study looked at the development of computer assisted learning (CAL) and its effect as a pedagogical tool. The research explored four main areas:

- the city technology college (CTC) students' previous micro experiences, their attitude responses to micros and their knowledge and usage of micros

- what effect did computer-assisted learning (CAL) have on student self-esteem between two samples of high IQ and specific learning difficulties (sld) students from two intake years at the CTC

- differing learning situations and the use of micros at the city technology college (CTC)

- comparison of information technology (IT) provision and practice at the city technology college CTC, a l.e.a. maintained school(soon to become grant-maintained) and a grant-maintained school

The main question considered:

- were there any indicators to prove the "value and effectiveness of equipping a secondary school with Information Technology hardware and software on a scale more extensive than is normal in the maintained sector". (D.E.S., 1986).

  If so:

- what were these indicators and

- what were their values and effects.

- more particularly, it also considered the effect of computer-assisted learning (CAL) on student self-esteem between two samples of high IQ and specific learning difficulties (sld) students from two intake years

The sample for the investigation of computer assisted learning (CAL) as a pedagogical tool was taken from the 1990 and 1991 intake years. There were 163 students in 1990 and 166 in 1991. From each of these years 10 high IQ (students who had achieved a Standard Age Score above 126 on the NFER Non-verbal Reasoning Test (NFER 1986) and 10 specific learning difficulties (sld) (students who had achieved a score below 88 on the NFER test) students were selected to take part in the second stage of the investigation i.e. the effect of computer assisted learning (CAL) on student self-esteem. This sample was carefully selected to reflect the gender imbalances and to exclude any secondary learning difficulty, such as English as a second language, hearing impairment, behaviour problems, etc. In this case specific learning difficulties meant students who were slow learners, had low IQs, were dyslexic, or were reluctant learners with literacy or numeracy deficits.

The tools (Appendix 1, p.91-104) used to collect the data were either developed by the researcher or modified from ones already available. Although "off the shelf" tools would have been easier to administer and would have permitted statistical testing to take place, their validation would have been questionable as specific learning difficulties (sld) students are often excluded from the standardisation processes which produce the norms for these tools. However, a self-esteem attitude questionnaire (Appendix 1C, p.98) developed by Rosenberg in 1964 was found to be particularly suited to this work.

The first data collection tool was a questionnaire (Appendix 1A, p.92-3) which was distributed to all new intake students within six months of entering the city technology college CTC. **The questionnaire was designed to elicit information on the student's previous micro experience, attitude responses to micros and knowledge and usage of micros.**

The advantages of using a questionnaire are ease of administration, economy of time and relevant data collection. A large sample was required for analysis and it was not practical to use a technique which required individual administration as there was only one researcher. Time was also limited and it was necessary for the task to be completed in one single lesson and the questionnaire would obtain a great deal of information about the respondent. In order to ensure the relevance of the information, the questionnaire was specifically designed to meet the purpose of the research. However, the questionnaire has not been standardised and the data may have only limited reliability.

There was a 98% return rate for the 1990 intake year and a 90% one for the 1991 intake year. The questionnaires were distributed by the researcher in timetabled information technology or private study lessons. The researcher returned 30 - 40 minutes later to collect the completed questionnaires. Although this mode of data collection should have ensured a 100% return rate, the instances of student absence due to sickness, medical appointments or other causes reduced this rate.

The structured interviews took place at the end of their first year for Year 7 (1991 intake) and their second year for Year 8 (1990 intake). The high IQ student sample was based on results from a N.F.E.R. Non-verbal Reasoning Test taken pre-entry to the city technology college (CTC). The specific learning difficulties (sld) sample was based on the N.F.E.R. test, Diagnostic Spelling Test (Vincent and Claydon, 1981), Effective Reading Test (Vincent and De la Mare, 1985), Widespan Reading Test (Brimer, 1984) and Skill Teach phonic assessment (Shelton, 1984).

The structured interview was used as a supplement to the questionnaires, which were used as a jumping-off place for the interview. **The structured interview record form (Appendix 1B, p.94-7) was designed to systematically cover a set of topics relevant to the research and to record the relevant information provided on each.** In this way, the lapses and biases of the single interviewer were minimised.

The structured interview samples were also asked to complete two further questionnaires. One on self-esteem using Rosenberg's measure (Rosenberg, 1964) (Appendix 1C, p.98) and one on self-esteem and micros (Appendix 1D, p.99), which was closely based on Rosenberg's measure, using the same language but inserting a specific reference to micros in each question. **These questionnaires were designed to assess the attitudes of the structured interview sample students to themselves and to themselves and micros.** Their results were also compared to the structured interview data.

The attitude questionnaire was chosen as the tool to collect this set of data as its format of a short set of statements, which are very homogenous in content, differing only in degree of some specific attitude offered reasonably reliable data. The questionnaire had already been standardised by Rosenberg (Rosenberg, 1964) and used a Guttman type scale.

"The Guttman scale insures a unidimensional continuum by establishing a pattern which must be satisfied before the scale can be accepted. The adequacy of each item is not determined primarily by its relationship to a total score but by its patterned relationship with all other items on the scale". (p. 16-17, Rosenberg, 1965).

The last part of the study was concerned with investigating differing learning situations and the use of micros.

A simple observation tool (Appendix 1E, p.100-1) was designed by the researcher to investigate students' use of the micros in their free-time at the city technology college (CTC). The design was based on tick-boxes, timed comments and a short yes/no question session at the end. Again ease of administration, economy of time and relevant data collection were the main function in its design.

A structured interview record form (Appendix 1F, p.102-4 was designed for use in visiting two other schools to find out what their information technology provision and practice were. A grant-maintained and a l.e.a. maintained school (soon to become grant-maintained) were chosen as they, along with the city technology college (CTC), represented the current maintained secondary sector in England and Wales.

The structured interview record form was designed to systematically cover a set of questions relevant to this part of the research. The data should show us how pervasive information technology (IT) is in the curriculum of the three schools.

The study began data collection in January 1991 using the intake questionnaire.

CHAPTER THREE

INTAKE COMPUTER AWARENESS QUESTIONNAIRE - COMPARISON OF 1990 AND 1991 INTAKE STUDENTS

Conditions

The questionnaire (Appendix 1A, p.92-3) was distributed to a total of 308 Year 7 students from two consecutive intake years (1990 and 1991) in their second or third, eight week term at a city technology college (CTC). The students were mixed-ability, co-educated and from a variety of ethnic backgrounds.

The 1990 intake (98% return rate) were interviewed between January and March 1991. Whereas the 1991 intake (90% return rate) students were interviewed in September and October 1991.

All questionnaires were answered in timetabled information technology (IT) or private study lessons. Each student received a questionnaire and the researcher left the room leaving the students with their class teacher. The researcher returned 30 - 40 minutes later to collect the completed questionnaires. Limited dialogue took place between the researcher and students with only answers about the administration of the questionnaire or clarification about the language content being given.

Summary of Research Data

The overall total of students in the questionnaire sample is 308.

Table 3.1 analyses the sample by gender and illustrates the gender imbalances which exist in the two intake years.

Table 3.1: Gender constituents of the sample

Intake Year	Female	Male
1990	46%	54%
1991	43%	57%

The first data shown in Table 3.2 tells us that the majority of students had used a micro prior to entry to the city technology college (CTC):

Table 3.2: Is this your first time using a micro ?

Intake Year	No		Yes		Abstained	
	F	M	F	M	F	M
1990	43%	51%	1%	1%	2%	2%
1991	40%	54%	1%	1%	2%	2%

The data also showed us that the students had high levels of use in both gender and year of intake groups.

Table 3.3: How many times have you used a micro before ?

Intake Year	0 - 5		5 - 10		10 - 15		15+	
	F	M	F	M	F	M	F	M
1990	1%	0%	3%	5%	4%	7%	36%	44%
1991	1%	1%	7%	2%	5%	5%	36%	43%

The data from Tables 3.2 and 3.3 indicate that the majority of intake students are familiar with micros and use them frequently.

The next two questions began to analyse the data into types of program used (Table 3.4) and the conditions of use (Table 3.5):

Table 3.4: Types of program used

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Type of Program				
Word Processing	89%	87%	70%	79%
Computer aided drafting or design	74%	72%	28%	49%
Simulation	90%	93%	94%	92%
Programming	44%	38%	27%	28%

The use of word-processing programs remains at a similar level for the two intake years whereas the computer-aided drafting or design levels fall more noticeably in the female students from 74% to 28%. Simulation remains ever popular. The greatest difference occurs in programming which drops dramatically between the two years. Again the most noticeable decrease is in the female students' use from 44% to 27%

When compared to national surveys carried out in February 1988 (D.E.S., Statistical Bulletin, 10/89), March 1990 (D.E.S., Statistical Bulletin, 11/91) and March 1994 (DFE, Statistical Bulletin, 2/95), the students of the city technology college (CTC) displayed a frequency of use higher than the national average:

Table 3.5: Comparison of D.E.S and DFE National Surveys and the CTC Survey Results

	Percentage frequency of use by 11 year olds				
	National	National	National	CTC	CTC
	2/88	3/90	3/94	3/91	10/91
Word Processing	35	39	34	41	76
CAD	7	7	11	73	40
Simulation	12	6	4	98	99
Programming	7	7	2	41	27

The reason for this higher than average use is mainly due to the extensive provision at the city technology college (CTC) of 1 micro to 3 students compared to a national average of 1 micro to 13 students in secondary schools (D.E.S.,1991). Changing to 1 micro to 6 students at the city technology college (CTC) and a national average of 1 micro to 10 students in March 1994. It is also partially due to the increase in micro provision in primary schools nationally, from 2.5 per school in February 1988 to 4.3 in March 1990 to 9.9 per school in March 1994 (D.E.S., 10/89, D.E.S. 11/91 and DFE 3/95).

The next set of data also reflects this improvement of micro distribution:

Table 3.6: Conditions of use of the micro at the CTC

Intake Year	1990		1991	
	F	M	F	M
Alone	71%	73%	72%	67%
Pair	65%	52%	66%	58%
Group	70%	41%	31%	35%
Class	41%	38%	39%	27%

The data illustrates a positive trend away from group or class use to one where a pair or individual use is more common. Again the city technology college (CTC) reflects a nationally improving situation:

Table 3.7: Student/Micro ratios in Primary and Secondary schools in 1985, 1990 and 1994

	Primary			Secondary		
	1985	1990	1994	1985	1990	1994
Student: Micro Ratio	107:1	40:1	18:1	60:1	18:1	10:1

Where the provision of more micros is improving the 'hands on' experience of the students increases. Also teachers are becoming more information technology (IT) literate in both primary and secondary schools due to the provision of in-service education and training (INSET).

The last question in this initial battery of "information-seeking" questions asked the students what work could a micro do. Again there was a noticeable change in the students' perceptions between the two years:

Table 3.8: What work can a micro do for you ?

	Number of responses			
Intake Year	1990		1991	
	F	M	F	M
Type of response				
Gives information	47%	22%	41%	34%
Help me/ help you learn	38%	33%	11%	14%
Anything	26%	30%	9%	10%
Word-process	7%	19%	23%	35%
Games	14%	13%	14%	7%
CAD	12%	6%	5%	13%
Check spelling	1%	1%	8%	9%
Store information/data	1%	9%	6%	4%
Keyboarding skills	0%	0%	13%	9%
Maths	0%	0%	5%	15%

The data collected in Table 3.8 shows an increase in the awareness of the micro's potential between the two year groups. Instead of blanket responses of the 1990 intake year such as: "help me/help you learn" (36%) or "anything" (29%), the 1991 intake group are more specific with their comments, such as: "word process" (30%), "check spelling" (8%),"teach to type" (10%) and "maths" (11%). These comments are due to an improved micro awareness course being taught to year 7 as well as the aforementioned increases in micro provision and the information technology (IT) literate teachers.

The next two questions investigated attitude responses to the micro. The first asked them how they felt sitting in front of one. The majority of responses for both year groups were either positive: "good" (71%) and "relaxed/happy" (60%) or neutral: "o.k./all right" (90%) and "normal" (56%). Clearly most students enjoyed or accepted sitting in front of a micro as part of their school routine as the data in Table 3.9 demonstrates:

Table 3.9: How do you feel about sitting in front of a micro ?

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Positive Responses	44%	56%	61%	68%
Neutral Responses	52%	42%	33%	26%
Negative Responses	4%	2%	6%	6%

If they felt so positive about merely sitting in front of a micro would that continuum be maintained when they were working it.

Table 3.10: How do you feel about working a micro ?

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Positive Responses	46%	59%	62%	69%
Neutral Responses	42%	34%	31%	31%
Negative Responses	10%	7%	6%	0%

The data from Tables 3.9 and 3.10 illustrate an overwhelmingly positive response in both intake and gender groups.. The positive responses such as "makes work more interesting" (1990 female) "like I own it" (1990 male) "cool and relaxed" (1991 males) and "mega - most triumphant" (1991 female) either maintained or increased their levels whereas the negative responses such as "bit nervous in case I break it" (1990 females) "frustrating" (1990 male) "tense" (1991 female) and "worried" (1991 male) are decreasing, especially where the male students are concerned. Clearly the students felt confident about using the micros.

The questionnaire then re-examined the students about an earlier question: What work can a micro do for you ? (Table 3.8). The intention was to try to examine whether the students are merely "poseurs with a micro" i.e. happy to promote an image "using" it or are they actually operating the micro to perform task. The wording of the question was slightly altered from that in the original question 8 to see if any further or different information would be given by the students.

Table 3.11: What else do you think a micro can do for you ?

	Number of responses			
Intake Year	1990		1991	
	F	M	F	M
Type of response				
A lot/anything	26%	24%	11%	2%
Home/school work	26%	29%	25%	26%
Print/word-process	30%	43%	9%	7%
Keyboard skills	0%	1%	6%	8%
CAD	11%	16%	3%	7%
Information retrieval	38%	15%	19%	15%
Store data	0%	3%	2%	8%
Games/entertain	5%	6%	5%	6%
Helps you	0%	0%	22%	32%
Communicate with others	0%	0%	2%	5%

The data illustrates little difference in the students' responses between Table 3.8 and 3.11 but it does indicate a shift in the quality of the response from the two years from the general to the more specific. Instead of commenting "a lot/anything" the 1991 student is able to realise the micro can help you with specific tasks: "keyboard skills", "store data" and "communicate with others". The 1991 student can see a wider range of applications because they are following a new information technology (IT) awareness course using the Apricot micros. Also more software packages have been added to the network to increase the micros' usefulness.

The data shows that the students are beginning to realise that the micros are useful and offer an ever increasing list of facilities. But do they realise how the micros can specifically help them in their college work ?

Table 3.12: How does the micro help you

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Type of Response				
Help with work/word processing	53%	52%	56%	55%
Information Retrieval	38%	20%	19%	20%
CAD	4%	3%	2%	0%
Data storage	0%	5%	3%	2%
A lot/many ways	7%	15%	5%	7%
Easy/quick to use	3%	2%	5%	11%
Keyboard skills	0%	0%	31%	16%
Future employment	0%	0%	6%	6%
Communicate	1%	0%	0%	0%

The data shows that the students can be very specific about the help the micro gives them with their college work. Again, the 1991 student is more informed about the micro's uses i.e. "keyboard skills" and "easy/quick to use". They are also able to realise that the micro will have a role in their future employment. A point totally missed by the 1990 students.

Clearly the 1991 student uses the micro as a tool to teach themselves a specific skill. do they like it as a way of learning or would they prefer more conventional methods ?

Table 3.13: Do you like it as a way of learning ?

Number of Responses				
Intake Year	1990		1991	
	F	M	F	M
Yes	97%	94%	94%	98%
No	0%	2%	1%	0%
All right	3%	4%	5%	2%

The overwhelming response was in favour of the micro as a learning tool in both year groups.

(The structured interview students were questioned further about their preference for the micro and the resultant data is in Chapter 4 (Tables 4.15 - 4.19).)

The 1991 student was also asked:

Table 3.14: Do you see it as another way of learning ?

	Number of Responses	
Intake Year	1991	
	F	M
Yes	91%	94%
No	9%	6%

Again the data shows overwhelming support for the micro. However, there were a few interesting comments made by two female 1991 intake students: "should write instead of typing all the time" and "micros teach you some things but not everything". Clearly they see the micro as one in their range of tools.

The data indicates that the 1990 and 1991 students are very positive about micros and enjoy using them as technological tools. However, all the questions asked so far relate to the student's own use of the micro. How perceptive are they about how the college uses them ?

Table 3.15: What different things do the micros in college do ?

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Word process	63%	36%	19%	14%
CAD	53%	42%	22%	30%
CD ROM	42%	24%	8%	5%
Games	22%	8%	11%	9%
Mealman lunch card	10%	13%	3%	4%
Data storage	4%	8%	2%	5%
All sorts	19%	26%	3%	12%
Information retrieval	0%	0%	27%	22%
Soutron Library System	0%	0%	23%	11%
Programming	0%	1%	8%	4%
Keyboard skills	0%	0%	17%	22%
Windows 3	0%	0%	5%	6%
Communications (E-mail)	0%	0%	0%	7%

The data illustrates that the students are not very perceptive about how the college uses micros. Their answers are restricted to their own uses of them. A few students realise micros are used to run the Mealman lunch card and Soutron Library systems but only a few male 1991 students realise it is used as a major internal communication system (E-mail). Again the 1991 student has a more developed understanding than his 1990 counterpart.

The penultimate question asked the students who uses micros in the world. Would they have a limited an understanding of the application of micros in the world as they had for the college ?

The 1990 student gave 23 different category responses whereas the 1991 student gave 53.

Table 3.16: Who uses micros in the world ?

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Lots of people/almost everyone	45%	41%	30%	29%
Business people	18%	38%	45%	46%
Schools/school people	34%	10%	56%	44%
Offices	34%	3%	20%	9%
Banks	18%	5%	16%	9%
Shops	14%	6%	2%	0%
Scientists	1%	3%	5%	8%
People who can buy them	4%	10%	0%	0%
Me	1%	5%	2%	1%

The data illustrates that although the students realise an ever widening band of people use micros, that band is restricted to the places where the students have seen micros in use. Not many thought of the industrial use of micros in factories and workshops or the administrative use of micros in hospitals.

The final question was an attitude one which posed the question:

Table 3.17: How would you feel if all the micros were taken away ?

	Number of Responses			
Intake Year	1990		1991	
	F	M	F	M
Sad/upset/miserable	42%	36%	34%	43%
Bored/lonely	7%	15%	16%	13%
Unhappy/not like it/disappointed	7%	17%	31%	20%
Angry/mad	17%	16%	7%	14%
Sick	3%	4%	0%	0%
Effect my learning	9%	0%	1%	5%
Uncomfortable/lost/stuck	6%	0%	2%	2%
Wouldn't mind/not really bothered	9%	12%	7%	1%
Could live without them/ok/other things to do	0%	0%	2%	2%

The data shows that the students would not approve of the removal of the micros (average of 92%). It is interesting to note that less than 10% realise that it would have some effect on their learning. The majority express an emotion at the loss of the micros: "sad" (1990 females and males) "very upset" (1991 females and males) but are unable to realise how this would effect their lives as students.

Conclusion and Evaluation

The majority of students in the questionnaire sample had used a micro before entering the city technology college (CTC) and had a high frequency of use. The data from the two years shows a positive trend away from the group or class use of the micro to pair or solo use. This is due to a nationally improving situation where the numbers of students to a micro has descended from 107:1 in 1985 to 40:1 in 1990 to 18:1 in 1994 in primary schools. (D.E.S. 10/89 and 11/91, DFE 3/95).

The types of program used by the students are mainly word-processing, computer-aided drafting or design, simulation and programming. The 1991 student used the computer-aided drafting or design and programming applications less than the 1990 student. However, when the results for the two groups were compared to national figures, the city technology college (CTC) students displayed a higher than average frequency of use. This is due to a higher than national average provision of micros: the city technology college (CTC) has a student to micro ratio of 3:1 whereas the national secondary school average is 13:1 in March 1990. (Changing to 6:1 and 10:1 respectively in March 1994.)

Students now have more chance of "hands on" experience with micros. They also have more information technology (IT) literate staff to help them due to INSET courses being provided. Those two points are particularly highlighted in the students' responses to questions such as: "What work can a micro do for you ?" They are now more likely to detail the specific tasks a micro can do or the functions it can perform rather than give blanket responses such as "help me learn" or "anything".

The students are very positive about sitting at or working a micro. This confidence is due to their ever increasing knowledge about the applications of the micros as each new intake year is now taught a comprehensive, computer awareness course. Also the addition of new software packages to the micros increases the range of readily available applications.

Although the students are very confident and positive about using the micros as a learning tool, they do not see it as their only learning tool. Some still enjoy writing by hand: "should write instead of typing all the time" (1991 female)and using other sources of learning: "computers teach you some things but not everything" (1991 female).

The one major negative finding was that the students do not realise for what purposes micros are used in the world. They do not realise that the city technology college (CTC) uses them for administration purposes. Their only responses are linked to their direct experience with the micros in college e.g. lunch card, library system, etc.

The same limited understanding of the use of micros is also extended to the wider, outside world. Few seem to realise that they are used in industrial, health, leisure, etc. industries. Again the most popular responses were restricted to their own experience of using them or seeing them being used by others.

However, should the college try to remove the micros there would be a college rebellion. Not necessarily because their learning would be affected by the loss but rather the idea that coming to a city technology college (CTC) involved contact with micros.

CHAPTER FOUR - PART ONE

STRUCTURED INTERVIEWS

COMPARISON OF 1990 AND 1991 INTAKE STUDENTS

Conditions

In order to attain more detailed data, a sample of students from Year 8 (1990 intake) and Year 7 (1991 intake) took part in structured interviews. The sample consisted of approximately 20 students in each year group. The Year 8 group had 8 high intelligence quotient (IQ) level students and 10 specific learning difficulties (sld) students. Whereas the Year 7 group had 10 high IQ and 11 specific learning difficulties (sld) students. The high IQ level students had achieved a Standard Age Score above 126 and the specific learning difficulties (sld) students one below 88 from the NFER Non-Verbal Reasoning Test (NFER 1986) taken pre-entry to the city technology college (CTC). Table 4.1 below shows the intellectual and gender constituents of the sample:

Table 4.1: Intellectual and gender constituents of the sample

Intake Year	High IQ	Male	Female	sld	Male	Female
1990	8	6	2	10	8	2
1991	10	5	5	11	6	5

This reflects the gender imbalance which exists in the two student groupings from which the sample was taken.

A structured interview questionnaire (Appendix 1B p.94-7) was compiled and each student was interviewed in a quiet, private area by the same person, the researcher. No time limit was imposed. The interviews took place in the normal college day, between June and July 1992. The Year 8 students had attended the school for two academic years and the Year 7 students for one year. Two male high IQ students had left the school from the original sample.

Summary of Research Data

Most of the students had used micros at primary school prior to joining the city technology college (CTC). There were two students who had not: one specific learning difficulties (sld) student in the 1990 intake and one specific learning difficulties (sld) student in the 1991 intake.

Table 4.2: Software use at primary level prior to joining the CTC

Intake Year	1990		1991	
Student Level	High IQ	sld	High IQ	sld
	%	%	%	%
Software Type				
Games	100	80	80	63
Word-processing	25	10	30	9
Projects	12	0	10	9
Information	0	10	10	9
Mathematics	0	0	0	9
Punctuation	0	0	0	9

The data illustrates a heavy use of games and only a minimal use of academic-based software, particularly with specific learning difficulties (sld) students.

The data also illustrates, as shown in Table 4.3, that the students mainly worked in small groups or alone.

Table 4.3: Levels of access to micros at primary school

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
	%	%	%	%
Levels of Access				
Alone	38	20	60	18
Pair	12	50	0	9
Group of 2/3	12	30	20	18
Group of 3/4	50	20	20	9
Group of 4+	25	10	30	0
Whole Class	0	20	0	9

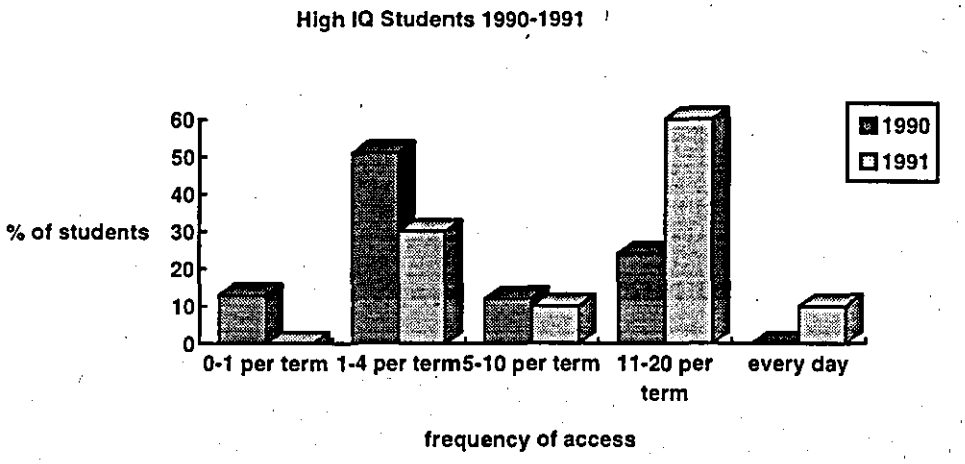
Table 4.4 shows the frequency of access:

Table 4.4: Frequency of access to micros at primary level

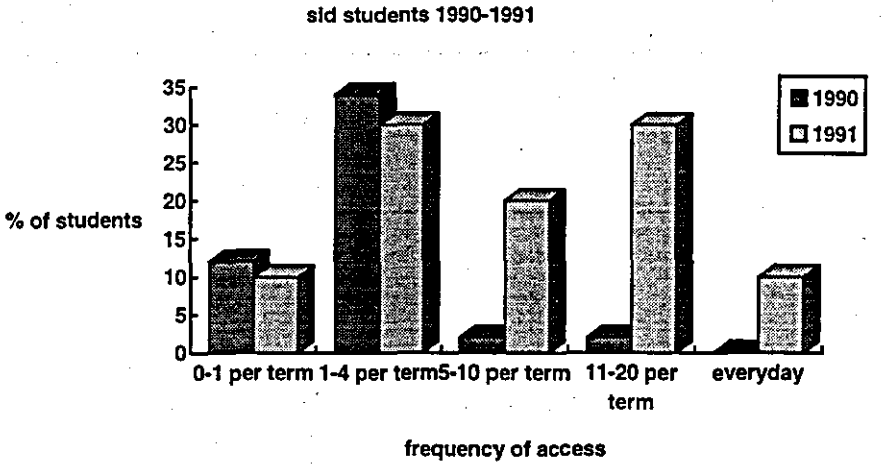
Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
	%	%	%	%
Frequency of access:				
0 - 1 per term	13	12	0	10
1 - 4 per term	51	34	30	30
5 - 10 per term	12	2	10	20
11 - 20 per term	24	2	60	30
Every day	0	0	10	10

Tables 4.3 and 4.4 demonstrate an increase in levels and frequency of access to micros between the two samples. The shift between 1990 and 1991 students is from a majority of 1 - 4 times a term in 1990 to between 11 - 20 times a term in 1991. These two increases are due to improved provision of micros in primary schools, from an average of 2.5 micros per school in February 1988 to 4.3 in March 1990. The improvement in provision of micros also meant there was a decrease in students per micro from 67 in February to 40 in March 1990. (DES 1989 and 1991).

Although the increase in frequency of access between the 1990 and 1991 high IQ students was not significant enough to indicate any major change:



the increase in frequency of access between the 1990 and 1991 specific learning difficulties (sld) students was significant and indicates a change:



The 1991 specific learning difficulties (sld) student is now far more likely to use a computer at least twice a week than the 1990 sld student who would rarely use it in a school term.

The first bank of attitude questions asked the students how they felt when they first saw a micro and how they felt using it for the first time. Only 22% of the 1990 students felt positive when seeing a micro for the first time as opposed to 48% for the 1991 students. This altered considerably when the students used a micro, from a 44% positive response with the 1991 students to a 81% positive response with the 1991 students.

This positive response was repeated when the students were asked:

Table 4.5: How did a micro help you ? Or did it not help you ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
	%	%	%	%
Help	76	60	80	65
Not help	24	40	20	35

The data illustrates that the micro was seen as a help rather than a hindrance. However, it is interesting to note that more specific learning difficulties (sld) students tend to view the micro as less helpful than their high IQ counterparts. A closer look at their individual comments: "can't remember using it for the first time" (1990 sld male) "feel nothing when using it" (1990 sld male) "nervous when using a micro" (1991 sld male)and "not confident - made mistakes" (sld 1991 female) would seem to indicate a slower build up in confidence with a micro than that of a high IQ student.

Thirty four out of the interview sample of thirty nine have access to a micro at home. The most popular use is games (74%) followed by basic programming (23%) and word-processing (18%). Some of the students (29%) use it at least once a day and (18%) whenever they get the chance. They tend to use them in their spare time (46%) or at the weekends (23%) or every night (13%).

The next bank of data examined the use of micros in the city technology college (CTC). What they were used for, when they were used and whereabouts in college.

All thirty nine students in the sample have free access to 77 Apricots LAN (Local Area Network) Stations at college. However, there were differences in the initial computer awareness course. The 1990 students had access to the micros but were not taught by computer literate teachers on the new computer awareness course. Such differences have an effect on the data and therefore direct comparisons are difficult.

The most popular use of the micro at college is word -processing (72%) as opposed to only 18% at home. Using the micros to store data and retrieve information; and for doing artwork are jointly popular at college at 36% each. Neither of these categories appeared in the home micro use data. Presumably because the home micro has neither the memory capacity nor the necessary software to perform either role. Games dropped to a mere 10% at college as opposed to the 74% at home. Clearly the data informs us that the uses of the micro at home and college are very different. The home micro software is often bought with entertainment in mind whereas the college buys software which educates its students.

All of the students (100%) will use a micro when they have free time to do so:

Table 4.6: Free time use of micros

Free time	%
Dinner time	28
When I need to	28
Break-time	27
After college	14
Private study	3

As opposed to only 56% when told to use one in the lesson time:

Table 4.7: Compulsory use of micros

Lesson time	%
Any lesson	31
Technology lessons	18
IT lessons	4
English lessons	3

The reason for this difference in attitude is given in the next table of information:

Table 4.8: Where do you use the micros most often ?

Place	%
Library	77
Communications Centre	46
Computer suite	21
Learning Support Base	13
Technology CAD suite	13

All of these areas are open at free times which would suggest why they are so popular. Clearly if there is free access to a micro at college during their own time, then the data illustrates that the students will utilise that opportunity more readily than if they are told to use a micro in lesson time. So how often do the students use the micros freely available ?

Table 4.9: How often do you use the micros at the CTC ?

Frequency	%
0 -1 per term	21
1 - 4 per term	8
5 - 10 per term	22
11 - 20 per term	31
Every day	18

Clearly the data in Table 4.9 contradicts that in Tables 4.6 and 4.8, which would suggest that most of the student sample will quite freely use a micro in their own time in an open access area. If we re-examine the figures we can see that 18% will use a micro every day and 31% at least once/twice a week (a college term is 8 weeks), 22% only once a week and 29% not very often. Within the technologically rich environment of a city technology college (CTC) the 18% and 31% figures will need to increase dramatically as the students mature and become more confident with the micros if the college is to fulfil one of its mission statements.

The next bank of questions asked them to suggest when they would learn about micros in their next college year, what they would like to learn about micros and what other things can the micro do.

Table 4.10: What will you do with micros next year ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Same as this year	38	20	50	47
Don't know	25	40	20	9
Look up information	0	0	10	17
Word process	0	20	0	9
Depends on work we do	12	10	0	0
Use for homework	25	0	10	0
Other applications	0	0	10	9
Play around	0	0	0	9

The data demonstrates a very limited understanding of the potential of the micro by the student sample. One possible positive point would be to suppose that the sub-text to the student response "same as this year" may well express feelings of wanting to improve the skills learnt in a 45 minute session once a week. The student sample may have been viewing the researcher as a 'spy' for the information technology (IT) curriculum and have voiced a desire to properly understand, and therefore be able to apply confidently, the skills already learnt before you (the teachers) teach us (the students) something new. This student voice is particularly relevant if you remember that the students were taught in groups of 22+ for the 1990 intake and 12+ for the 1991 intake; very often 2 or 3 to one micro; and by teachers of limited micro expertise following a scheme of work which had not been fully developed.

The data illustrates that the specific learning difficulties (sld) student is more interested in word-processing than his high IQ counterpart but less interested in using the micro for his homework. Another worrying illustration is that 9% of the 1991 intake specific learning difficulties (sld) students would like to play around on a micro. However, this is counter-balanced by the definite decrease between 1990 and 1991 specific learning difficulties (sld) students' response of "don't know" from 40% to 9%, and the 1991 specific learning difficulties (sld) students' desire to "look up information" at 17% compared to 1990's 0%.

If you gave the students the opportunity of planning and writing the next stage for their scheme of information technology work, what would they choose: lots of games as per the home micros or the college micro top choice of word-processing ?

Table 4.11: What would you like to learn about micros ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
How they work	12	30	60	41
Greater knowledge of software	38	30	10	41
Advanced programming	26	0	20	0
Don't know	0	10	0	9
Use rest of keyboard	12	10	0	0
Nothing/not much	12	20	0	0
Get good games	0	0	0	9
More advanced work	0	0	10	0

The data illustrates, however, that games would come quite low on their list of priorities and word-processing is not even mentioned. Instead the majority of students would prefer to learn about the "working" inside the micro.

The students' second choice: "greater knowledge of software" could be interpreted to mean more knowledge about the software they have already met, or a desire to work with new software packages. The first interpretation would reinforce the hypothesis made when interpreting the data in Table 4.10: that is that the students would prefer to improve on the skills (and therein software) already learnt before beginning to acquire new ones.

The data also discloses an interesting difference between the two student samples with their next choice: "advanced programming". The two high IQ student samples would like it whereas the two specific learning difficulties (sld) student samples make no reference to it at all. Whether this is because they do not want to do it or it has not occurred to them isn't obvious from the data. We can only hypothesise.

The data does however point to two positive trends between the 1990 and the 1991 intake student samples, and those are the choices: "nothing/not much" and "use the rest of keyboard" disappear from the first intake year to the next. This is probably due to the improved micro expertise of the teachers and the development of the scheme of work they followed.

The last question in this bank asked the students to think of what other things could micros do for them. The most popular response was "help me in my education" (46%) followed by specific instances of how this help can be administered: "spelling" (10%) "save my file/time" (8%) and "help you type" (5%). Only 8% said "nothing much/not much" and were "don't knows". The data illustrates that the students have realised the support micros can give them in their education, especially if they develop their information technology skills.

The D.E.S. proposed that within city technology colleges (CTCs) "pupils will be selected by the Head and the Governing Body ..... on their parents' commitment to full-time education or training up to the age of 18". (DES, 1986) With this proposal in mind, the next bank of questions asked the students to view themselves as post-16 students at the city technology college (CTC).

The first question asked them what they imagined they would know about micros. Would they still be at the quiescent levels show in Table 4.10, i.e. "same as this year" or "don't know", or would they have progressed.

Table 4.12: Imagine that you are a first year post-16 - what do you imagine you will know about micros ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Quite a lot	63	30	40	42
How they work	25	20	50	9
How to use different programs	38	30	20	9
More detailed knowledge	12	0	0	0
Keyboard skills	12	0	10	0
A bit	0	0	0	9
Not a lot	0	30	0	18
Don't know	0	10	0	0

The data illustrates that the students feel they would have progressed and could even say in what areas e.g. "how they work" and "how to use different programs". It also illustrates that some of the specific learning difficulties (sld) students feel they would not have learnt a lot by post-16 whereas no high IQ student made that comment.

If the students generally felt that they would know "quite a lot" about micros by the time they reached post-16, were they able to realise what help micros would be in practical terms i.e. what will micros be able to do for you.

Only 12% responded negatively with the comments: "not sure" "no idea" and "nothing". A resounding 88% responded positively with comments such as: "helps you/tells you things" "word -process and print" "Coreldraw" "pass my exams" " basic programming" and " music". Again another positive point could be plotted on the graph indicating an increase in the students' understanding of the role of the micro.

Was this positive support by the micro going to invade their life ? How much did they feel micros would be part of their post-16 lives was the next question. The comments fall into three general banks: "quite a lot" (49%) "not very much" (31%) and "don't know/not sure" (20%). Again the students felt very positive about the micro and realised it would have quite an impact on their lives.

However, an acceptance of the role of something does not necessarily indicate benevolent feelings towards it. Would there be an air of resignation about the acceptance or one of inspiration ? How will you feel about them (micros) - was the last question in this data bank. 74% of the students thought they would be "okay/relaxed" "a way of life" "there to help me" and "they're good if I like to use them". Whereas only 26% were negative: "not sure" "don't know" "nothing" and "not very confident".

The sum of the data from the post-16 bank of questions illustrates that the students feel positive progress will have been made by the time they reach post-16 resulting in confident use of micros.

The students were then asked quite simply whether they thought the micros were useful or a nuisance. The majority 92% thought they were useful and only 18% thought they were a nuisance. The reasons why, however, were quite complex with 14 different responses:

Table 4.13: Do you see the micro as (a) useful or (b) a nuisance? Why ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Help me	12	60	90	63
Retrieve information	25	50	30	18
Print work neatly	0	30	0	18
Variety of uses	25	0	0	0
Store files	12	0	20	9
Dinner system	12	0	0	0
Draw for you	12	0	0	0
Always there	12	0	0	0
Easy to use	12	0	0	0
Does wonderful things	12	0	0	0
Play games	0	10	0	10
Know how to use when I'm older	0	0	0	9
Can get lost	12	0	0	0
Don't find useful when it loses your work and crashes	0	10	0	9

The data illustrates that most of the responses were positive. The last three could be viewed as negative although their explanations indicate potentiality. This echoes the specific learning difficulties (sld) students' comments in Table 4.5, which seemed to indicate a slower build up of confidence with a micro than that of a high IQ student.

One reason worth noting is the third one where the specific learning difficulties (sld) students appreciate the quality of written work the micro can produce. Such a comment reminds us of Dolores Loughrey's article: "Formulating letters on the page comes naturally to those who mastered the art but to the child with a learning disability the production of a single letter may require tremendous effort to co-ordinate all the physical and intellectual sub skills. Relieved from the burden of mastering the mechanical skills of writing, the teachers claimed, the children were able to focus their intellectual skills on the production of creative thought." (p.125, Loughrey, 1991)

The question: what can a micro do for you was asked again in the interview to see if any further responses could be elicited from the sample. Sixteen responses were received at the first time of asking whereas a second demand elicited seventeen. However, instead of bland, all-encompassing responses such as "help me in my education" "help me spell" and "help design things" the second demand received more detailed and thoughtful answers.

Table 4.14: What can a micro do for you ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Gives information	12	40	50	42
Helps with work	25	10	20	42
Word-processing	25	10	10	33
Help me to learn	12	30	20	0
Draw	25	0	0	27
Fun and games	0	10	20	0
Not a lot	0	20	0	9
Spelling	12	0	0	18
Type faster	12	0	10	0
Simple maths	12	0	0	0
Makes me more clever	12	0	0	0
Learn about software	12	0	0	0
Anything with right software	12	0	0	0
Keeping time in music	12	0	0	0
Get you a job	0	0	10	0
Help my memory	0	0	10	0

The data illustrates that the students are actually able to say in what way the micro helps them with their school work. The comment "makes me more clever" from a 1990 high IQ student is particularly interesting as the student seems to be anthropomorphizing the micro into some super-being capable of empowering the student with increases in intellectual skills !

The next bank of questions asked the students whether they preferred the artificial intelligence of the micro or the human intelligence of the teacher. 90% of the students liked using micros as a way of learning. 5% thought they were all right and 5% said they did not like them as a way of learning. The students were then asked to give reasons for their opinions. The yes voters responded with a variety of reasons.

Table 4.15: Why students like micros as a way of learning

Responses	%
Easy to use	21
Gives me more information	15
Not as boring as books	8
Easier than copying	8
Fun	5
Helps me find things	5
Helps improve spelling	5
Feel more confident	3
Different	3
No idea why	3
Useful	2
Doesn't criticise you when you have done something wrong	2
Helps for getting a job	2
Like a person	2
Haven't got a teacher there	2
Can correct if things go wrong	2
Like having a personal teacher	2

The "all rights" gave two reasons:

Table 4.16: Why students think micros are all right as a way of learning

Responses	%
Can help me sometimes	3
Prefer to be taught	2

The two negative voters also gave two reasons:

Table 4.17: Why students do not like micros as a way of learning

Responses	%
Has to be given information and can't help me spell	3
Never been able to do anything with computers, prefer books	2

Interestingly in both the "all right" and the negative voters categories there was one high IQ and one specific learning difficulties (sld) student. The high IQ students preferred the presence of a book or human teacher whereas the sld students were totally unconvinced of the supportive aspects of the micros. Among the reasons given by the yes voters were some comments which indicate that the students value the non-judgmental aspect of the micro's artificial intelligence: "doesn't criticise you when you have done something wrong" (1990 high IQ male) and "haven't got a teacher there to watch me" (1991 high IQ male).

If the students like micros as a way of learning would they be able to envisage learning situations in which the micro could replace the teacher, i.e. were they just wanting to get rid of teachers per se or could they say how the replacement would happen ? The students gave 14 situations:

Table 4.18: What can the micro teach you/help you with that a teacher cannot ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Not sure/don't know	26	30	40	36
Micro knows more about more subjects	12	0	20	37
Nothing really - micros can't speak	26	20	0	0
If teacher busy - can go to micro	0	10	10	0
Micro can give your more detail	0	10	10	0
Micro helps you to type/draw circles	0	0	0	9
Micro has more knowledge - but not a human approach - can't talk about problems	12	0	0	0
Micro puts it in simple words	12	0	0	0
Micro helps you be patient with yourself	12	0	0	0
Micro can let you go on programs - teacher can't	0	10	0	0
Micro doesn't embarrass you	0	10	0	9
Micro knows something teacher doesn't know about	0	10	0	0
Organise	0	0	10	9
Learn different languages	0	0	10	0

The data illustrates that the students realise the micro cannot replace the teacher. Rather that it has a complementary role in teaching and learning situations. The positive comments about micros focus on their wider knowledge base due to information retrieval facilities and their potential to improve the skills of spelling, drawing and keyboarding skills. The high IQ student particularly enjoys the wider knowledge base whereas the specific learning difficulties (sld) student appreciates the non-judgmental nature of the micro.

However, quite a number from both samples would miss the human presence of the teacher. A point which is reinforced in their responses when asked whether they preferred a micro or a teacher. 62% prefer the teacher and 31% prefer the micro. There were 5% who wanted both and 2% who were not sure.

When asked to give reasons to support their opinions, the data in the table below shows that the students think human contact is important: "teacher, can ask them, micro have to type in", "can't ask questions on a micro", "can talk to a teacher if you have problems", "don't have to press a lot of buttons to get something out", "more centred on you - can help you if you are confused" but also appreciate the micro.

Table 4.19: Why do you prefer the teacher or the micro ?

Intake Year	1990		1991	
Student Level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Teacher				
Positive	60	70	40	55
Negative	0	0	0	0
Neutral	0	0	10	27
Micros				
Negative	12	0	0	0
Positive	28	30	50	18

The students, both high IQ and specific learning difficulties (sld), appreciate the non-judgmental aspect of the micro which human-beings find harder to display: "doesn't shout at you", "not too embarrassing to ask", "doesn't say things out in front of class", "computer doesn't talk back", "it doesn't tell you to go and sit back down", "doesn't criticise you when you go wrong".

The last question in this data bank asked the students to think about their reactions when they see or are told to use a micro. 84% were positive, 6% were negative and the remaining 10% were non-committal. They were asked why they felt this way.

Table 4.20: Why do you feel positive, negative or non-committal when seeing or using a micro ?

Intake Year	1990		1991	
Student Level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Positive	64	60	70	64
Negative	36	20	20	18
Non-committal	0	20	10	18

The positive responses from both high IQ and specific learning difficulties (sld) students are dependent on how much confidence and experience they possess: "ok. when you get used to them", "know how to use keyboard properly", "can't harm you in any way", "know most packages", "better than doing own writing". Whereas the negative comments for both samples focus on feelings of nervousness or inadequacy: "nervous I might get shouted at", "can't use them, if I could would have different attitude", "been told to". A few students, again from both samples, have lost their initial feelings of interest and excitement "not exciting now" and "not that interested".

The final bank of questions investigated the self-esteem of the students in three ways: in comparison to other students, in choice of career and their interaction with micros. When asked to say what sort of student they were, the responses were many and varied.

Table 4.21: What sort of student do you think you are ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Friendly	38	60	50	63
Quiet	50	30	70	42
Like work	38	30	50	66
Hard worker	25	50	60	18
Clever	63	0	10	27
Love school	12	20	10	27
Noisy	0	20	20	9
Like some work	12	30	0	0
Lazy	12	10	0	0
Don't see point of work	12	0	0	9
Gets on with work	0	10	0	0
Talks quite a lot	12	0	0	0
Sometimes mucks about	12	0	0	0
Prefer school to home	12	0	0	0
Helpful	12	0	0	0
A little modest	12	0	0	0
Thinks schools are "crap"	0	0	0	9
Quite a good worker	0	0	10	0
Shy	0	0	10	0

The data shows that more specific learning difficulties (sld) students than high IQ students think that they are friendly. Whereas the high IQ student thinks he is quieter than his specific learning difficulties (sld) counterpart. Their attitude to work alters from one intake year to the next. Interestingly the 1991 high IQ student thinks he works harder than his predecessor whereas the 1991 specific learning difficulties (sld) student thinks he works less harder than his. Not many specific learning difficulties (sld) students think they are "clever" but they love school marginally more than their high IQ "clever" peers.

When asked to choose a career, 85% of the sample reinforced their preference for human contact by choosing jobs where other people were involved: "chef" "footballer" "fighter pilot" "secretary" and "hairdresser". Only 10% did not know what sort of job they would like. Whereas the remaining 5% chose jobs where there was minimal human contact, "computer programmer" or "research scientist".

The next question in this bank asked the students whether the micro could help them in their job.

Table 4.22: How could a micro help you in your job ?

Intake Year	1990		1991	
Student level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Give me more information	25	40	20	18
Store data	25	20	40	9
Administration	25	10	50	9
Design work	25	0	20	0
Find files	12	30	0	0
Don't know	0	20	10	9
Financial information	0	20	10	0
Help me with calculations	0	10	10	9
Put things on the network	0	0	0	18
Helpful	0	0	10	9
Print out work	0	0	0	9
DTP	12	0	0	0
Sound sampling	12	0	0	0
Make games	0	10	0	0
Couldn't	0	10	0	0

The data illustrates that the students see the micros as being helpful in their jobs. Again they reinforce the data storage and handling comments made earlier in Table 4.13. The high IQ students would use the design facilities whereas the specific learning difficulties (sld) students seem keen on the financial information and calculator facilities. Only one specific learning difficulties (sld) student thought a micro couldn't help you and a small number didn't know how it could.

The students were then asked if they thought they were good with micros, 41% said they were, and 41% said they were of average standard. Only 13% said they were no good and 5% said they were good sometimes. Of the 41% who said they were good only 25% were specific learning difficulties (sld) students. Whereas 75% of the 41% who said they were average were specific learning difficulties (sld) students. The specific learning difficulties (sld) students were also in the majority in the "no good" and "good sometimes" results also. Clearly the high IQ students see themselves as good with the micros whereas the specific learning difficulties (sld) students only see themselves as average or below.

When asked to give reasons the positive students gave 11 different category responses, the negative 4 and the don't knows 3.

Table 4.23: Positive responses

Response	%
Know most packages	23
Know about micros	10
Understand micros	10
Got one at home	8
Stick to packages I know	8
Easy to work with	6
Confident	6
Try to sort out problems	3
Type quite fast	2
Brilliant with them	2
Part of work/nothing special	2
Total	**80**

Table 4.24: Negative responses

Response	%
Don't know how to use properly	4
Haven't explored the packages	4
Don't understand them	2
Get silly on them	2
Total	**12**

Table 4.25: Don't know responses

Response	%
Not sure	4
Depends on what I'm doing	2
Not useless- but don't know everything	2
Total	**8**

The 1990 intake specific learning difficulties (sld) students were in the majority in the negative responses. Their responses show than they are not confident when using the micros. However, by 1991's intake the situation is reversed and the specific learning difficulties (sld) students are in the majority of positive responses. Clearly the improvements in the initial computer awareness course taught to all new students is beginning to become evident.

The final question in this data bank asked the students what sort of relationship they had with micros and why they gave that reason. Some students had difficulty in understanding the term "relationship" when referring to a micro. However, there was a full response.

Table 4.26: What sort of a relationship have you got with micros ?

Intake Year	1990		1991	
Student Level	High IQ	sld	High IQ	sld
Response	%	%	%	%
Good	48	20	50	0
Quite good	16	0	10	64
Don't know	0	0	20	9
Haven't	0	30	0	0
OK	0	10	0	9
Not too good	12	10	0	0
Just there	12	0	0	0
Like using them	0	10	10	0
Not a lot	0	10	0	0
Avoid them	0	10	0	0
Not much	0	0	0	9
Friendly	0	0	10	0
All right	0	0	0	9
Don't rely on - prefer own work	12	0	0	0

The second part of the question asked why have you got that sort of relationship with micros. The responses show why the majority of high IQ students have a good relationship with micros: "used for a long time - easy to work with" "good at them" "they do what I tell them to" whereas the specific learning difficulties (sld) students have not: "don't use them very often" "if you break it, costs a lot of money" "don't really like them" "no good programs on them - wiped off the games". There was a higher number of specific learning difficulties (sld) students making neutral or negative comments: "only use if forced to" "only use in a basic way" "if ever I need it, it's always there" than high IQ students: "avoid them - they don't understand me" "sometimes helpful but don't rely on them".

Conclusion and Evaluation

Most of the students had used micros before coming to the city technology college (CTC). Two specific learning difficulties (sld) students, one from each intake year, had no experience prior to entry. The majority had used them for games and this was particularly prevalent among specific learning difficulties (sld) students.

Frequency of use and level of access increased between the two year groups, mainly due to increased provision of micros by government funded initiatives into primary education. Specific learning difficulties (sld) students preferred to work in groups of 2 or 3, whereas the high IQ students preferred to work alone. Also specific learning difficulties (sld) students see the micro as less helpful than high IQ students due to a slower build up in confidence when using micros.

The majority of students (87%) have access to a micro at home and mainly play games every day during their spare time. Whereas, at college the most popular use is word-processing.

At college, the students prefer to use the micros in their free time rather than lesson time. The preferred place is the library to which the students have open access. Interestingly, they don't use the micros as often as you think they would in such a technologically rich environment. Hopefully, this should show a dramatic increase in the years to come as the students mature and become more confident with micros.

The data illustrated that the students had a limited understanding about the potential uses of the micro. However, the most popular comment made by both student samples may provide a clue to this limitation. This is that the students appear to be voicing a desire to properly understand, and therefore be able to apply skills already learnt, before being taught new ones. This comment is particularly relevant as the students were taught in groups of 12+, with 2 or 3 students to each micro, by teachers of limited expertise on a scheme of work which had not been fully developed.

The specific learning difficulties (sld) students are more interested in developing their word-processing skills than their high IQ peers who display a greater preference for using micros to do their homework. The majority of students expressed an interest in learning about the "workings" inside micros and developing their knowledge of software. However, it is only the high IQ students who are interested in advance programming.

Most of the students are beginning to realise that micros can give them support in their education. This idea is carried on into their view of themselves as post-16 students. By that age, they think they will be confident users of micro technology for whatever demands their education places upon them. The specific learning difficulties (sld) students particularly appreciate the quality of written work a micro can produce

All of the students like using micros as a way of learning. They demonstrate a positive attitude to micros which is, of course, in turn a reflection of their confidence with and experience of micros. They particularly appreciate the non-judgmental aspect of the micro's artificial intelligence. However, the students would not choose to get rid of teachers per se. Rather that they appreciate their complementary roles in the teaching/learning situation.

The specific learning difficulties (sld) students see themselves as friendly people who love school whereas the high IQ student thinks he is quieter but clever. The majority of both student samples like to work.

When they leave full-time education, most students would like to work in a job which has human contact. In these jobs they would see the micro as a useful resource which could help them with data storage and handling.

82% of the student sample see themselves as being of average or above average ability level when using micros. The above average student comes mainly from the high IQ sample who feel confident and competent when using micros, whereas the specific learning difficulties (sld) student does not. However, the situation is changing as the improvements in the initial computer awareness course appear.

The difference in self-esteem and micros between the two student samples is also obvious when questioning the students about their relationship with micros. The high IQ student feels he has a good relationship whereas the specific learning difficulties (sld) student feels he has only a quite good one or no relationship at all.

This final bank of data on self-esteem displayed many differences between high IQ and specific learning difficulties (sld) students. As the main focus of the active research was to investigate whether "computer assisted learning (CAL) increased the students' self-esteem as learners and young people", a further survey of the structured interview sample was undertaken. This was to discover whether there was any correlation between self-worth (esteem) and self-esteem and micros. The findings are contained in part two of this chapter.

CHAPTER FOUR - PART TWO

SELF-ESTEEM SURVEY

COMPARISON OF 1990 AND 1991 INTAKE STUDENTS

Conditions

Students from the two structured interview samples (1990 and 1991 intakes) were given two self-esteem surveys in February 1992. One survey looked at self-worth (or self-esteem) and the other looked at self-esteem and micros.

The self-worth tool (Appendix 1C, p.98) was devised by Rosenberg (1964) as a measure of self-worth suitable for us with students in secondary schools. It is a Guttman-type scale with a reproducibility of .93 and an item scalability of .73.

The self-esteem and micros tool (Appendix 1D, p.99) was based closely on the Rosenberg measure, using the same language but inserting a specific reference to micros in each question.

On both survey tools a low score indicates a high self-worth or self-esteem with micros.

The students completed the two surveys either in the Learning Support Base or around the college buildings in quiet corners. It was given to the 1990 intake students one week and to the 1991 intake the following week. On both occasions there was an informal atmosphere. The two sheets were distributed to each student and the researcher merely read aloud all the questions on both surveys. The students were then left to complete the two survey sheets at their own pace. The time taken to complete both survey tools was on average about 10 minutes.

Summary of Research Data

The results from the first survey tool, Rosenberg's (1964) self-worth measure, showed that most of the students in the structured interview samples have high category levels of self-worth.

Table 4.28: Self-worth survey using Rosenberg (1964)

Intake Year		1990		1991	
Student Level		High IQ	sld	High IQ	sld
High self-worth	0/10	3	3	6	2
	1/10	1	2	3	4
	2/10	2	3	0	3
	3/10	1	1	1	1
	4/10	1	1	0	1
Low self-worth	5/10 - 10/10	0	0	0	0

When using Spearman's Rank Order Correlation Coefficient (rho) to see if there was an increase in feelings of self-worth in each student level between the two years, there was insufficient evidence for rejection of the null hypothesis. (The results were: High IQ - Coefficient of Correlation -Rho= 0.34 (N.S.) and sld - Coefficient of Correlation - Rho= 0.65 (N.S.)

However when combining the two student levels and comparing them over the two years:

Table 4.28a: Self-worth survey using Rosenberg (1964) - combined student levels

Intake Year		1990	1991
High self-worth	0/10	6	8
	1/10	3	7
	2/10	5	3
	3/10	2	2
	4/10	2	1
Low self-worth	5/10 - 10/10	0	0

and then using the Spearman's Rank Order Correlation Coefficient (rho) the result was:

Coefficient of Correlation (Rho)=0.87 ($p<.05$)

which indicates there is some evidence for rejection of the null hypothesis therein informing us that there was some increase in feelings of self-worth over the two years.

The results from the second survey tool, self-esteem and micros, adapted from Rosenberg (1964), showed that most of the students also had high category levels of self-esteem when working with micros.

Table 4.29 Self-esteem and micros, adapted from Rosenberg (1964)

Intake Year	1990		1991	
Student Level	High IQ	sld	High IQ	sld
High self-esteem 0/10	5	4	5	3
1/10	2	1	3	7
2/10	1	0	2	1
3/10	0	3	0	0
4/10	0	1	0	0
5/10	0	1	0	0
Low self-esteem 6/10 - 10/10	0	0	0	0

Again Spearman's Rank Order Correlation Coefficient (rho) was used to see if there was any increase in feelings of self-esteem when working with micros. The high IQ students had a Coefficient of Correlation-Rho=1.00 ($p<0.01$) which indicated that there was strong evidence that feelings of self-esteem when working with micros had increased over the two years. Whereas the sld students' result Coefficient of Correlation-Rho=0.03(N.S.) indicated that there was insufficient evidence of any increase.

Again the two student levels were combined for each year and the two sets of data compared.

Table 4.29a: Self-esteem and micros, adapted from Rosenberg (1963) (combined student levels)

Intake Year	1990	1991
High self-esteem 0/10	9	8
1/10	3	10
2/10	1	3
3/10	3	0
4/10	1	0
5/10	1	0
Low self-esteem 6/10 - 10/10	0	0

The result was a Coefficient of Correlation Rho=0.56(N.S.) which concluded that there was insufficient evidence to support or reject the hypothesis that feelings of self-esteem and micros increased over the two years.

One further examination of the data took place by comparing the self-worth and self-esteem and micros surveys for each year.

Table 4.30: Self-worth and self-esteem and micros survey results (combined student levels)

Intake Year		1990		1991	
Surveys		Self-worth	Self-esteem and micros	Self-worth	Self-esteem and micros
High	0/10	6	9	8	8
	1/10	3	3	7	10
	2/10	5	1	3	3
	3/10	2	3	2	0
	4/10	2	1	1	0
	5/10	0	1	0	0
Low	6/10 - 10/10	0	0	0	0

Again Spearman's Rank Order Correlation Coefficient (rho) was used. The result for the 1990 comparison was Rho=0.55 (N.S.) which meant there was insufficient evidence for rejection of the null hypothesis. The result for the 1991 comparison was Rho=0.88($p<.05$) which meant there was some evidence for rejection of the null hypothesis. Therefore the 1991 students showed a correlation between high self-worth and high self-esteem when working with micros.

The results from the 8 Spearman Rank Order Tests show only 3 areas of increase:

- that all students (high IQ and sld) had increased feelings of self-worth between 1990 and 1991
- high IQ students had increased feelings of self-esteem when working with micros between 1990 and 1991
- all 1991 students showed a correlation between high self-worth and high self-esteem when working with micros

Two of these results link directly to the use of micros: the high IQ students self-esteem when working with micros and the 1991 combined students correlation between high self-worth and high self-esteem when working micros.

The first of these supports the findings from question 26 in the structured interviews which asked the students what sort of relationship they had with a micro (Table 4.26). The high IQ student felt he had a good relationship: "good at them" and "use at home and lots at school" whereas the specific learning difficulties (sld) student felt he had only quite a good relationship: "only use in a basic way" and "something that will develop more in the future". This is probably partly due to the introduction of the new computer awareness course being taught by computer literate teachers with a more developed scheme of work.

The second increase with the results from the combined student levels showing a correlation between high self-worth and high self-esteem when working with micros in the 1991 students is also probably another indication of the effect of the new computer awareness course on the students. Comments such as: "Go on to Excel"

(1991 High IQ student) "Know most of the skills and things about computers" (1991 sld student) "Get them to help me do my work - looking up information, using databases and spellchecker" (1991 High IQ student) and "I like using them" (1991 sld student) reinforce this.

Clearly the 1990 students reflected the findings from the National Development Programme in Computer Assisted Learning in 1973-77: "People are not only unfamiliar with the computer but are alienated by, amongst other things, its complexity. It may be difficult to get across basic points about computer-assisted learning, because people are disturbed by the technological sophistication. On the other hand, the way you are using the computer for teaching or learning is constrained often in quite complex ways by the technology, and sooner or later the CAL user has to realise this and get some technological initiation." (p.4, Hooper,1990). Whereas the 1991 students had got the "technological initiation" and were not feeling "alienated".

Also the work of the University of Alabama to evaluate the effects of computer assisted learning (CAL) on learners' global self-esteem carried out on 1,000 students in 1987 (Robertson et al, 1987) strengthens the hypothesis. The results of the study indicated that the students who were in the experimental group, which had access to supplementary materials and the microcomputer, scored significantly higher on self-esteem than did the control group who had no such access.

Although the results of the study did not directly explain the reasons why computer assisted learning (CAL) had a positive effect on the self-esteem of the experimental group, several possible explanations were offered. One of these was that the self-esteem of the students "may have been enhanced as a result of the students developing proficiency with the use of the microcomputer". (p.36, Robertson et al, 1987). The 1991 students had developed their proficiency with the microcomputer and, therefore, it would follow that their self-worth in that situation would increase as a result.

Conclusion and Evaluation

The data illustrated that there was some evidence of a correlation between self-worth and self-esteem when working with a micro. This was evident among high IQ students whereas the specific learning difficulties (sld) students had no such indication of a correlation. One probable cause could be that the high IQ students were increasing their knowledge and skills with micros faster than their sld counterparts and therefore their confidence levels were building up at a faster rate. This, in turn, would lead to feelings of success and achievement which would increase their self-esteem.

The correlation between self-worth and self-esteem when working with micros was also evident in the combined student levels in the 1991 intake year. This was most probably due to the introduction of a new computer awareness course being taught to all students by computer-literate teachers using a more developed scheme of work. Becker (1984) had already emphasises that the most appropriate and sophisticated software package will be useless: "without a plan for mutually reinforcing learning at the computer terminal" (p.15, Becker,1984).

Support was also given in the literature search in Chapter One. The National Development Programme in Computer Assisted Learning in 1973-77 had already found that the micro user has to "get some technological initiation". (p.4, Hooper, 1990). The University of Alabama's work to evaluate the effects of computer assisted learning (CAL) on learners' global self-esteem in 1987 found "Self-esteem also may have been enhanced as a result of students developing proficiency with the use of the micro-computer."(p. 316, Robertson et al, 1987). Purkey's (1970) documentation of previous research on self-concept and school achievement found that the researchers agreed that students who under-achieved scholastically, or who failed to live up to their own academic expectations, suffered significant losses in self-esteem. All of these supported and confirmed the hypothesis that a feeling of self-worth/self-esteem in a given situation i.e. working with a micro, can be enhanced by developing the skills and competencies necessary to become a proficient worker.

The students are beginning to become more competent users of micros due to the new computer awareness course being taught to them in Year 7. All students at the city technology college (CTC) have easy access to micros in their lessons and free time. The next chapter looks at how they use micros in different learning situations. It also examines how the National Curriculum for Information Technology is being introduced at the city technology college (CTC) and two grant maintained schools.

CHAPTER FIVE

DIFFERING LEARNING SITUATIONS AND THE USE OF MICROS

One of the main components of the curriculum of a city technology college (CTC) is information technology (IT) and in order for this to be realised city technology colleges (CTCs) were equipped with a high level of information technology (IT) hardware and software.

By 1991 (the time of the initial surveys) the provision at the city technology college (CTC) was more extensive than at the "average secondary school in the UK":

Table 5.1: Student to micro ratio March 1990 in the CTC and the average secondary school in the UK (DES, 11/91)

CTC	4:1
Average secondary school in UK	18:1

Obviously a student at the city technology college (CTC) had increased accessibility to a micro compared with the student at the "average secondary school". However, accessibility does not necessarily mean availability. What if all the micros were locked away other than for designated periods of the week ? Such a situation would not improve the students' competence in information technology (IT) skills or enable them to realise the true potential of the micros as a teaching and learning aid.

Fortunately, the city technology college (CTC), like most other schools, has realised that students need open access to micros during the school day. In some schools this also means before and after school hours as well. This access is usually supervised by an adult to ensure the security of the equipment as well as enabling the students' learning to take place by answering queries and sorting out any running problems.

Between June and September 1992, 44 students (9% of student population) at the city technology college (CTC) were closely observed using one of the selected micros (Apricot 386 LAN Workstations) in the Library during their free time. The observations took place at random intervals during the 50 minute dinner-time break(using a simple observation tool (Appendix 1E,p.100-1). In this free-time all of the students had open access to micros in the Library, Communications Centre and the Computer Suite.

The data showed that gender was not an issue as male and female use of the micros was evenly distributed. They used the micros in groups; mainly single gender grouping with two students per group as a popular choice. Only one group was a mixture of the two genders. Use of the micros by years 7 and 8 was at a similar level whereas that for year 9 was only at half the level of years 7 or 8:

Table 5.2: Free-time use of a micro by student year group

Year	Numbers of students using micros
7	17
8	19
9	8

The reason for such a low level of use by year 9 is that their initial computer awareness course was on RM Nimbus 186 micros not the Apricot 386s. The years 7 and 8 had their awareness course on the Apricots and these are the only machines now available to the students.

The students from all of the three years used a variety of software packages:

Table 5.3: Software packages used in free-time

Package	Number
Write/word	12
"Granville" (language adventure)	10
Touch n' Go (keyboard skills)	8
Excel (spreadsheet)	6
Paintbrush (graphics)	4
Maths Blaster Plus	2
Compton's Encyclopaedia	2

The data shows that word processing and the French language adventure game "Granville" were the most popular. Touch n' Go was mainly used by year 7 to improve their keyboard skills.

Most of the students had acquired the necessary skills to operate a particular software package in information technology (IT) lessons. The other area where they acquired the necessary skills was through "hands on experience/discovery". Such an experience could be acquired by working alone or by working with or closely observing another student. This indicates that the students feel that they have enough competence with micros to be able to explore software they have not been formally introduced to in information technology (IT) lessons. They can use the micro as a tool to aid their learning in any situation and see their competency in using a micro as an "across the curriculum skill".

The next question asked the students to go one stage further and decide for what purpose they were using those skills. The data set out in table 5.4 illustrates that they used micros for educational purposes mainly:

Table 5.4: Why was the program used

Response	Yes %	No %
Academically stimulating/challenging	34	20
Practising skills	26	20
Preparing work for homework/lesson	26	22
Just playing	14	38

Clearly the students equate the micros with school work and learning.

The majority (93%) also responded that they really needed a micro "to do the work". Only 7% thought they did not. The reasons given concentrated mainly on the ease and enjoyment of use and the quality of work produced by micros:

Table 5.5: Reasons for using a micro

Response	%
Easier	23
Work looks better when printed	10
More exciting/fun	8
Good graphics	8
Can work in French language	8
Learn to type	8
Can edit	8
Don't know	8
Not as good on paper	8
Told to by a teacher	4
Bored	4
Quicker	3

However the students are not completely dependent on micros and can see alternative ways of working:

Table 5.6: How else could it have been done ?

Response	%
Exercise book/paper	24
Handwriting	20
Don't know	14
Typewriter	10
Reading	10
Go to France	6
Drawing	6
Use another software package	5
Have to have a micro	5

The collective data from the observations shows that information technology (IT) is beginning to be pervasive in the free time of some of the students at the city technology college (CTC). They felt competent and confident about using the micros, whether to explore a software package they had not used before, or to complete lesson or homework tasks with a familiar package. They were able to give reasons to support their response. Only 14% thought they were playing whereas the remaining 86% thought they were engaged in purposeful activities with the micros.

The data also reminds us of Hooper's comments in Chapters One and Four - part two: "sooner or later the CAL user has to realise this and get some technological initiation". (p.4, Hooper, 1990) Clearly the year 9 students need a refresher computer awareness course using the Apricot 386s if their level of use was to match that of years 7 and 8 who had had such a course.

One of the initial ideas behind setting up city technology colleges (CTCs) was "to establish the value and effectiveness of equipping a secondary school with information technology (IT) hardware and software on a scale more extensive than is normal in the maintained sector". (DES, 1986) Furthermore the national curriculum for Technology incorporates information technology (IT) into its Statutory Orders - the statements of attainment say: "Pupils should be able to use the information technology (IT) to:

- communicate and handle information;
- design, develop, explore and evaluate models of real or imaginary situations
- measure and control physical variables and movement.

They should be able to make informed judgements about the application and importance of information technology and its effect on the quality of life". (p.43, DES, 1990) Presumably with a higher level of equipment and superior technical support the city technology college (CTC) should be able to respond to the challenges of information technology (IT) and the National Curriculum better than other maintained secondary schools. We have already seen from the collective data from the free-time observations at the city technology (CTC) that information technology (IT) was beginning to become pervasive in some students' free-time and that some students felt competent and confident when using micros. Also that the city technology college (CTC) allowed the students open access to micros in their free-time.

In 1992 and 1994/5 the researcher visited two other secondary schools to find out how they were responding to the information technology (IT) challenge and were their responses similar, better or worse than the city technology college (CTC). The chosen schools were representative of the variety of secondary educational establishments at that time i.e. a lea comprehensive (soon to become grant-maintained (GM)), a grant-maintained comprehensive and a city technology college comprehensive (CTC).

All three schools have micros available in most subject areas and in open-access areas such as the Library, Open Learning Centre, etc. The data in table 5.7 also shows a quantity of micros freely available on trolleys to be moved to other locations :

Table 5.7: Location of and access to micros

	CTC		now GM		GM		DES	
Location	92 %	94 %	92 %	94 %	92 %	94 %	92 %	94 %
Computer room	36	18	44	15	31	15	36	35
Library/Open access	6	9	0	50	8	15	3	7
Other rooms	58	64	31	35	61	70	35	43
Freely available	0	9	25	0	0	0	26	15

The data illustrates that the three secondary schools are following a national trend and moving micros away from the one central location (computer room) in schools to more open access areas such as the Library, Open Learning Centre, Communications Centre and a variety of subject areas. The 1980s tendency to put all the computers in "one room where they were locked away and remained the province of one subject/department" has thankfully ceased.

The number of micros available in the maintained secondary education sector has increased quite dramatically since 1985 when the student:micro ratio was 60:1 (DES,1986):

Table 5.8: Student:micro ratio in 1994

DFE	CTC	Lea secondary to become GM	GM
10:1	6:1	12:1	8:1

The data shows that two of the schools (notably the CTC and GM) were better resourced than the average secondary school of the March 1994 DFE survey (DFE, 3/95)

The three schools also had a variety of additional information technology (IT) equipment such as printers, modems, scanners, digitizers, CAD/CAM facilities, CD ROM, etc. All schools had added to or updated this equipment between 1992 and 1994/5 and were developing a network system for all the micros in their school and hoping to join the Internet in the future. (The figures for expenditure for the average secondary school was £15,119 in March 1990 (DES, 11/91) and £ 23,950 in March 1994 (DFE, 1995) and 37% of schools in March 1990 were on a network system increasing to 40% in 1994.) The additional technology equipment is fairly standard across the UK.

In all of the schools there was one person responsible for co-ordinating the delivery of information technology (IT) across the curriculum. This person organised the awareness course for initial entry students, tried to ensure information technology (IT) was delivered in most subjects, ran specific information technology (IT) exam courses and tried to ensure that all uses of information technology (IT) by students were logged. In two of the schools (the city technology college (CTC) and the lea secondary to become GM) there is also technical support: 1 full-time Network Manager and 1 full-time Assistant Network Manager at the city technology college (CTC); and 2 part-time technicians and a part-time secretary (who has to enter all the Record of Achievement information) at the other school. Clearly the technical support has moved a little since the 1980s when it was a major problem in delivering information technology (IT) in schools. But Owen's (1992) findings that: "very few schools have the staffing to afford a computer network manager and IT co-ordinator, the majority of co-ordinators have the technical aspect subsumed into their role". (p.37, Owen, 1992) are still relevant in most schools.

In 1992 two out of the three schools surveyed had a computer awareness course for their Year 7 students. The other school offered the course in year 8 (as part of a Technology modular cycle). The courses consist of basic keyboard skills, use of function keys and an introduction to word-processing/spreadsheets/databases as well as teaching them to log on, save files and print. Such courses are fairly common in year 7, as the March 1990 DES survey found: "an average of 11 pupils per secondary school studies a Computer Literacy/information technology (IT) appreciation course of an average of 37 hours duration. The most common age of assessment was 11". (Table 16, DES 11/91) This had increased to 102 pupils per secondary school by 1993/4 but the age of assessment had altered to 16 (Table 17, DFE 3/95). By 1994/5 all the three schools were offering these courses in years 7, 8 and 9 in information technology (IT) lessons (taught as timetabled lessons). The skills learnt on these awareness courses are then developed in subject areas. Usually particular subjects take responsibility for certain skills which are applicable in their subject. That is English will be responsible for word-processing, Mathematics for spreadsheets, Humanities for databases, Technology for control processes or computer-aided drafting and design and Science for data-logging.

No one school has found the ideal formula for logging the uses of information technology (IT) or assessing this use. In 1992 the lea school to become GM and the city technology college (CTC) used an information technology (IT) passport or log to record students' uses of information technology (IT) with subject areas also involved in this. By 1994/5 the lea secondary school to become GM had developed a logging system which also included a form of profiling (as the student could choose pieces of work to put in their information technology (IT) portfolio). The GM school were not happy with their system and were working on a model but subject teachers still logged and assessed uses in each subject area. The city technology college (CTC) were developing an internal logging and assessment system using the new National Curriculum IT level descriptors. Under the new National Curriculum (SCAA,1994) the uses of information technology (IT) do not have to be logged but all three schools were still going to develop a system to do so.

However, assessment (internally and externally) varied in all three schools. At year 7 and 8 levels all three schools had an internal end of module test in 1992 and 1994/5. In 1992 all schools used the Key Stage 3 SAT in information technology (IT) as their main form of assessment (with a teacher's coursework grade). By 1994/5 this has changed as the KS3 SAT in information technology (IT) has been abandoned. The only one of the three schools still involved in an externally validated course at KS3 (year 9) is the lea secondary to become GM which uses a City and Guilds' Modular Course with a 65% pass rate (students have to pay own exam fee). Years 10 and 11 show the greatest variety of externally validated courses:

Table 5.9: Externally validated courses in Years 10 and 11 in surveyed schools between 1992 and 1994/5

Year	CTC	Lea secondary to become GM	GM school
1992	Nothing	GCSE IT	GCSE Computer Studies C&G 4242 Basic IT course
1994/5	RSA CLAIT GCSE Information Systems GNVQ IT RSA Initial Award in Computer Graphics	RSA CLAIT (looking at GCSE IT as discrete subject in the future)	Nothing (looking at GNVQ IT)

The data also reflects the developments in information technology (IT) courses at GCSE level over the last few years nationally. The courses are aimed at all levels from the high fliers with GCSE Information Systems or GNVQ Information Technology (IT) Advanced level to the lower levels of achievement at RSA Initial Award level. Underlying the data is the change in core curriculum time brought about by the latest development in the National Curriculum. These changes have altered school timetables considerably with information technology (IT) being seen as cross curricular rather than a separate subject. However, all three schools are now developing specialist information technology (IT) courses, either within vocational subject time or by using time slots given to additional subjects in order to satisfy the demands from the students and the outside world.

All three schools were also encouraging students to use micros outside of curriculum time i.e. in students' free time sessions at break, lunch or after school. Micros were available in open-access areas which were supervised by staff who were readily available to help students sort out any problems. Such opportunities enable the student to view the micro as a tool to be used as and when applicable rather than as an element of a special area or lesson time. Information technology (IT) will only be pervasive in the curriculum when the students view it as a tool which enables them to complete a task.

One key element of success with information technology (IT) in schools is to ensure that all teachers have a basic awareness of information technology (IT) and feel capable of using micros. Micros should be part of every teachers' planning and preparation for lessons. Indeed one of the findings from the ImpacT Report (Watson, 1993) says: "In service provision was also identified as a major concern. Results indicated that many teachers felt they need an on-going programme of in service training if they were to make regular use of computers in their teaching and if they were to exploit the potential offered by some software". (p.153, Watson,1993) Also the research by Collis (1993), Collison and Murray (1993), Heywood and Norman (1988), Lai (1993) and Veen (1993) support this idea.

At the three surveys schools (on both survey dates) the advertisements for new staff included a reference to an interest in information technology (IT). This interest at recruitment level is followed up with regular in-service training courses for the staff. These courses offer chances to explore new software, new hardware or look at subject-specific or cross curricular uses of information technology (IT). All three schools report an increased enthusiasm and use of information technology (IT) by the staff (comparison of 1992 and 1994/5 survey results). Comments from the 1994/5 survey such as: "Science department now book Computer Room on a regular basis" (GM school) "43% of staff are information technology (IT) literate to the level where they could teach it to students" (CTC) and "60% of staff now use information technology (IT) regularly with students, 20% use occasionally and a small hard core don't use at all" (Lea secondary to become GM) would seem to indicate that in-service training in information technology (IT) is beginning to have the desired effect.

All three schools followed up their in-service training by involving all staff in the decisions about the purchase of new hardware and software. At two of the schools (the city technology college (CTC) and the lea secondary to become GM) there is a formal committee who meet regularly to discuss such issues. The members are representative of each curriculum area, NQTs (newly qualified teachers) and senior management. At the other school (GM) staff are involved and consulted at a more informal level. The constituents of the committee may have changed between the two survey dates but the desire to involve as many staff as possible had not.

All three surveyed schools also had an information technology (IT) policy which they had constantly developed and updated between 1992 and 1994/5 as new software, hardware and educational developments occurred. The latest update involved incorporating the new 1994 Draft Proposals for Information Technology as well as developing strategies to get more departments/subjects to integrate their curriculum work with information technology (IT) (by using CD ROM and networked micro facilities) and planning how the school was going to use the Internet.

Conclusion and Evaluation

Most schools, including the city technology college (CTC) and the two other schools surveyed, allow their students access to micros in their free time. Usually in supervised areas where adults were on hand to answer queries and sort out any running problems.

The observations at the city technology college (CTC) of students using micros in their free time showed that gender was not a problem and students usually worked collaboratively. There was a discrepancy between year groups as the year 9 students' use was only half of that for years 7 and 8. The simple explanation for this was their lack of technological information as they had not received any formal instruction on those particular micros. This reinforces the hypothesis made in Chapter 4, part 2, that students who did not have enough basic technological initiation felt incompetent when working these micros as they hadn't developed any level of proficiency. Even in their free-time, which is less stressful than lesson-time, the students still felt inadequate and avoided the situation (or confrontation).

The students used a variety of software packages with word-processing and Modern Foreign language programs being the most popular. The year 7 students were also keen to develop their keyboard skills using another dedicated package. They used these packages to improve their level of academic excellence, to practise information technology (IT) skills already taught or to prepare homework/classwork. Clearly the students were beginning to use micros across the curriculum and felt competent enough to use them on a voluntary basis.

Most students realised that the micros were easy to use and could improve the quality of presentation of their work. They enjoyed using them and appreciated their editing and graphic facilities. However, they also realised that they could have hand-written the work on to paper or even typed it up. To them the micro was a useful tool which helped them in their work; they were not completely dependent on them.

By surveying two other schools over a period of time and by comparing the results (and looking at national statistics) we have learnt that student:micro ratios have decreased over the last ten years (60:1 in 1984/5 to 10:1 in 1993/4 (DFE 3/95)) and all schools have added to or updated their hardware and software. The city technology college (CTC) is better equipped than the two other surveyed schools or the "national average secondary school". The data also illustrates that the surveyed schools and the national trend is to move micros away from the "one room, locked away and remained the province of one subject/department" situation of the 1980s. The micros are now located in Library/Opening Learning Centres, other rooms, etc. around the school or freely available on trolleys, etc.

All of the surveyed schools and 99% nationally surveyed schools (para 69, DFE 3/95) had information technology (IT) Co-ordinators. However, only the city technology college (CTC) had full-time technical support of the surveyed schools and nationally the trend is similar with most schools receiving technical support from the information technology (IT) advisory teacher or as part of the information technology (IT) co-ordinator's role. Unlike the city technology college (CTC) most schools are unable to fund separate computer network managers, either full or part-time. Clearly when it comes to technical support the city technology college (CTC) is working at an advantage compared to most secondary schools in the UK.

The three surveyed schools and those surveyed nationally by the DFE (DFE 3/95) all run computer awareness courses usually with year 7 (first intake year). This has been an improving situation nationally and these courses are intended to introduce students to the functions of micros and various software packages based around word-processing, spreadsheets and databases. The logging of students' use of information technology (IT) and assessing this has been a problem for the surveyed schools and nationally. Different ways of logging information technology (IT) use were tried by the surveyed schools with the lea secondary to become GM probably the most successful with its information technology (IT) portfolio of work which formed part of the school's profiling work. Post-Dearing, information technology (IT) uses do not have to be logged but most schools still seem keen to do this as presumably it informs their future development of hardware and software as well as their use of information technology (IT) across the curriculum.

Assessment takes place on two levels, internally and externally. Year 7 computer awareness courses have end of module tests. However, all three schools are running externally validated courses as well as developing new ones. These courses usually run in years 10 and 11 (as part of the academic and vocational package for KS4 level examination). The city technology college (CTC) is the most successful in this area with a package of exams ranging from the less able RSA Initial Award to the high achievers' GNVQ IT Advanced level/GCSE Information Systems. Nationally 45% of schools offer GCSE level subjects and 48% vocational ones (DFE, 3/95). Whereas the lea secondary to become GM is the only one to offer any external validation at KS3 level (year 9).

The data also shows that the three surveyed schools encouraged access to micros outside of curriculum time. Nationally: "Ninety five percent of secondary schools reported that their pupils made use of information technology (IT) facilities for individual assignments". (para. 41, DFE 3/95) Also the national (and surveyed schools) trend of placing micros into open access areas would encourage such free-time use.

Teacher in-service education and training with information technology (IT) at the three surveyed schools and nationally has increased with the knock-on effect that teachers' enthusiasm for and use of information technology (IT) also correspondingly increased.

All of the surveyed schools and 74% nationally (DFE 3/95) have a written information technology (IT) policy. Some schools (two of those surveyed) have formal information technology (IT) committees whilst others have more informal consultative networks.

When we compare the available data and refer to the question of whether the surveyed schools (and to an extent the national survey ones) are responding similarly, better or worse than the better equipped (in hardware, software and technical support areas) city technology college (CTC) to the demands of information technology (IT) and the National Curriculum then the conclusion is that overall their responses are similar. "the value and effectiveness of equipping a secondary school with Information Technology hardware and software on a scale more extensive than is normal in the maintained sector". (DES, 1986) would appear to be questionable based on this survey (which acknowledges its limitations of scope and size). We are reminded of Becker's comments about how simply grafting microcomputers on to a school will not result in extensive or effective use: "in a school context without a means of using them with a current ratio of students to computers, without a plan for mutually reinforcing learning at the computer terminal and learning away from the computer, and without an appropriate model of what instruction should be provided to which students at what age". (p. 15, Becker , 1984) and those from the ImpacT Report (Watson,1993) that: "IT did make a contribution to pupils' learning" with the main evidence coming from HiIT (high IT user) classes. However, this was substantially influenced by teaching (organisation, management, teaching styles, philosophy as to the nature of the subject, and pedagogical practice, and their links with effective use of IT) and "the teachers' understanding of, and willingness to experiment with, the underlying philosophy of the software considered for use by pupils".

CHAPTER SIX

DISCUSSION AND CONCLUSIONS

This study has looked at the effect of computer assisted learning (CAL) and the self-esteem of students at a city technology college (CTC) as well as considering the value and effects of equipping a secondary school with more information technology (IT) hardware and software than is normal. City technology colleges (CTCs) were more extensively equipped with information technology (IT) hardware and software than is normal in the maintained sector. The national surveys carried out by the Department of Education and Science (D.E.S. 10/89 and 11/91) and the Department of Education (DFE, 3/95) and the survey at the CTC supported this (with student: micro ratios of 10:1 (nationally) and 6:1 (CTC)). Indeed national spending on information technology (IT) in schools has risen from £10 million in 1984 - 5 to £87 million in 1993 - 4 (DFE, 3/95). However, the main question of this study was:

- were there any indicators to prove the "value and effectiveness of equipping a secondary school with Information Technology hardware and software on a scale more extensive than is normal in the maintained sector" (D.E.S., 1986).

  If so,

- what were these indicators and

- what were their values and effects.

- more particularly, it also considered the effect of computer-assisted learning (CAL) on student self-esteem between two samples of high IQ and specific learning difficulties (sld) students from two intake years.

The data from the questionnaire distributed to all the new intake students showed increasing numbers of students had used micros prior to entering the CTC with a positive trend away from group or class use to pair or solo use. The software programs most commonly used were the word-processing and simulations ones with no significant differences between genders and years. However, the use of computer aided design (CAD) and programming packages fell between the two years, and especially with female students. Compared to national figures the CTC students displayed a higher than average frequency of use and were increasingly positive about using micros. Between the two intake years there was a noticeable increase in the students' ability to say more explicitly how the micro could help them rather than giving blanket responses. They used them to help with their work, both word-processing and information retrieval. The 1991 student was more informed and realised you had to improve your keyboard skills which would make the micros even quicker and easier to use. Both intake years liked the micros but did not see them as their only learning tool; just one of a range available to them. However, they all had a limited understanding of their uses in college (they were restricted to their own use of them) and the outside world. For the latter category responses tended to relate to where they had seen them being used or blanket responses such as "a lot"

"business people". Nevertheless should the authorities try to remove them there would be a major student revolt. They were very emotional about this but unable to reason as to how the loss would effect them and their learning. Rather the idea that coming to a city technology college (CTC) involved contact with micros was paramount.

The data collected from the structured interview sample illustrates the differences in experiences, uses, understanding and attitudes to micros between two differing ability samples (one high IQ and one specific learning difficulties (sld)) and two different two intake years. Previous experience at primary school had consisted of a high use of games amongst both samples in the two intake years with a minimal use of educational software by the specific learning difficulties (sld) students. Frequency of use and access to the micros improved in both samples over the two years with high IQ users being particularly noticeable. The 1990 intake student was less positive about the micro when he first saw it compared to his 1991 counterpart. However, this increased dramatically when they had used a micro and saw how helpful it could be. The high IQ student, perhaps predictably, had a quicker build up in confidence than his specific learning difficulties (sld) counterpart. They all had high levels of access to micros outside of college and used them in their spare-time mainly to play games. At college they used them mainly for word-processing activities and preferred to use them in their free time. Some of the comments made indicated that the students preferred free-time use to classroom use as there was less chance of being told off or making a mistake in front of others which could lead to feelings of embarrassment, disapproval and diminished status.(Clement 1981 and Dalton and Hannafin 1984) They also liked the situation because they could ask a friend for help and work/learn at their own pace. However, it was disturbing to realise that only 49% of the student samples used a micro at least once a week - not a good result when considering the higher than average levels of information technology (IT) provision and its importance in the city technology college's (CTC's) curriculum.

Both student samples had a limited understanding of the potential of the micro. When asked what they would like to do with micros in the future both samples wanted to do the same as this year: they wanted to explore and have greater knowledge of current software. The reason for such a limited response lies in the fact that the micros had changed from RM Nimbus 186 to Apricot 386s between the two intake years and the students needed to get to know how to use the new micros. Also they were being taught in large groups with 2-3 students to each micro by teachers of limited expertise using an under-developed scheme of work. As Hooper (1990) pointed out: "sooner or later the CAL user [student] has to realise this and get some technological initiation". (p.4, Hooper, 1990)

There was a difference in how the students thought a micro could be used with the specific learning difficulties (sld) students being more interested and limited to its word-processing potentiality, probably due to their own poor skills of handwriting, spelling and text organisation, whereas the high IQ students were able to state many other wider applications of the micro. Both student samples were particularly interested in the engineering of the micro and wanted to know "what went on inside". The high IQ students also wanted to develop their programming skills.

By the time the two student samples had reached the post-16 (years of age) sector of education they all felt they would be happy and confident when using a micro, and would not use one merely because someone (presumably a teacher/lecturer) said they had to do so. The two samples thought they would have progressed with their ability to use micros, however, the specific learning difficulties (sld) students feel they wouldn't have progressed a lot. The majority of the two samples were able to say how the micro would be able to help them and realised they would have quite an impact on their lives.

Attitudinal responses to the micros showed that the majority of students thought they were useful and the majority showed a positive attitude to micros. Again the specific learning difficulties (sld) students were particularly grateful for the word-processing/presentational skills of the micro - an echo from a previous response in the structured interview sample. Also there were again indications that the specific learning difficulties (sld) students had a slower build up in confidence and skills than their high IQ counterparts. The attitudinal responses to the question of whether the students preferred teachers to micros provided some interesting data. All of the students liked the micros as a way of learning with particular references to their non-judgmental aspects and the emotionally-secure and non-threatening learning environment they provided. They liked the fact that micros give them encouragement through rapid and informative feedback and a greater measure of control than in a "traditional" learning situation. Again there is a correlation between this response and the one made earlier in the structured interview sample's responses about why the students prefer to use micros in their free-time rather than class-time as they felt there was less chance of being show up in front of other students. However, the majority of the samples' students do not want to replace all the teachers with micros. Rather they realised that the two have complementary roles.

There were differences between the high IQ and specific learning difficulties (sld) students perceptions of what sort of students they thought they were. The specific learning difficulties (sld) students thought they were friendlier whereas the high IQ students thought they were quieter. Interestingly, the specific learning difficulties (sld) students thought they weren't clever but marginally loved school more than their high IQ counterparts. The majority of both student samples wanted careers with human contact; only 5% preferred a career with little or no human contact. The majority also realised that contact with micros would be useful in their careers.

There were also differences in skill levels when using a micro and the confidence in those skills between the two ability samples. There was a smaller percentage of specific learning difficulties (sld) students than high IQ students in the good at using micros category. Whereas in the average at using micros category the reverse was apparent. Generally the results indicated that the high IQ students saw themselves as more competent than the specific learning difficulties (sld) students - a result which has already been discussed earlier as probably highly predictable given the quicker build up in confidence and skills displayed by the high IQ students. However, the specific learning difficulties (sld) student sample increased their confidence levels significantly between the 1990 and 1991 intake years. This increase was also illustrated in their response to the relationship to micros question when the high IQ student sample thought they had a good relationship in both intake years whereas the specific learning difficulties (sld) students' relationship again showed a positive

increase over the two intake years. Obviously this is due to their improving confidence with and the ability to use a micro.

The relationship between the two differing ability samples (high IQ and specific learning difficulties (sld)) and the two different intake years was further explored in the two surveys taken on self-worth and self-esteem and micros. The data showed that there was some evidence of a correlation between self-worth and self-esteem when working with a micro. It was evident among high IQ students and in the combined student levels for the 1991 intake year. One probable cause could be that the high IQ students were increasing their knowledge of and skills with micros faster than their specific learning difficulties (sld) counterparts which would lead to confidence levels building up at a faster rate leading to feelings of success which would increase their feelings of self-esteem. Whereas the probable cause for the 1991 intake year students was the introduction of the new computer awareness course being taught to all students by computer literate teachers using a more developed scheme of work. Again the "technological initiation" (Hooper, 1990) factor was having an effect on the students when working with micros. Without they felt dissatisfied and devalued, both with their "self" and when working with micros (1990 students), whereas with it they (1991 students) felt "a person of worth" and "recognises his limitations and expects to grow and improve" (Rosenberg's high self-esteem students, Rosenberg, 1965)

The data from the free-time observation sample showed no difference in frequency of use between the genders but a noticeable decrease in use between the two sample intake years. The 1990 intake sample's use of micros was only 50% that of the 1991 intake sample. Further investigations of the data showed that this was due to a lack of "technological initiation" (Hooper, 1990). Quite simply the 1990 students had not had the same computer awareness course taught by computer literate teachers on the Apricot 386 micros they were expected to use (their original RM Nimbus 186 micros had by then been sold). They were involved in avoidance behaviours of non-participation, minimisation of effort and procrastination which had a downward spiralling effect of increasing their probability to fail. As Kaplan (1994) commented the 1990 students needed a "remediation program" which would lead to "frequent opportunities for participating in self-enhancing experiences", "decrease whenever possible opportunities for self-devaluing experiences" and the encourage the "students (to) become less defensive in an environment that they have found to be hostile in the past". (p. 171, Kaplan, 1994) Hopefully, the resultant effect would then be an increase in the necessary skills, and therein self-esteem, relating to competent and frequent use of the micros.

The data showed the most popular use was the ever popular word-processing programs with all students using skills they had acquired in lesson (taught) time. However, they also felt comfortable and competent to explore new programs either alone or with the help of a friend. They usually used the micros for schoolwork or learning and again appreciated the micro's presentation, graphic and editing facilities. However, they were not totally dependent on them and could see other (non-micro) ways of completing their work.

The comparison survey between two other schools and the CTC showed that compared to the two other schools in the survey the CTC was certainly better equipped in hardware and software terms and perhaps more noticeably in staffing terms. This latter advantage of increased staffing gives the CTC an advantage over most maintained sector schools. The CTC had also become the most successful at assessing, internally and externally, its students' competence with micros. However, all the three surveyed schools were doing as well as each other when it came to implementing information technology (IT) and the National Curriculum. All the schools were encouraging students to use information technology (IT) in their free-time by making micros readily accessible. They were all also encouraging the staff to develop their competency with micros and understanding of the applications across the curriculum with on-going programmes of in-service training and involving them in decisions about the purchase of hardware and software. This would seem to indicate that equipment is not the only factor in information technology (IT) being successfully implemented by a school. More important is the staff's understanding of and willingness to experiment with the hardware and software available to them.

The study found four positive indicators to prove the "value and effectiveness of equipping a secondary school with Information Technology hardware and software on a scale more extensive than is normal in the maintained sector" (D.E.S., 1986), namely:

- higher than the national average frequency of the use rate in all surveyed categories (Table 3.5, p.28), with the most popular programs being word-processing: (an average of 88% on the 1990 intake student survey and a 75% average on the 1991 intake survey (Table 3.4, p.28)) and 27% of the free-time use survey (Table 5.3, p.70).

- the majority of students were increasingly confident and positive about using micros (an average of 53% in 1990 rising to 66% in 1991 (Table 3.10, p.31) and in the structured interview sample 41% said they were good with micros and 41% said they were of an average standard (p.58). They also realised how they could help them with their school work (Table 3.8, p.30 and Table 3.11, p.32 illustrate a shift in the quality of the student response between the two years from the general to the more specific and this was repeated in the structured interview sample on p.54 and Table 4.14 p.52) and in their careers later in life (Table 3.16 p.36 and Table 4.22, p.58)

- the CTC is well equipped with non-teaching, information technology dedicated, specialist staff; which alleviates the burden of maintaining the system from the Information Technology Co-ordinator. "very few schools have the staffing to afford a computer network manager and IT co-ordinator, the majority of co-ordinators have the technical aspects subsumed into their role" (p.37, Owen, 1992)

- the CTC has become more successful at assessing its students' information technology (IT) competence compared to the two surveyed schools (as shown in Table 5.9, p.76) with a variety of internal (end of module tests) and external (RSA Initial Award. RSA CLAIT, GCSE Information Systems and GNVQ IT)assessments.

There were two negative indicators:

- a limited understanding of the potential applications of information technology (IT) by the students, both within their immediate college environment and the outside world. This is shown by the responses from the 1990 and 1991 intake survey students (Table 3.16, p.36) which tend to be restricted to their own use or where they had seen them being used in the outside world. This is repeated (Table 4.22, p.58) by the structured interview sample students. However, they do realise that the micro will have quite an impact on their lives (Table B.13, p.133 and Table C.22, p.156)

- a failure to teach a whole year group the necessary skills to competently use newly purchased (and different) micros resulting in a limited use by the year group as shown in the structured interview sample findings (Table 4.9, p.46) where only 18% would use it every day and only 31% at least once/twice a week and the fact that the positive responses to attitudinal questions (Table 4.20, p.56) are dependent on how much confidence and experience they possess. This also resulted in a lower level of self-esteem in the "untaught year" (1990) when compared to the "taught year" (1991) (Table 4.30, p.66).

Therefore, the value of the extra hardware and software is questionable as the research has shown that simply grafting micros on to a school will not result in extensive or effective use. As Becker (1984) commented "without a plan for mutually reinforcing learning at the computer terminal and learning away from the computer, and an appropriate model of what instruction should be provided to which students at what age". (p. 15, Becker, 1984) the most appropriate and sophisticated hardware and software packages will be useless.

The short-term effects of the extra equipment have been minimal. However, the CTC has taken notice of these and certain changes have already taken place:

- a change of personnel: a new Network Manager (who also teaches) and a review of the role of the Information Technology Co-ordinator

- a better developed initial micro awareness course for new students and an on-going programme for all students to develop their use of micros across the curriculum

- a higher level of information technology (IT) literate staff, backed by an on-going programme of in-service training

- an information technology (IT) committee of staff (from all subject areas, newly qualified teachers, administration, etc.) make decisions about the acquisition and distribution of IT hardware and software

In the long-term these new measures should show significant increases in the value and effectiveness of equipping a school with more extensive Information Technology hardware and software than is normal, and therein a more positive response to this initial question raised in the government's mission statement about city technology colleges.

The study on the effect of computer-assisted learning (CAL) on student self-esteem between two samples of high IQ and specific learning difficulties (sld) students from two intake years showed two main indicators:

- the high IQ students showed an increase in feelings of self-esteem when working with micros between the two years whereas the specific learning difficulties (sld) did not (Table 4.29, p.65). One probable cause could be the high IQ students had a faster build up in confidence and skills when using micros in comparison to their sld counterparts. Oliver (1993) also found inequities in the levels between lower and higher achievers and found that levels of micro knowledge correlated with measures of academic achievement.

- the 1991 combined student levels showed a correlation between high self-worth and high self-esteem when working with micros (Table 4.30, p.66). The probable cause of this is the effect of the new computer awareness course which taught the students how to competently use the micros. They had received the necessary "technological initiation" (p.4, Hooper, 1990) whereasthe 1990 students needed a "remediation program" which would lead to "frequent opportunities for participating in self-enhancing experiences", the resultant effects of which would be an increase in their micro skills, and therein their self-worth and self-esteem when working with micros.

The major conclusion from this study is that computer-assisted learning (CAL) can help raise the self-esteem of all students but only when part of a well-thought out, effectively taught and adequately resourced educational programme.

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APPENDIX 1 RESEARCH TOOLS

1A - Questionnaire for Intake Years

1B - Structured Interview Sheet for Sample Students

1C - Rosenberg's (1964) Measure of Self-worth used with Sample Students

1D - Adapted from Rosenberg (1964) Measure of Self-esteem and Micros used with Sample Students

1E - Observation sheet used to investigate uses of information technology (IT) in Students' Free time

1F - Information technology (IT) used to survey three representative schools

Appendix 1A

QUESTIONNAIRE FOR INTAKE YEARS

Name: **Date:**

Boy: **Girl:**

1. Is this your first time using a micro ?

2. How many times have you used one before ?

   0-5 6-10 11-15 16 or more

3. What did you use it for ?

Folio	Logo	Turtle Graphics	Newspaper
Pendown	Paint	Games	Adventures
Grass	Grasshopper	Ourselves	Inform

   Other (please give name of program)

4. Where ?

   Alone Pair Group Class

5. What work can a micro do for you ?

6. How do you feel about sitting in front of one ?

7. How do you feel working a micro ?

8. What else do you think a micro can do for you ?

9. How does it help you ?

10. Do you see it as another way of learning ?

11. Do you like it as another way of learning ?

12. What different things do the micros in college do ?

13. Who uses micros in the world ?

14. How would you feel if all the micros were taken away ?

Appendix 1B

STRUCTURED INTERVIEW SHEET FOR SAMPLE STUDENTS

INTRODUCTION:

Show them their questionnaire response and remind them of the sheet and their answers.

Say: I now want to do some more detailed research finding out what 20 first year (Year 7) students really think about micros and I need to ask you some questions. All first years will have the same questions and I will record the answers. I will not tell anyone what you say or think - the answers are only for me and my university work. Can you try to be as honest as possible and answer all the questions.

Appendix 1B

INTERVIEW

1. a) Did you have micros at primary/junior school ?

   b) What for ?

   c) Alone Group Class

   d) How often ?

2. How did you feel when you first saw a micro ?

3. How did you feel using it ?

4. How did it help you ?

5. Had you used a micro before coming here to the CTC ?

   a) when ?
   b) where ?
   c) what for ?
   d) how often ?

6. What do you use the micros for at the CTC ?

   a) when
   b) where ?
   c) how often ?

7. What will you do with them next year ?

8. What would you like to learn about them ?

9. What other things can they do for you ?

10. Imagine you are in the first year of the post 16 - what do you imagine you'll know about micros ?

11. What will they be able to do for you ?

12. How much will they be a part of your life ?

13. How will you feel about them ?

14. Do you see the micro as :

    a) useful ?
    b) a nuisance ?

15. What can a micro do for you ?

16. Do you like it as a way of learning ?

    Why ?

17. What can the micro teach you/help you with that a teacher cannot ?

18. Which do you prefer ?

    Why ?

19. How do you feel when you see a micro or are told to use one ?

20. What sort of student do you think you are ?

    Clever Quiet Friendly Hard worker

    Lazy Don't work Like work

    Don't see the point of work Love school

21. What sort of job do you want ?

22. How could the micro help you in your job ?

23. Do you think you are good with micros ?

    Why ?

24. What sort of a relationship have you got with micros ?

    Why ?

Appendix 1C

ROSENBERG'S (1964) MEASURE OF SELF-WORTH USED WITH SAMPLE STUDENTS

PUT A TICK IN THE APPROPRIATE BOX TO SHOW HOW YOU FEEL ABOUT YOURSELF				
	Strongly agree	Agree	Disagree	Strongly disagree
I feel that I'm a person of worth, at least on an equal plane with others				
All in all, I am inclined to feel that I'm a failure				
I feel that I have a number of good qualities				
I am able to do things as well as most other people				
I feel I do not have much to be proud of				
I take a positive attitude toward myself				
On the whole, I am satisfied with myself				
I wish I could have more respect for myself				
I certainly feel useless at times				
At times I think I am no good at all				

Appendix 1D

MEASURE OF SELF-ESTEEM AND MICROS USED WITH SAMPLE STUDENTS, ADAPTED FROM ROSENBERG (1964)

PUT A TICK IN THE APPROPRIATE BOX TO SHOW HOW YOU FEEL ABOUT YOURSELF				
	Strongly agree	Agree	Disagree	Strongly disagree
I feel that I'm equally as good at the computers as other students				
All in all I am inclined to feel that I'm a failure with computers				
I feel that I have a number of good skills when it comes to computers				
I am able to do things on the computers as well as most other people				
I feel I am not able to do things on computers as well as other people				
I take a positive attitude towards the computers				
On the whole I am satisfied with myself when it comes to using the computer				
I wish I could feel more satisfied with myself when it comes to using the computers				
I certainly feel useless with the computers				
At times I think I will never be any good with the computers				

Appendix 1E

OBSERVATION SHEET USED TO INVESTIGATE USES OF I.T. IN STUDENT'S FREE TIME

Date: **Gender:** **F** **M**

Year: **7** **8** **9**

Any other observations ?
(i.e. student in structured interview sample)

Program/s used:	
Minutes	**How was time used ?**
00 - 02	
02 - 04	
04 - 06	
06 - 08	
08 - 10	
10 - 12	
12 - 14	
14 - 16	
16 - 18	
18 - 20	

Appendix 1E

Where was the skill acquired ?

I.T. lesson

Other subject area (specify)

Other student

Teacher

Observing another student

Observing teacher

Hands-on experience/discovery

Was the program used:

- academically stimulating/challenging Y N
- practising skills learnt in I.T. lesson Y N
- preparing work for lessons/homework Y N
- just "playing" Y
N

Did the y really need a micro to do this ? Y
N

Reasons:

How else could they have done it ?

Appendix 1F

INFORMATION TECHNOLOGY INTERVIEW SHEET USED TO SURVEY THREE REPRESENTATIVE SCHOOLS

Name of school:

Type:

Number of students on roll:

Age range:

Number of micros available to students:

Type	Number

Location of micros:

Location	Type	Number

Appendix 1F

Other facilities:

Printers:	Type	Number

Modem:
CAD/CAM:
Scanners:
Digitisers:
CD ROM
CD: COTV
Other:

How is IT. delivered ?

How is IT. logged ?

How is IT. assessed ?

Appendix 1F

How is IT. delivered elsewhere ?

IT. policy ?

IT. literate staff ?

How are staff chosen to do IT. ?

Further developments and strategies:

APPENDIX 2 REPORTS ON SURVEYED SCHOOLS

2A - Visit to the lea secondary (now Grant-maintained (GM)) school on 15.10.1992

2B - Visit to the Grant-maintained (GM) school on 16.10.1992

2C - Visit to the City Technology College (CTC) on 17.12.1992

2D - Update visit to the lea secondary (GM)) school on 11.10.1994

2E - Update visit to GM school on 10.06.1995

2F - Update visit to CTC on 15.07.1995.

Appendix 2A

VISIT TO THE L.E.A.SECONDARY NOW GM. SCHOOL ON 15.10.1992

An 11- 16 comprehensive school on the outskirts of a city (about to become a grant-maintained school later in 1992). There are 960 students on roll. There is an Information Technology Co-ordinator.

There are 80 micros at the school; therefore a ratio of 12:1 students per micro. The DES Statistical Bulletin for June 1991 reports an average ratio of 18:1 students per micro in secondary schools throughout England and Wales in March 1990. The micros are either BBC or Archimedes. They are distributed as shown below:

Table 1: Distribution of micros

Location	No.	Type
Information Centre: upper floor	16	A3000 in 2 Nexus Forms
	2	A5000 18mb. hard drive
	3	A3000 40 mb. hard drive
	1	PC 80 mb. hard drive
	1	Amiga no hard drive
Information Centre: lower floor	12	A3000 stand alones
At fixed points in school	25	A3000 stand alones
On trolleys in school	20	BBCs

To complement these there is a variety of printers:

3	colour Integrex
10	black and white 24 pin dot matrix
2	A310 laser
1	Canon bubble jet

There is also a modem facility as well as one scanner and one digitiser. In the Information Centre are also two CD TVs and a CD ROM is due any time.

Within the school there are also other features:

A plotter in CDT
Lego control systems - Dacta Lego
Midi music
Overlay keypads for special needs students

Most of the features are used in the school's work i.e. the sound digitiser is used a lot for Drama and Production work; the Gen lock enables the computer to be locked to a video to put on text; and heart monitoring equipment is logged into the micros to give read outs.

Information Technology is delivered to the students in two formats:

(a) in purely IT modules
(b) across the curriculum

In Years 7 & 8 each student spends 5 weeks of a Technology Carousel Course on an IT Awareness Course.The students are in their class grouping and they are taught to do everything i.e. word-processing; spread sheets; data-bases; video work; Dacta Lego, etc. The students are encouraged to come at dinner-time and any other free time to use the micros. They are also free to come in lesson time providing teacher's permission is given and there is a micro available.

In year 9 the students can take a City and Guilds Modular Course in basic competence. They select which modules they would like to participate in and the assessment is open-ended i.e. they work at it until they pass that module. The course runs for half an hour a week and 25 - 30 students take part in each session. If the students wish they pay for the certificate, which is proving to be a popular option. Already 1/5th of the students had paid and parents were enquiring which module was the most appropriate for their child to take.

In Years 10 & 11 students can opt to do GCSE Information Technology. Fifty students have chosen to do so. No prior knowledge or experience are requested; if you want to take the option then you're allowed to do so. It is a popular option which has grown from 11 to 36 to 50 participating students over the last three years. The course concentrates on how you use the micro rather than the programming or engineering aspects of the micro.

Information Technology is also delivered across the curriculum. There is an IT committee consisting of representatives from each subject area who bring ideas and information to the meetings; report back at subject meetings; are responsible for IT in their subject area; and take part in planning and delivering INSET on IT.

Each subject is responsible for two areas of IT i.e. English is responsible for Desk Top Publishing and word-processing; whereas Craft Design and Technology will look at the Control elements. Also the subject areas log when students use IT in their area. However, some subject areas do not feel this is their responsibility.

The two Information Centre rooms are not purely the domain of IT. Subject teachers are encouraged to bring either whole classes or send children in small groups to use the micros whenever they are free. Indeed the policy is if a micro is free then anyone can use it. A booking system is maintained to enable people to be aware of the availability of a micro.

There are two permanent staff running the information technology area. However, other members of staff are keen and have developed their own skills. If a member of staff has developed or used a particular piece of software then they are responsible for it. All the advertisements for new staff include a reference to an interest in IT. Clearly

IT has a high profile at the school with support from staff, students and parents. The school's latest development is to computerise their Records of Achievement to make easy access for students and staff when recording any information. The school is involved in a debate as to how to do this most efficiently and effectively.

Conclusions and Evaluation

The school has a well-written IT policy which is clearly delivered in practice across the whole school. All subject areas are involved in its delivery and development. The Information Centre encourages the development of skills by both staff and students through its open access policy and permitting people to be involved in the ownership of IT. No one person or subject area is viewed as the guardian of IT which means it has probably assumed its rightful level as a tool for learning which enhances the curriculum.

VISIT TO THE GRANT MAINTAINED SCHOOL ON 16.10.1992

An 11- 18 grant maintained school in a rural setting close to a market town. There are 766 students on roll. There is an Information Technology Co-ordinator.

There are 55 micros at the school; therefore a ratio of 13:1 students per micro. The DES Statistical Bulletin for June 1991 reports an average ratio of 18:1 in March 1990. The micros are either BBC, Archimedes or Amstrads. They are distributed as shown below:

Table 1: Distribution of micros

Location	No.	Type
Computing	1	Archimedes
	5	A 3000
	11	M 128
CDT	1	A 3000
	2	Model B
Home Economics	1	A 3000
Science	3	A 3000
	1	Model B
English	1	Model B
Special Needs	1	A 3000
	1	Model B
Modern Languages	1	A 3000
	1	Model B
History	1	Model B
Geography	1	A 3000
Mathematics	1	Archimedes
	1	A 3000
Art	1	Archimedes
Library	1	Model B
Business Studies	10	PCW 8256
	4	PCW 9256
	1	PCW 8512
	4	GTi 386

To complement these micros there is a variety of printers:

9	Black & White pin dot matrix
1	Colour printer
1	Laser jet

There is also a modem facility as well as one scanner and plotter. There is a CD ROM facility in the Library. IT is undergoing a state of change at the school. Currently Year 8 are engaged in IT as part of a Technology Modular Cycle. That is each student spends 2 hours a week for 7 weeks in one specific input area of Technology; information technology is one of those input areas. At the end of the seven weeks they are involved in a group project, based on a theme, in which they may use IT skills. The inclusion of IT skills is logged by the Technology department but assessed by the Co-ordinator for IT.

Year 9 have IT skills delivered in their lessons whereas Years 10 & 11 can opt for a GCSE in Computer Studies. There are currently 35 students on this course. The students not on the GCSE course have the skills delivered in their lessons on an ad-hoc basis. They have to use odd machines around the school as the computer room is fully booked.

In Years 12 & 13 there is a City and Guilds' 4242 Basic IT Competence skills course offered. Any student can sign up for the lessons regardless of previous experience or lack of knowledge. It examines the skills of word-processing, data-base, spreadsheets and graphics. There is also a substantial amount of theory involved.

One of the future strategies in the development of IT at the school is to increase the delivery of IT across the curriculum via specific subject areas. An IT corridor is being built which will house 15 A3020 micros. Easy access from subject lessons will facilitate the teaching of word-processing skills in English; spread sheet skills in Maths and Science; and database skills in Humanities. It is hoped that subject teachers and the IT Co-ordinator will work together to deliver these skills to Years 7 & 8. Year 9 will follow a Computer Awareness Course which will be linked to the Standard Assessment Tasks which have to be completed for Stage 3 of the National Curriculum at the end of Year 9. Years 10 & 11 will be able to opt for a GCSE course in either IT or Information Systems. It has not been decided whether to phase out the City & Guilds' course in Years 12 & 13, or whether to maintain that present option.

The staff are mainly IT literate and IT is achieving a higher profile in the school.

Conclusions and Evaluation

The school does not have an IT policy at the present. The practice throughout the school is on an ad-hoc basis. The subject areas do not feel committed to its delivery and too many students are missing out on these vital skills. The development of the IT Corridor presents a chance for the school to change this situation. With a clearly defined policy and a common application of practice in all subject areas the situation could significantly improve.

Appendix 2C

VISIT TO THE CITY TECHNOLOGY COLLEGE ON 17.12.1992

The City Technology College is a 11 - 19 inner-city, comprehensive which opened in September 1989. There are 653 students on roll. The highest year is Year 10, as full capacity has not yet been realised. There is an IT Co-ordinator as well as full-time a Network Manager and an Assistant Manager.

There are 77 Apricot LAN (Local Area Network) Stations; therefore a ratio of 8:1 students per micro. The DES Statistical Bulletin for June 1991 reports an average ratio of 18:1 in secondary schools throughout England in March 1990.

Table 1: Distribution of workstations

Location	Number
Communications Centre	14
Computer Suite	14
Technology Suite	14
Library	5
Subject areas	30

To complement the workstations there is a variety of printers:

Canon Laserjet	4
9 pin dot matrix	20

There is a modem facility, a scanner and digitisers. There are 12 CD ROM drives attached to the network. There are 2 interactive video set ups.

Information Technology is delivered to the students in two formats:

a) purely IT modules
b) across the curriculum

In year 7 each student spends 2 x 35 minute sessions each week on a computer awareness course for the first school year. They are taught in groups of 14 and learn how to use the function keys, keyboarding skills, word-processing, spread sheets, database and general information technology applications. They have end of module tests. They are also able to test themselves for typing speed and level of accuracy on the Touch'n Go package.

In Years 8 & 10 the students have IT skills taught across the curriculum. In all of the subjects they will use IT as part of their learning process i.e. word processing in English, computer-aided design in Technology, spreadsheets in Mathematics, etc.

In year 9 each student spends 2 x 35 minute sessions per week developing their skills. They are taught in groups of 14 for 2 x 8 week sessions.

The college is thinking about offering the City and Guilds' 4242 Modular Course in basic IT competence.

Most of the staff are IT literate. All of the IT modules are taught by IT literate staff, very often team teaching with someone who is less IT experienced. Staff are chosen on their ability and subject experience not on their suitability for filling timetable slots. Therefore a rolling in-service programme on IT is offered with up to 4 sessions every 8 weeks. New staff spend a day on learning the basics during their first term of appointment.

The students have open access to most of the workstations in their free time. They are usually supervised by an adult to ensure security for the machines and to sort out any running problems for the students. The students are responsible for keeping a record of their uses of IT by recording these on their IT log.

Subject areas are encouraged to use the IT logs but there is no IT Curriculum Map with subjects taking specific responsibility for logging and assessing skills. There is also no official IT policy document.

Conclusions and Evaluation

The college does not have an IT policy but is seeking to reverse this situation within the immediate future. Such steps should have been taken earlier in an establishment with such a high level of IT equipment and personnel. The external profile does not match the internal practice.

The college also needs to draw up a curriculum map for IT to ensure all the attainment targets and strands are being taught and assessed.

The college, however, does teach all of the students and the staff how to use IT. It also encourages students to use IT at any time to help with their learning.

IT does pervade the whole curriculum. However, with a more purposeful and reasoned approach the college could significantly improve the situation.

Appendix 2D

UPDATE VISIT TO THE L.E.A. SECONDARY SCHOOL (NOW G.M.) 11.09.1994

The school is now grant-maintained and the number of students on roll is approximately the same as at the last visit. The IT Co-ordinator is still in post.

The number of micros is the same but they are now on a network (Nexus, with 3 file servers and the 4th to come for the Technology block). Therefore the student:micro ratio is still 12:1. The micros are in farms: Technology block, Maths area, English area, Open Learning Centre etc. They also hope to get a class set of portables to take home (staff and students). Software has expanded and increased the cross-curricular applications. Decisions on purchase of new software are taken by the IT Co-ordinator and the subject area jointly. The subject area must ask for it to ensure ownership, it is then trialled and purchased if thought appropriate by students, department staff and IT staff.

Complementary hardware now includes 2 Hewlett Packard Bubble Jets, 1 A3 Canon Bubble Jet and 1 HP4 Laserjet printers. The CD ROM is in use and they are awaiting a second machine.

Years 7 & 8 now spend 2 5 week blocks on an IT Awareness Course with Year 9 having one lesson a week. The Year 9 City and Guilds' Modular Course is still running with 65% passing and 40% being certificated (which means they are one item away from passing). It tends to attract high fliers who enjoy putting their portfolios together.

GCSE IT in Years 10 & 11 has been dropped as the number of specific IT lessons was interfering with work across the curriculum. the course tended to attract low ability students who thought it was just about computer games. In 1994 50 students got a grade C or higher pass level but as the remaining 50% of the students were not getting much from IT it was deemed a waste of resources. They may offer it as a discreet subject in the future. Some students do the RSA CLAIT qualification and there is a high pass rate of 100% with 50-60% with merits or distinctions.

The IT committee still meets and now includes the NQTs. The use of IT by the staff is increasing to 60% who use it regularly with students, 20% who use it occasionally and a small hard core who don't use it all.

The IT staff have increased: 2 permanent full-time staff, 1 part-time English/IT, 1 part-time Technology/IT, 2 part-time Technicians and 1 part-time secretary.

IT is delivered across the curriculum with each area concentrating on a specific skill area. Each subject logs the uses with the student who fills in what they have done and if they feel it is good enough they put a copy in their IT portfolios.

Appendix 2E

UPDATE VISIT TO GM SCHOOL ON 10.06.1995

There are now 817 students on roll. the IT Co-ordinator is still in post.

There are now 101 micros with a 8:1 student to micro ratio. They are Acorn 3020, Amstrad PCWs, A 3000 etc. located in 6 farms. There are 3 networks. The print facilities are now Hewlett Packard Deskjet 540s for finished work, Star LC20 for drafts and a few Epson dot matrix. There is no modem (although they are looking at the Internet), CAD/CAM in Technology area, scanners, digitisers and 2 CD ROMs.

There are formal IT lessons in Years 7, 9, 10 and 11. Subject areas are involved in the delivery, assessment and logging of IT. There are no externally assessed courses but they are investigating GNVQ IT with post 16 students.

The staff are developing their IT literacy skills and there is a lot of enthusiasm. INSET in IT is on a regular basis and each INSET day has some input from IT. The successful ones have been in-house developed as well as bought in from outside. There are 1 full-time and 2 part-time (Maths/IT) posts.

Future developments include getting a whole school network, developing CD ROM, joining the Internet and improving curriculum uses of IT.

Appendix 2F

UPDATE VISIT TO THE CITY TECHNOLOGY COLLEGE ON 15.07.1995

The City Technology College has 803 students on roll as the college has now completed its intake years. The IT Co-ordinator is still in post, as is the Assistant Network Manager. The Network Manager has changed.

There are 130 Apricot 386 and 486 LAN (Local Area Network) Stations and PCs; therefore a 6:1 students per micro. The micros are distributed in farms of 12-14 in open access areas and subject departments. The print facilities have improved to a HP Duplex Laserjet and a Compaq Q Pagemark 20. There is a 28.8 modem, CAD/CAM, 2 flatbed colour scanners, digitisers, 30 CD ROM drives on the network and 27 stand alone CD ROM facilities.

IT is delivered to Year 7, 8 and 9 students for 1 hour and 20 minutes each week (5% of their timetable). They are taught generic and across the curriculum skills. They have end of module tests and can use a Touch'n Go package to test keyboarding skills. In years 10 & 11 the skills are taught across the curriculum and in externally validated courses.

The uses of IT are logged and the college are looking at an in-house system using National Curriculum level descriptors. IT will be assessed in subject areas by developing cross curricular assessments in line with the new National Curriculum. There are externally validated courses in RSA CLAIT, GCSE Information Systems, GNVQ IT at Foundation, Intermediate and Advanced levels and RSA Initial Awards in Computer Graphics.

IT is delivered in the curriculum: increasing amount of control and computer-aided design in Technology, data-logging in Science, spreadsheets in Maths, word-processing and desk top publishing in English and Humanities, etc.

The staff need to improve their IT literacy levels. About 20 - 25 are IT literate and can work with the students whereas 37 are not confident users. However, everyone has to use the network to get their electronic mail (internal communication system). New staff are encouraged to advance their level of IT literacy with in-service training. Staff are chosen to teach IT because of their commitment to it; only 3 of the 10 who teach it have a teaching qualification.

Further developments include updating and replacing the 386s with 486s in the next two years, moving to Windows 95 with Office 95 software on it, making Internet available to everyone in stages, getting subject departments to use more IT in their curriculum work and keeping students up to date with the latest hardware and software technology.

APPENDIX 3 TABLES OF RAW DATA

Tables A1 - A14	**Results of Questionnaire 1990 Intake**
Tables B1 - B14	**Results of Questionnaire 1991 Intake**
Tables C1 - C24A	**Results of Structured Interviews June - July 1992**
Tables D1 - D2	**Results of self-worth and self-esteem and micros survey**
Tables E1 - E8	**Results of Observations of uses of Information Technology (IT) in Students' free time at the City Technology College**

TABLES OF RAW DATA
RESULTS OF QUESTIONNAIRE - 1990 INTAKE

Table A: Questionnaire Sample

Female	Male	Total
73	86	159

Table A.1: Is this your first time using a micro

Gender	Yes	No	Abstentions
Female	2	68	3
Male	1	81	4

Table A.2: How many times have you used one before

Times used	Female	Male
0 - 5	1	0
6 - 10	7	7
11 - 15	6	9
16+	59	70

Table A.3: What did you use it for

Use	Female	Male
Folio	3	6
Logo	32	33
Turtle Graphics	12	19
NewSPAper	53	62
Pendown	5	3
Paint	57	62
Games	54	55
Adventures	19	25
Grass	0	0
Grasshopper	0	0
Ourselves	10	5
Inform	33	14
Other:		
Word-processing	4	4
Frog jumping	2	0
Wreckers rock	2	0
Research	1	0
Grannies Garden	1	0
Topics	1	0
Touch'n Go	1	4
CD ROM	0	4
Chucky Egg	0	1
Robo cop	0	1
Windows	0	1
Homework	0	1
Maths	0	1
Programming	0	1

Appendix 3A

Table A.4: Where

Situation	Female	Male
Alone	52	63
Pair	48	45
Group	51	35
Class	30	33

Table A.5: What can a micro do for you

Use	Female	Male
Help you learn	28	28
Anything	19	26
Give information	34	19
Print/word-process	5	16
Games	10	11
Store data	1	8
Drawing	3	5
Help me spell	1	1
Fun	2	1
Some things	0	1
Change pictures	6	0
Make work neater	0	1
Make programs	0	1
Happy/excited	0	1

Table A.6: How do you feel about sitting in front of one

Feeling	Female	Male
O.K.	20	20
Good/V. Good	9	18
Happy	4	9
Normal	9	4
Confident	8	1
Fine	6	5
In control	2	3
Natural	1	4
Great	2	2
Relaxed	0	2
Depends on what I'm doing	2	2
Like it	1	2
Calm	0	2
Easy	0	2
Important	0	2
Excited	0	2
Got there first	2	0
Ready to work	1	1
Safe	0	1
Sensible	0	1
Brilliant !	0	1
Intelligent	0	1
Nothing	0	1
Blurring	0	1
Ready to try	0	1
Something new	0	1
Playing	0	1
Excellent	0	1
Brainy	0	1
Not shy	0	1
Like myself	0	1
Bit nervous	0	1
Lazy	0	1
Do everything	0	1
Find out things	0	1
Gives me a headache	0	1
A bit silly	0	1
It'll do	0	1

Table A.7: How do you feel working a micro

Feeling	Female	Male
OK.	23	19
Good	12	16
Confident	6	6
Fine	6	4
Like myself	1	5
Clever	0	4
Works more interesting	3	0
Great	0	3
Bit nervous	3	1
Happy	1	11
Pleased	2	2
Enjoy it	1	2
All right sometimes	2	0
Comfortable	2	0
Not too sure	2	0
Safe	0	2
Sometimes angry	0	2
Easiest thing to do	0	2
Easy	1	1
Much better	1	0
Nothing	1	0
Helps me	1	0
Angry when it goes wrong	1	0
Anything	0	1
In charge	1	1
Intelligent	0	1
Know what I'm doing	1	0
Like it	1	1
Exciting	1	1
Important	1	0
Not bad	1	0
Can't understand it	1	0
Don't know what to do	1	0
Typing is good	0	1
Big	0	1
OK. on my own	0	1
Like I own it	0	1
Proud	0	1
Powerful	0	1
Frustrating	0	1
Successful	0	1
Interested	0	1
Not relaxed	0	1
Excellent	0	1

Table A.8: What else do you think a micro can do for you

Response	Female	Male
Print/word-process	22	37
Anything	19	19
Draw	8	14
Give information	28	10
Home/school work	4	10
Help learn	8	6
Calculate	1	7
Games	4	4
Store data	0	3
Spelling	4	2
Find books	0	2
Few things	0	2
Different languages	0	2
What you want	1	1
Learn to type	0	1
Other things	0	1
Search for things	0	1
Don't know	0	1
Depends on program	0	1
Nothing - I have to give it instructions	0	1

Table A.9: How does it help you

Response	Female	Male
Helps with work/learning	31	23
Find information	28	17
Prints	5	20
Many ways	5	13
Drawing	3	3
Stores data	0	4
Checks spelling	3	2
Easy to use	1	2
Tests languages	0	0
Ride around network	0	2
Communicate	1	0
Stops boredom	1	0
Improves imagination	1	0
Don't know	1	0
Don't have to wait	0	1
Know more	0	1
Improves my IQ	0	1
Corrects me	0	1
Stops me worrying	0	1

Table A.10: Do you see it as another way of learning

Response	Female	Male
Yes	66	78
No	2	4
Not sure	5	4

Table A.11: Do you like it as another way of learning

Response	Female	Male
Yes	70	81
No	0	2
Not sure	1	5
All right	1	4
Fun	0	1

Table A.12: What different things do the micros in college do

Response	Female	Male
Draw	39	36
CD ROM	31	21
Print/word-process	25	14
Games	16	7
All sorts	14	22
Write	11	13
Meals	7	11
NewSPAper	10	4
Save	3	7
Music	2	0
Programming	1	0
Logo	1	0
Don't know	1	0
Languages	1	0
Obey orders	0	1
Nothing much	0	1
Spelling	0	1
Calculate	0	1

Appendix 3A

Table A.13: Who uses micros in the world

Response	Female	Male
Everyone	33	35
Businessmen	13	33
Offices	25	3
Schools	25	9
Shops	10	5
People who can buy them	3	9
Bank manager	13	4
Women	0	5
Me	1	4
Factories	2	3
Newspapers	2	3
Satellites	0	2
Computerists	0	1
Nuclear warheads	0	3
Scientists	3	1
Doctors	0	1
Airports	1	2
Stock markets	2	0
Libraries	1	0
Travel shop	2	0
Writers	1	0
Artists	3	0
Weathermen	2	0

Table A.14: How would you feel if all the micros were taken away

Response	Female	Male
Sad	19	28
Bored	4	13
Unhappy	2	9
Angry	9	8
Upset	9	3
Mad	2	6
Disappointed	4	2
Sick	1	4
Could live without	4	1
Wouldn't mind	2	3
All right	3	1
Not really bothered	1	3
Bad	2	2
Horrible	1	1
Don't know	2	1
Hard to work	4	0
Not that good	3	0
Stuck	3	0
Normal	0	3
Dull	0	3
OK.	0	3
Not like it	2	2
Wouldn't be fun	0	1
Useless	0	1
Peeved	0	1
Not quite sure	0	1
Agitated	0	1
Nothing	0	1
Not very pleased	0	1
Fine	0	1
No fun	1	0
Confused	1	0
Lonely	1	0
Lost	1	0
Not right	1	0
Awful	1	0
Happy	1	0
Not a big loss	1	0
Annoyed	1	0
Shame	1	0
Harder to work	1	0

Appendix 3B

TABLES OF RAW DATA
RESULTS OF QUESTIONNAIRE - 1991 INTAKE

Table B: Questionnaire Sample

Female	Male	Total
64	85	149

Table B.1: Is this your first time using a micro

Gender	Yes	No	Abstention
Female	3	59	2
Male	2	80	3

Table B.2: How many times have you used one before

Number of times	Female	Male
0 - 5	2	2
6 - 10	12	4
11 - 15	7	5
16+	43	74

Table B.5: What can a micro do for you

Use	Female	Male
Folio	13	19
Logo	17	24
Turtle graphics	3	4
Newspaper	16	32
Pendown	5	9
Paint	18	40
Games	51	72
Adventures	22	32
Grass	0	5
Grasshopper	1	4
Ourselves	5	11
Inform	5	8
Other:		
Word-processing	10	7
Pod	1	2
City Fox	1	1
Deluxe Paint	0	2
Maths	3	3
Music	0	2
Writer	0	1
Designing	0	3
Granny's Garden	0	1
Typing Tutor	0	1
Vikings	1	0
Animals	1	0
Spelling	1	0

Appendix 3B

Table B.4: Where

Situation	Female	Male
Alone	46	57
Pair	42	49
Group	20	30
Class	24	23
Home	5	11
School	7	12
Friends	0	2
Library	0	3

Table B.5: What can a micro do for you

Use	Female	Male
Type/word-process	15	30
Information	26	29
Maths	3	13
Draw/paint	3	11
Help me	7	12
Check spelling	5	8
Teach to type	8	6
Games	6	4
Educational	5	5
Store data	4	3
Lots	2	3
Homework	1	3
Communicate	2	2
Anything	2	0
Ideas	2	0
Enjoyment	1	2
All sorts	1	2
Quicker	1	2
Everything	1	2
Home economics	1	1
Teach to use a micro	0	3
Exciting	0	1
Confidence	0	1
Doesn't tense your brain	0	1
History	1	0
Don't know	1	0
Different things	1	0
Graphs	1	0
Neat work	1	0

Table B.6: How do you feel about sitting in front of one

Feeling	Female	Male
Good	9	15
All right	11	13
Excited	4	13
Happy	8	10
Confident	3	7
Normal	5	7
Great	5	4
Nervous	3	5
Relaxed	2	6
Important	4	0
Get to work	3	1
Fine	1	3
Like it	2	1
Easy	0	2
Don't know	0	2
OK.	3	0
Very proud	2	0
Don't feel anything	1	1
Fun	1	0
Quite good	1	0
As if I'm doing well	1	0
Enjoy it	1	0
Strange	1	0
Independent	1	0
Take on the world	1	0
In control	0	1
Like a t.v.	0	1
Lucky	0	1
Wicked	0	1
Playful	0	1
Busy	1	0
As if it's my own	1	0

Table B.7: How do you feel working a micro

Feeling	Female	Male
Good	13	7
Happy	6	12
All right	11	13
Very confident	1	10
Great	2	6
Fine	3	5
Normal	2	6
Excited	1	4
Easy	3	1
Like it	2	2
Important	3	0
Brainy	0	3
Nothing	2	0
Mature	2	0
Cool/relaxed	0	2
Different	0	2
Fairly confident	2	0
OK.	2	0
Worried	2	0
Strange at first	1	1
Brilliant	1	1
Comfortable	1	1
Tense	1	0
Bored	1	0
Nervous	1	0
Can do anything	1	0
Experienced	1	0
Older	1	0
Interested	1	0
Not frightened	1	0
Frustrated	0	1
Whizz kid	0	1
Want to do more	0	1
Not bad	0	1
Amazed by myself	0	1
Responsible	0	1
Wicked	0	1
Enjoy	0	1
Learning new things	0	1
Positive	0	1
Depends	0	1
Jolly	0	1
Safe	0	1
Don't know	0	1
Busy	0	1
Mega	0	1
In good hands	1	0
Proud	1	1

Table B.8: What else do you think a micro can do for you

Response	Female	Male
Help you	13	27
Get information	12	13
Educate you	6	10
Teach typing	4	7
Save work	1	7
Draw	2	6
Print	6	6
Maths work	2	4
Don't know	1	4
Work	1	4
A lot	3	2
Communicate	0	3
Enjoyment	0	3
Not much	0	3
Nearly anything	4	0
Spelling	4	1
Games	2	2
Run programs	2	1
Study countries	0	2
Learn to read and write	0	2
Control things	0	2
Do tasks I can't	0	1
Tests you	0	1
Keeps records	0	1
Technology	0	1
Stops boredom	1	1
Talk to me	1	1
Career	1	0
Confidence	1	0
Something to do	1	0
Entertainment	1	0
Challenges you	1	0
Reading	1	0
Homework	1	0
Think	0	1
Suggest answers	0	1
Make robots	0	1
Hand/eye co-ordination	0	1
Business	0	1

Table B.9: How does it help you

Response	Female	Male
Helps you	14	24
More information	11	17
To type	8	14
Educates	3	9
When I get a job	3	5
Move fingers quicker	6	1
Spell	5	3
Makes life easier	2	5
Lots of ways	2	6
Writing	4	4
Pressing keys you know	3	0
Maths	3	0
Saves time	1	3
School work	0	3
Games	2	2
Saves work	2	2
Tells you when you're wrong	2	0
Programs to work on	2	0
Calculator	0	2
Types faster/better	2	0
Concentrate more	1	1
Timing you	1	0
Finds books	1	0
Drawing	1	0
Gives advice	1	0
Confident	1	0
Not shouting at me	0	1
Quicker ways of learning	0	1
Encyclopaedia	0	1
Think in proper perspective	0	1
Don't know	0	1
Get things right	0	1
All ways possible	1	0
Other things	1	0
Reading	1	0
Understand things	1	0
Good job	1	0
Homework	1	0

Table B.10: Do you see it as another way of learning

Response	Female	Male
Yes	52	80
No	6	5
Sort of	3	0
Should hand write	1	0
Nothing much	1	0
A bit	0	1
Teach you something but not everything	1	0

Table B.11: Do you like it as another way of learning

Response	Female	Male
Yes	60	83
No	1	4
Yes/No	0	1
OK.	3	0

Table B.12: What different things do the micros in college do

Response	Female	Male
Drawing	11	25
Information	17	19
Touch Type	11	19
Soutron Library System	15	9
Lots of things	2	10
Word-process	7	7
Games	7	7
Print	3	5
Windows	5	5
Make more programs	5	1
Meal system	2	3
Educate	2	3
Maths	2	2
Store data	1	4
Don't know	2	1
Encyclopaedia	1	3
Newspaper	1	2
Calculator	1	2
Help you	1	1
Communicates	0	6
Breakdown	0	3
Paint	3	0
Languages	0	2
Same as other micros	0	2
Control things	0	2
Program things	0	2
Different things	1	0
PC Globe	2	0
More advanced work	1	0
Wide choice	1	0
More fun	1	0
CD ROM	0	1
Logo	0	1
More options	0	1
Work	0	1
Entertainment	0	1

Table B.13: Who uses micros in the world

Response	Female	Male
Business	29	39
Everybody	19	25
School students	17	17
Teachers	17	15
Banks	10	8
Secretaries	11	4
Scientists	3	7
Schools	2	5
Solicitors	2	4
Police	0	4
Programmers	1	4
Librarians	2	1
Designers	0	3
Satellites	0	2
TV people	3	1
Accountants	0	2
Airports	0	2
Some people	0	2
Historians	0	2
Weathermen	1	1
Doctors	1	1
Travel agents	1	1
Me	1	1
News readers	0	1
Inventors	0	1
Mathematicians	0	1
Workmen	0	1
Parents	0	1
Analysts	0	1
Hospitals	0	1
Navy	0	1
Not everybody	0	1
Prime ministers	0	1
Art people	0	1
Don't know	0	1
Researchers	1	0
Shops	1	0
Government	1	0
Social workers	1	0
Car factories	1	0
Journalists	1	0
Posh people	1	0
Robotics	1	0
Manufacturers	0	1
Games' freaks	0	1
My family	0	1
Electricians	0	1
Technicians	0	1
Engineers	0	1
Normal	0	1
Communicators	0	1
Computer engineers	1	0
Builders	1	0

Table B.14: How would you feel if all the micros were taken away

Response	Female	Male
Sad	19	30
Bored	6	10
Not very happy	10	5
Angry	1	7
Very upset	3	3
Horrible	2	4
Lonely	3	1
Mad	1	3
Disappointed	2	2
Unhappy	0	4
Lost	1	2
Bad	2	1
Not like it	2	0
Not very good	2	0
Miserable	0	2
Terrible	0	2
Depressed	0	2
Make life more difficult	1	0
Not learn some things	1	0
Beat someone up	1	0
Not really bothered	1	0
Not coming to school	1	0
Wouldn't care	1	0
Empty life	1	0
No different	1	0
Bit mad and bored	1	0
Not feel anything	0	0
Absent minded	0	1
Happy	0	1
Things would be slower	0	1
Wouldn't learn as much	0	1
Same as before	0	1
Unplayful	0	1
Very uncomfortable	0	1
I would die	0	1
Revenge	0	1
Try to make my own	0	1
Very cross	0	1
Shocked	0	1
Unadvanced	0	1
Hate it	0	1
Devastated	0	1
Spoil the school	0	1
Not the same	0	1
Only school in GB without micros	0	1
Bogus college	0	1

TABLES OF RAW DATA
RESULTS OF STRUCTURED INTERVIEWS JUNE - JULY 1992

Table C: Intellectual and gender constituents of the sample

Intake Year	High IQ	Male	Female	sld	Male	Female
1990	8	6	2	10	8	2
1991	10	5	5	11	6	5

Table C.1A: Did you have micros at primary/junior school ?

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Yes	1990	6	2	7	2
No	1990	0	0	1	0
Yes	1991	5	5	5	5
No	1991	0	0	1	0

Table C.1B: What for

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Games	1990	6	2	6	2
	1991	3	5	3	4
Projects	1990	1	0	0	0
	1991	2	0	1	0
Word-processing	1990	2	0	1	0
	1991	2	1	0	1
Information	1990	0	0	1	0
	1991	1	0	1	0

Table C.1C: Alone ? Group ? Class ?

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Alone	1990	2	1	0	2
	1991	2	4	2	0
Group	1990	6	1	7	4
	1991	4	3	2	2
Class	1990	0	0	0	3
	1991	0	0	0	0

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Table C.1D: How often

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Once a week	1990	1	0	3	0
	1991	3	2	0	2
Once a term	1990	1	0	1	0
	1991	0	0	0	0
Never	1990	0	0	1	0
	1991	0	0	1	0
Twice a term	1990	1	2	1	1
	1991	0	1	0	1
Thrice a term	1990	0	0	1	0
	1991	2	0	2	0
Twice a week	1990	1	0	0	0
	1991	0	0	1	0
Once a fortnight	1990	1	0	0	0
	1991	0	0	0	0
Once in 3 terms	1990	1	0	0	0
	1991	0	0	0	0
5/6 times a term	1990	0	0	0	0
	1991	0	2	2	3
Once every 2 days	1990	0	0	0	0
	1991	0	1	0	0
Every day	1990	0	0	0	0
	1991	0	0	1	0
				0	

Appendix 3C

Table C.2: How did you feel when you first saw a micro

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Can't remember	1990	0	1	0	0
	1991	0	0	1	1
Not sure	1990	1	1	2	1
	1991	0	1	0	0
Bit scared	1990	1	0	0	1
	1991	3	1	0	0
All right	1990	2	0	0	0
	1991	0	0	0	0
Didn't know what to do	1990	1	0	0	0
	1991	0	0	0	1
Wanted to have a go	1990	1	0	1	0
	1991	0	0	0	0
What's this ?	1990	0	0	2	0
	1991	0	0	1	0
Nothing	1990	0	0	1	0
	1991	0	0	0	0
It was just there	1990	0	0	1	0
	1991	0	0	0	0
Don't know	1990	1	0	0	0
	1991	0	0	1	0
Be dead complicated	1990	0	0	0	0
	1991	0	0	0	0
Thought it's good	1990	0	0	0	0
	1991	0	0	1	0
Not that bothered	1990	0	0	0	0
	1991	0	0	1	0
Glad I'm learning	1990	0	0	0	0
	1991	0	1	0	0
Excited	1990	0	0	0	0
	1991	0	0	0	2
Nervous	1990	0	0	0	0
	1991	0	0	0	0
What do you do ?	1990	0	0	0	0
	1991	0	0	0	0
Quite hard	1990	0	0	0	0
	1991	0	0	0	0

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Table C.3: How did you feel using it

		High IQ		sld	
Responses	Intake Year	Male	Female	Male	Female
Can't remember	1990	0	0	1	0
	1991	1	0	0	0
All right	1990	1	0	2	0
	1991	2	1	3	2
Nothing	1990	0	0	1	0
	1991	0	0	0	0
Enjoyed it	1990	0	0	1	0
	1991	0	0	0	0
Good - brilliant	1990	0	0	1	0
	1991	0	0	0	0
More confident	1990	0	0	1	0
	1991	1	1	1	0
Didn't know at first	1990	2	1	1	1
	1991	0	0	0	0
Nervous	1990	1	0	0	1
	1991	0	0	1	0
Quite easy	1990	1	0	0	1
	1991	0	0	0	0
Can control it	1990	1	0	0	0
	1991	0	0	0	0
Happy	1990	0	0	0	0
	1991	0	0	0	1
Going to break it	1990	0	0	0	0
	1991	0	1	0	1
Left out	1990	0	1	0	0
	1991	0	0	0	0
Not confident	1990	0	0	0	0
	1991	0	0	0	1
Excited	1990	0	0	0	1
	1991	0	1	0	0
Not happy	1990	0	0	0	0
	1991	1	0	0	0

Table C.4: How did it help you

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Help	1990	5	1	5	1
	1991	4	4	3	4
Not help	1990	1	1	3	1
	1991	1	1	3	1

Appendix 3C

Table C.5A: When

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Spare-time	1990	1	0	4	1
	1991	2	4	2	2
Weekends	1990	1	0	3	0
	1991	0	1	1	2
Anytime	1990	1	0	1	0
	1991	1	0	0	0
Every night	1990	2	0	0	0
	1991	2	0	1	0
Every 2 months	1990	1	1	0	0
	1991	0	0	0	0

Table C.5B: Where

		High IQ		sld	
Response	Intake year	Male	Female	Male	Female
Home	1990	5	1	8	1
	1991	5	4	3	4
Friend	1990	1	0	0	0
	1991	0	1	0	0
Cousin	1990	0	0	0	0
	1991	0	0	1	0

Table C 5C: What for

		High IQ		sld	
Response	Intake Year	Male	Female	Male	Female
Games	1990	5	2	6	1
	1991	4	5	3	4
Drawing	1990	2	0	1	0
	1991	0	0	0	0
Basic programming	1990	2	0	2	0
	1991	1	1	3	0
Word-processing	1990	2	0	2	1
	1991	0	2	0	0
Maths	1990	0	0	0	0
	1991	0	0	1	0
Learning letters	1990	0	0	1	0
	1991	0	0	0	0

Table 3C

Table C.5D: How often

		High IQ		sld	
Response	Intake Year	M	F	M	F
Whenever get the chance	1990	1	0	2	0
	1991	0	0	3	1
Every weekend	1990	0	0	1	0
	1991	0	0	0	2
Every day	1990	2	0	2	0
	1991	1	3	2	0
Twice a week	1990	0	0	2	0
	1991	2	1	0	1
Odd time	1990	1	3	0	0
	1991	0	0	0	0
5 days a week	1990	0	0	1	1
	1991	0	0	0	0
Once a week	1990	0	0	0	0
	1991	0	1	0	0
All the time	1990	0	0	0	0
	1991	1	0	0	0

Table C.6: What do you use the micros for at the CTC

		High IQ		sld	
Response	Intake Year	M	F	M	F
Nothing	1990	0	1	1	0
	1991	0	0	0	0
Languages	1990	0	0	1	1
	1991	0	0	1	0
Word-processing	1990	4	1	4	2
	1991	4	5	4	4
CD ROM	1990	0	0	0	1
	1991	0	0	0	0
Games	1990	0	0	0	1
	1991	0	0	3	0
Information storage/retrieval	1990	4	1	3	0
	1991	1	0	2	3
Art work	1990	3	1	2	0
	1991	3	2	2	1
Spreadsheets	1990	1	0	0	0
	1991	1	1	0	0
Everything	1990	1	0	0	0
	1991	0	0	0	0
Learn to type	1990	0	0	0	0
	1991	0	1	2	2

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Table C.6.A: When

		High IQ		sld	
Response	Intake Year	M	F	M	F
Technology	1990	1	0	0	0
	1991	0	0	0	0
Lessons	1990	4	1	2	1
	1991	2	0	1	1
Break	1990	2	0	1	2
	1991	3	2	0	1
Home times	1990	0	0	1	1
	1991	1	1	2	0
Dinner	1990	3	0	2	0
	1991	1	2	2	0
When I need to	1990	2	0	2	0
	1991	0	2	1	3
Doing projects	1990	0	0	1	0
	1991	0	0	0	0
English	1990	0	0	1	0
	1991	0	0	1	0
Private study	1990	0	0	0	0
	1991	1	1	0	0
IT	1990	0	0	0	0
	1991	2	3	1	1

Table C.6.B: Where

		High IQ		sld	
Response	Intake Year	M	F	M	F
CAD Suite	1990	1	1	1	0
	1991	0	0	2	0
Library	1990	6	1	7	2
	1991	2	5	4	3
Learning Support Base	1990	0	0	1	1
	1991	0	0	1	2
Communications Centre	1990	2	1	4	1
	1991	3	3	2	2
Classrooms	1990	2	0	0	0
	1991	0	0	0	0
Science Labs	1990	1	0	1	0
	1991	1	0	0	0
Home Economics	1990	0	0	1	0
	1991	0	0	0	0
Computer Suite	1990	0	0	2	0
	1991	1	2	2	1

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Table C.6.C: How often

		High IQ		sld	
Response	Intake Year	M	F	M	F
Just Technology	1990	0	1	1	0
	1991	0	0	0	0
Not very often	1990	1	1	1	2
	1991	0	0	1	2
Whenever I need to	1990	1	0	0	0
	1991	1	3	0	2
Twice a term	1990	1	0	0	0
	1991	1	0	0	0
Every week	1990	1	0	1	0
	1991	1	1	2	0
Break times	1990	1	0	1	0
	1991	0	0	0	0
Every day	1990	1	0	1	0
	1991	1	0	1	1
3 times a week	1990	0	0	2	0
	1991	0	2	0	1
When nothing to do	1990	0	0	1	0
	1991	0	0	0	0
Once a month	1990	0	0	0	0
	1991	1	0	0	0

Table C.7: What will you do with them next year

		High IQ		sld	
Response	Intake Year	M	F	M	F
Don't know	1990	1	1	3	0
	1991	0	1	1	0
Depends on work we do	1990	0	1	1	0
	1991	0	0	0	0
Not sure	1990	0	0	1	0
	1991	0	1	0	0
Word-processing	1990	0	0	2	0
	1991	0	0	0	0
Getting information	1990	0	0	2	0
	1991	1	0	1	2
Same as now	1990	3	0	0	2
	1991	3	2	2	4
Homework	1990	2	0	0	0
	1991	1	0	0	0
Go on to Excel	1990	0	0	0	0
	1991	0	0	0	1
Type up work	1990	0	0	0	0
	1991	0	0	1	0
Play around	1990	0	0	0	0
	1991	0	0	1	0
Other applications	1990	0	0	0	0
	1991	1	0	0	0

Table C.8: What would you like to learn about them

		High IQ		sld	
Response	Intake Year	M	F	M	F
Not much	1990	0	1	0	0
	1991	0	0	0	0
How they work	1990	1	0	1	2
	1991	2	4	2	2
More software	1990	2	1	3	0
	1991	1	0	1	3
More about my computer	1990	1	0	0	0
	1991	0	0	0	0
Advanced programming	1990	2	1	0	0
	1991	2	0	0	0
Use rest of keyboard	1990	0	0	1	0
	1991	0	0	0	0
Don't know	1990	0	0	1	0
	1991	1	0	1	0
Nothing	1990	0	0	2	0
	1991	0	0	0	0
How to get good games	1990	0	0	0	0
	1991	0	0	1	0
More advanced work	1990	0	0	0	0
	1991	0	1	0	0

Table C.9: What other things can they do for you

		High IQ		sld	
Response	Intake Year	M	F	M	F
Nothing	1990	0	1	1	0
	1991	0	0	01	0
Not much	1990	1	1	10	0
	1991	0	0	2	0
Don't know	1990	1	2	0	0
	1991	0	0	2	0
Help me	1990	1	2	2	2
	1991	3	2	1	2
Word-process	1990	0	1	0	0
	1991	0	0	1	0
Play games	1990	0	1	0	0
	1991	0	0	0	0
Organise you	1990	1	0	0	0
	1991	0	0	0	0
Store data	1990	1	0	0	0
	1991	1	0	0	0
Music	1990	1	0	0	0
	1991	0	0	0	0
Specific Learning Difficulties	1990	1	0	0	0
	1991	0	0	0	0
Help spell/homework	1990	0	0	0	0
	1991	1	1	1	1
Type faster	1990	0	0	0	0
	1991	0	0	0	1
Help you to type	1990	0	0	0	0
	1991	0	0	0	0
Design things	1990	0	1	1	0
	1991	1	0	0	0
Help you to read	1990	0	0	0	0
	1991	0	1	1	0
Print stuff	1990	0	0	0	0
	1991	0	1	1	0
Save time	1990	0	0	0	0
	1991	0	0	0	0

Table C.10: Imagine you are in the first year of post-16 - what do you imagine you'll know about micros

		High IQ		sld	
Response	Intake year	M	F	M	F
Quite a lot	1990	1	4	3	0
	1991	1	3	3	2
How they work	1990	1	1	1	1
	1991	3	2	1	0
Different programs	1990	3	0	2	1
	1991	1	1	0	1
Don't know	1990	0	0	0	1
	1991	0	0	0	0
More detailed knowledge	1990	1	0	0	0
	1991	0	0	0	0
Not a lot	1990	0	0	3	0
	1991	0	0	1	1
Keyboard	1990	0	1	0	0
	1991	1	0	0	0
A bit	1990	0	0	0	0
	1991	0	0	0	1

Table C.11: What will they be able to do for you

		High IQ		sld	
Response	Intake Year	M	F	M	F
Help you	1990	1	2	3	1
	1991	1	4	2	5
Pass my exams	1990	1	0	0	1
	1991	1	0	0	0
Basic programming	1990	1	0	1	0
	1991	0	0	1	0
Corel Draw	1990	2	0	0	0
	1991	0	0	2	0
Not sure	1990	1	0	1	0
	1991	2	0	0	0
Word-process	1990	0	1	3	0
	1991	1	0	1	0
Music	1990	0	0	0	0
	1991	1	0	0	0
No idea	1990	0	0	0	0
	1991	1	0	1	0
Nothing	1990	0	0	0	0
	1991	0	1	0	0

Table C.12: How much will they be part of your life

		High IQ		sld	
Response	Intake Year	M	F	M	F
Quite a lot	1990	0	1	2	0
	1991	2	3	3	3
Not very much	1990	1	1	2	2
	1991	1	1	1	1
More and more	1990	2	0	0	0
	1991	1	0	0	0
Word-processing for projects	1990	1	0	0	0
	1991	0	0	0	0
Barest minimum	1990	1	0	0	0
	1991	0	0	0	0
Something to do when bored	1990	1	0	0	0
	1991	0	0	0	0
Don't know	1990	0	0	2	0
	1991	1	1	1	1
Not sure	1990	0	0	2	0
	1991	0	0	0	0

Table C.13: How will you feel about them

		High IQ		sld	
Response	Intake Year	M	F	M	F
Not sure	1990	0	1	0	1
	1991	0	1	0	0
OK	1990	0	1	1	1
	1991	3	3	1	1
Way of life	1990	1	0	0	0
	1991	0	0	0	0
More confident	1990	2	0	2	0
	1991	1	1	3	3
There to help me	1990	2	0	0	0
	1991	0	0	0	0
Don't know	1990	1	0	1	0
	1991	1	0	0	0
Good	1990	0	0	1	0
	1991	0	0	1	0
Nothing	1990	0	0	2	0
	1991	0	0	0	0
Just a machine	1990	0	0	1	0
	1991	0	0	0	0
Not confident	1990	0	0	0	0
	1991	0	0	0	1

Table 14: Do you see the micro as a) useful or b) a nuisance

		High IQ		sld	
Response	Intake Year	M	F	M	F
Useful	1990	5	2	6	2
	1991	5	5	5	5
Nuisance	1990	2	0	1	0
	1991	0	0	0	0

Table C.14A: Why do you see the micro as useful

		High IQ		sld	
Response	Intake Year	M	F	M	F
Store files	1990	1	0	0	0
	1991	2	0	1	0
Dinner system	1990	0	1	0	0
	1991	0	0	0	0
Help me	1990	1	1	4	2
	1991	8	1	5	2
Print work	1990	0	0	2	1
	1991	0	0	2	0
Can do lots	1990	2	0	0	0
	1991	0	0	0	0
Retrieve information	1990	2	0	5	0
	1991	3	0	2	0
Draw for you	1990	1	0	0	0
	1991	0	0	0	0
Always there	1990	1	0	0	0
	1991	0	0	0	0
Easy to use	1990	1	0	0	0
	1991	0	0	0	0
Do wonderful things	1990	1	0	0	0
	1991	0	0	0	0
Can get lost on it	1990	1	0	0	0
	1991	0	0	0	0
Play games	1990	0	0	1	0
	1991	0	0	0	0
Not useful when it crashes	1990	0	0	1	0
	1991	0	0	1	0
Know how to use when I'm older	1990	0	0	0	0
	1991	0	0	1	0

Table C.15: What can a micro do for you

		High IQ		sld	
Response	Intake Year	M	f	M	F
Homework	1990	0	0	1	0
	1991	0	0	0	0
Gives information	1990	1	0	4	0
	1991	3	2	3	2
Not a lot	1990	0	0	2	0
	1991	0	0	0	1
Word-processing	1990	2	0	1	0
	1991	1	0	3	1
Helps you with work	1990	2	0	1	0
	1991	1	1	3	1
Fun and games	1990	0	0	1	0
	1991	0	0	2	0
Helps me learn]	1990	1	0	1	2
	1991	2	0	0	0
Draw	1990	2	0	0	0
	1991	0	0	3	0
Simple maths	1990	1	0	0	0
	1991	0	0	0	0
Makes me more clever	1990	1	0	0	0
	1991	0	0	0	0
Type faster	1990	1	0	0	0
	1991	1	0	0	0
Learn about packages	1990	1	0	0	0
	1991	0	0	0	0
Anything	1990	1	0	0	0
	1991	0	0	0	0
Keep time in music	1990	0	1	0	0
	1991	0	0	0	0
Spelling	1990	0	1	0	0
	1991	0	0	1	1
Get you a job	1990	0	0	0	0
	1991	0	1	0	0
Helps my memory	1990	0	0	0	0
	1991	0	1	0	1

Table C.16: Do you like it as a way of learning ? Yes -why?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Feel more confident	1990	0	0	0	0
	1991	0	0	0	1
Different	1990	0	0	0	0
	1991	0	1	0	0
No idea	1990	0	0	0	0
	1991	0	0	1	0
Useful	1990	0	0	0	0
	1991	0	0	1	0
Easier than copying	1990	0	0	2	0
	1991	0	1	0	0
Fun with work	1990	1	0	1	0
	1991	0	0	0	0
Not as boring as books	1990	1	0	1	0
	1991	1	0	0	0
Easy to use	1990	0	0	2	4
	1991	0	0	2	0
Gives me information	1990	0	0	1	1
	1991	1	3	0	0
Doesn't criticise you when you	1990	1	0	0	0
do something wrong	1991	0	0	0	0
Help to get a job	1990	1	0	0	0
	1991	0	0	0	0
It's like a person	1990	0	0	0	0
	1991	0	0	0	0
Helps me find things	1990	0	0	1	1
	1991	0	0	0	0
Haven't got a teacher there	1990	0	0	0	0
	1991	0	0	1	0
Can correct things	1990	0	0	0	0
	1991	0	0	1	0
Like having a personal teacher	1990	0	0	0	0
	1991	0	0	1	0
Helps improve spelling	1990	0	1	0	0
	1991	0	0	1	0

Table C.16B: No - why ?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Has to be given information	1990	0	0	1	0
	1991	0	0	0	0
Can't work them-prefer books	1990	0	1	0	0
	1991	0	0	0	0

Table 16C: All right - why ?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Prefer to be taught	1990	1	0	0	0
	1991	0	0	0	0
Can help sometimes	1990	0	1	0	0
	1991	0	0	0	0

Table C.17: What can the micro teach you/help you with that a teacher cannot

		High IQ		sld	
Response	Intake Year	M	F	M	F
Knows more about subjects	1990	0	1	0	0
	1991	0	2	3	1
Not sure/don't know	1990	1	1	1	2
	1991	2	2	1	3
More knowledge but not human	1990	1	0	0	0
	1991	0	0	0	0
Nothing really-can't speak	1990	2	0	2	0
	1991	1	0	0	0
Computers put it in simple words	1990	1	0	0	0
	1991	0	0	0	0
Helps you to be patient	1990	1	0	0	0
	1991	0	0	0	0
Lets you go on programs	1990	0	0	1	0
	1991	0	0	0	0
Doesn't embarrass you	1990	0	0	1	0
	1991	0	0	0	0
If teacher busy-can go to a computer	1990	0	0	1	0
	1991	1	0	0	0
Gives you more detail	1990	0	0	1	0
	1991	1	0	0	0
Something teacher doesn't know about it	1990	0	0	1	0
	1991	0	0	0	0
Organise	1990	0	0	0	0
	1991	0	0	0	1
Learn different languages	1990	0	0	0	0
	1991	0	1	0	0
Teacher tells you to go away	1990	0	0	0	0
	1991	0	1	0	0
How to type/draw circles	1990	0	0	1	0
	1991	0	0	1	0

Table C.18: Which do you prefer

		High IQ		sld	
Response	Intake Year	M	F	M	F
Micro	1990	2	0	4	0
	1991	2	3	1	0
Teacher	1990	4	2	4	2
	1991	2	2	3	4
Both	1990	0	0	0	0
	1991	1	0	1	0
Not sure	1990	0	0	0	0
	1991	0	0	0	1

Table C.18A: Why ?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Don't like micros	1990	0	1	0	0
	1991	0	0	0	0
Teacher can help you more	1990	0	1	2	2
	1991	1	1	0	1
Can talk to teacher	1990	1	0	2	0
	1991	0	0	1	2
Teacher makes it simpler	1990	1	0	0	0
	1991	0	0	1	0
Teacher gives individual help	1990	1	0	0	0
	1991	1	1	1	0
Teacher talks to you	1990	1	0	1	0
	1991	0	0	0	0
Micro easier to understand	1990	1	0	0	0
	1991	0	0	0	0
Micro doesn't criticise you	1990	1	0	0	0
	1991	0	0	0	
Can't make mistakes on a micro	1990	0	0	1	0
	1991	0	0	0	0
Micros don't say things in front of class	1990	0	0	1	0
	1991	0	0	0	0
Teacher not programmed to a fixed pattern	1990	0	0	1	00
	1991	0	0	0	0
Micros don't shout at you	1990	0	0	2	0
	1991	1	0	1	
Both can help me	1990	0	0	0	0
	1991	1	0	1	2
Micros explain in more detail	1990	0	0	0	0
	1991	0	2	0	1
Micro can go to different things	1990	0	0	0	0
	1991	0	1	0	0
Both can answer questions- micro can't ask them	1990	0	0	0	0
	1991	0	0	1	0

Table C.19: How do you feel when you see a micro or are told to use one

		High IQ		sld	
Response	Intake Year	M	F	M	F
Don't know	1990	0	0	1	0
	1991	0	0	1	0
Nothing - just get on with work	1990	0	0	3	0
	1991	0	1	0	1
Just go and use it	1990	0	0	1	0
	1991	1	1	0	0
Great	1990	0	0	1	0
	1991	1	0	1	0
Feel more confident	1990	1	0	1	0
	1991	1	0	0	0
Like it	1990	1	0	0	0
	1991	0	0	0	0
OK	1990	1	0	1	1
	1991	1	0	1	2
Depends if used before	1990	1	0	0	0
	1991	0	1	0	0
Better - don't have to do own writing	1990	1	0	0	0
	1991	0	0	0	0
No problem	1990	1	0	0	0
	1991	0	0	0	0
Bit scared at first	1990	0	0	0	1
	1991	0	0	1	0
Don't like them	1990	0	1	0	0
	1991	0	0	0	0
Don't mind-can use if I want to	1990	0	1	0	0
	1991	0	0	1	0
Happy	1990	0	0	0	0
	1991	0	0	1	0
Just normal	1990	0	0	0	0
	1991	0	1	0	0
Quite easy	1990	0	0	0	0
	1991	0	1	0	0
Not confident	1990	0	0	0	0
	1991	0	0	0	1

Appendix 3C

Table C.19A: Why ?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Can't use them-if I could would have different attitude	1990	0	1	0	0
	1991	0	0	0	0
OK when I know how to use	1990	1	0	1	1
	1991	1	1	1	4
OK	1990	0	0	0	1
	1991	1	0	0	1
Can't harm you	1990	1	0	1	0
	1991	0	0	0	0
Know most packages	1990	1	0	0	0
	1991	1	0	0	0
Better than doing own writing	1990	1	0	0	0
	1991	0	0	0	0
Nervous if haven't used before	1990	1	0	1	0
	1991	0	1	0	0
Had lots of experience with them	1990	1	0	0	0
	1991	1	0	1	0
All right if use keys properly	1990	0	0	1	0
	1991	0	0	1	0
I like to use them	1990	0	0	1	0
	1991	0	0	0	0
Help me	1990	0	0	1	0
	1991	0	0	0	0
Been told to	1990	0	0	1	0
	1991	0	0	0	0
Don't know	1990	0	0	1	0
	1991	1	0	2	0
Not told to that often	1990	0	0	1	0
	1991	0	0	0	0
Worried might get shouted at	1990	0	0	0	1
	1991	0	0	0	0
Not exciting now	1990	0	0	0	0
	1991	0	1	0	0
Happy - don't like waiting	1990	0	0	0	0
	1991	0	1	0	0
Not that interested	1990	0	1	1	0
	1991	0	0	0	0

Table C.20: What sort of student are you

		High IQ		sld	
Response	Intake Year	M	F	M	F
Clever	1990	4	1	0	0
	1991	0	1	2	1
Quiet	1990	2	2	1	2
	1991	3	4	2	3
Friendly	1990	2	1	4	2
	1991	3	2	2	5
Hard worker	1990	2	0	3	2
	1991	3	3	2	0
Lazy	1990	1	0	1	0
	1991	0		0	0
Noisy	1990	0	0	2	0
	1991	2	0	1	0
Don't work	1990	0	0	0	0
	1991	0	0	0	0
Like work	1990	2	0	3	0
	1991	3	1	3	5
Like some work	1990	1	2	3	0
	1991	0	0	0	0
Don't see point of work	1990	0	0	0	0
	1991	0	1	1	0
Love school	1990	1	0	2	0
	1991	0	0	1	1
Get on with work	1990	0	1	1	0
	1991	0	0	0	0
Talk quite a lot	1990	1	0		0
	1991	0	0	1	0
Want to get on with work	1990	1	0	0	0
	1991	0	0	0	0
Sometimes muck about	1990	1	0	0	0
	1991	0	0	0	0
Prefer school to home	1990	1	0	0	0
	1991	0	0	0	0
Helpful	1990	1	0	0	0
	1991	0	0	0	0
Little modest	1990	10	0	0	0
	1991	0	0	0	0
Think schools are "crap"	1990	0	0	0	0
	1991	0	0	1	0
Quite a good worker	1990	0	0	0	0
	1991	0	1	0	0
Shy	1990	0	0	0	0
	1991	0	1	0	0

Table C.21: What sort of job do you want

		High IQ		sld	
Response	Intake Year	M	F	M	F
Guitarist	1990	1	0	0	0
	1991	0	0	0	0
Footballer	1990	0	0	1	0
	1991	1	0	1	0
Fighter pilot	1990	1	0	0	0
	1991	0	0	0	0
Spaceman	1990	0	0	0	0
	1991	0	0	1	0
Biologist	1990	1	0	0	0
	1991	0	0	0	0
Chef	1990	0	0	0	0
	1991	1	0	0	0
Accountant	1990	1	0	0	0
	1991	0	0	0	0
Administration	1990	1	0	0	0
	1991	1	0	0	0
Office - clerical	1990	0	0	1	0
	1991	0	0	0	1
Secretary	1990	0	0	0	0
	1991	0	1	0	0
Nurse	1990	0	0	0	0
	1991	0	1	0	0
Surgeon	1990	0	0	0	0
	1991	0	0	0	0
Journalist	1990	0	0	0	0
	1991	0	0	0	0
Policeman	1990	0	0	1	0
	1991	0	0	1	0
Hairdresser	1990	0	0	0	0
	1991	0	1	0	2
Actor	1990	0	0	0	0
	1991	0	0	1	0
Media production	1990	1	0	0	0
	1991	0	0	0	0
Architect	1990	1	0	0	0
	1991	0		1	0
Mechanic	1990	1	0	1	0
	1991	0	0	0	0
Designer	1990	0	0	0	0
	1991	0	1	0	0
Solicitor	1990	0	0	0	0
	1991	0	1	0	0
Civil Servant	1990	1	0	0	0
	1991	0	0	0	0
Teacher	1990	0	0	0	0
	1991	0	0	0	1
To do with computers	1990	1	0	3	0
	1991	2	1	2	0
Self-employed	1990	1	0	0	0
	1991	0	0	0	0
Don't know	1990	0	0	1	1
	1991	0	0	1	1

Table C.22: How could the micro help you in your job

		High IQ		sld	
Response	Intake Year	M	F	M	F
Couldn't	1990	0	0	1	0
	1991	0	0	0	0
Give me more information	1990	1	1	2	2
	1991	0	2	2	0
Find files	1990	1	0	1	2
	1991	0	0	0	0
Store data	1990	2	0	1	1
	1991	2	2	0	1
Financial information	1990	0	0	2	0
	1991	0	0	1	0
Make games	1990	0	0	1	0
	1991	0	0	0	0
Help with calculations	1990	0	0	1	0
	1991	1	0	0	1
Administration	1990	2	0	1	0
	1991	3	2	0	1
All important work	1990	1	0	0	0
	1991	0	0	0	0
Design work	1990	2	0	0	0
	1991	1	1	0	0
Have to have one	1990	1	0	0	0
	1991	0	0	0	0
DTP	1990	1	0	0	0
	1991	0	0	0	0
Sound sampling	1990	1	0	0	0
	1991	0	0	0	0
Don't know	1990	0	0	1	1
	199	1	0	0	1
Find telephone numbers	1990	0	0	0	0
	1991	0	1	0	0
Put things on network	1990	0	0	0	0
	1991	0	0	2	0
Helpful	1990	0	0	0	0
	1991	0	0	1	0
Help to do research	1990	0	0	0	0
	1991	0	1	0	0
Print work	1990	0	0	0	0
	1991	0	0	0	1

Table C.23: Do you think you are good with micros

		High IQ		sld	
Response	Intake Year	M	F	M	F
No	1990	0	2	2	1
	1991	0	0	0	0
Yes	1990	4	0	2	0
	1991	4	4	2	0
Sometimes	1990	0	0	1	1
	1991	0	0	0	0
Average	1990	2	0	3	0
	1991	1	1	3	5

Table C.23A: Why ?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Don't understand them	1990	0	1	0	0
	1991	0	0	0	0
Sometimes get silly	1990	0	0	0	1
	1991	0	0	0	0
Don't know how to use	1990	0	0	1	1
	1991	0	0	0	0
Easy to work with	1990	1	0		0
	1991	1	0	0	0
Try to sort out problems	1990	1	0	0	0
	1991	0	0	0	0
Haven't explored yet	1990	1	0	0	0
	1991	0	0	1	0
Can type quite fast	1990	1	0	0	0
	1991	2	0	0	0
Understand them	1990	1	0	0	0
	1991	0	0	1	0
Stick to packages I know	1990	1	0	0	0
	1991	0	0	0	1
Not sure	1990	1	0	1	0
	1991	0	0	1	0
Confident	1990	0	0	1	0
	1991	0	0	0	0
Know a bit about them	1990	0	0	3	0
	1991	0	0	1	0
Depends what I'm doing	1990	0	0	0	0
	1991	0	0	0	1
Know most things	1990	0	0	1	2
	1991	0	0	3	3
Got one at home	1990	0	0	0	0
	1991	1	2	0	0
Not useless with them	1990	0	0	0	0
	1991	0	1	0	0
Brilliant with them	1990	0	0	0	0
	1991	0	0	1	0
Know a lot	1990	0	0	0	0
	1991	1	0	0	0
Nothing special	1990	0	1	0	0
	1991	0	0	0	0

Table C.24: What sort of a relationship have you got with micros

		High IQ		sld	
Response	Intake Year	M	F	M	F
Haven't	1990	0	0	3	0
	1991	0	0	0	0
Just there	1990	1	0	1	0
	1991	0	0	0	0
Like using them	1990	0	0	1	0
	1991	1	0	0	0
Good	1990	3	0	2	0
	1991	2	3	0	0
Quite good	1990	1	0	0	0
	1991	1	0	3	3
Not too good	1990	1	0	0	1
	1991	0	0	0	0
Not a lot	1990	0	0	0	1
	1991	0	0	0	0
Avoid them	1990	0	0	0	1
	1991	0	0	0	0
Don't know	1990	1	0	0	0
	1991	0	1	1	0
Not much	1990	0	0	0	0
	1991	0	0	0	1
Friendly	1990	0	0	0	0
	1991	0	1	0	0
OK	1990	0	0	1	0
	1991	0	0	0	1
All right	1990	0	0	0	0
	1991	0	0	0	1
Don't rely on - prefer own work	1990	0	1	0	0
	1991	0	0	0	0

Table C.24A: Why ?

		High IQ		sld	
Response	Intake Year	M	F	M	F
Don't know	1990	0	0	1	1
	1991	1	0	1	2
Don't like them	1990	1	0	2	1
	1991	0	0	0	0
Just there	1990	0	0	2	0
	1991	0	0	0	0
Help me	1990	1	0	1	0
	1991	0	0	0	0
Something to do	1990	0	0	1	0
	1991	0	0	0	0
Like them	1990	0	0	1	0
	1991	0	0	0	0
Know how to use	1990	1	0	1	0
	1991	2	1	2	1
Spend a lot of time with them	1990	2	0	0	0
	1991	0	1	1	0
Don't like to rely on them	1990	1	1	0	0
	1991	0	0	0	0
Easy to use	1990	1	0	0	0
	1991	0	0	0	0
Never disagree with you	1990	1	0	0	0
	1991	0	0	0	0
Don't understand me	1990	0	1	0	0
	1991	0	0	0	0
Just use them	1990	0	0	0	0
	1991	1	0	0	0
Not like a teacher	1990	0	0	0	0
	1991	1	0	0	0
Like some more than others	1990	0	0	0	0
	1991	1	0	0	0
Don't throw it around the room when it doesn't do something	1990	0	0	0	0
	1991	0	1	0	0
OK	1990	0	0	0	0
	1991	0	0	0	1
Useful	1990	0	0	0	0
	1991	0	0	0	1
Only if forced to	1990	0	0	0	0
	1991	0	0	0	1

TABLES OF RAW DATA
RESULTS OF SELF-WORTH AND SELF-ESTEEM AND MICROS SURVEY

Table D.1: Self-worth survey using Rosenberg (1964)

Intake Year		1990				1991			
Student Level		High IQ		sld		High IQ		sld	
Gender		F	M	F	M	F	M	F	M
High self-worth	0/10	1	2	1	2	3	3	0	2
	1/10	0	1	1	1	2	1	2	2
	2/10	1	1	0	3	0	0	1	2
	3/10	0	1	0	1	0	1	1	0
	4/10	0	1	0	1	0	0	1	0
	5/10	0	0	0	0	0	0	0	0
	6/10	0	0	0	0	0	0	0	0
	7/10	0	0	0	0	0	0	0	0
	8/10	0	0	0	0	0	0	0	0
	9/10	0	0	0	0	0	0	0	0
Low self-worth	10/10	0	0	0	0	0	0	0	0

Table D.2: Self-esteem and micros

Intake Year		1990				1991			
Student level		High IQ		sld		High IQ		sld	
Gender		F	M	F	M	F	M	F	M
High self-worth	0/10	1	4	0	4	3	2	0	3
	1/10	1	1	0	1	1	2	4	3
	2/10	0	1	0	0	1	1	1	0
	3/10	0	0	1	2	0	0	0	0
	4/10	0	0	1	0	0	0	0	0
	5/10	0	0	0	1	0	0	0	0
	6/10	0	0	0	0	0	0	0	0
	7/10	0	0	0	0	0	0	0	0
	8/10	0	0	0	0	0	0	0	0
	9/10	0	0	0	0	0	0	0	0
Low self-worth	10/10	0	0	0	0	0	0	0	0

TABLES OF RAW DATA
RESULTS OF OBSERVATIONS OF USES OF INFORMATION TECHNOLOGY (IT) IN STUDENTS' FREE TIME AT THE CITY TECHNOLOGY COLLEGE (CTC)

Table E.1: Free time use of micros by student year group

Year	Number of students using micros
7	17
8	19
9	8

Table E.2: Free time use of micro by gender group

Gender	Number of students using micros
F	24
M	20

Table E.3: Free time use of micros by group size, number of groups and gender

Group size	M	F
6	1	0
5	0	0
4	0	2
3	1	1
2	4	5
1	1	2
3	Mixed: 2M 1F	

Table E.4: Free time use of micros by students - software package used

Package	Number
Word/write	12
Granville (language adventure)	10
Touchn' Go	8
Excel	6
Paintbrush	4
Maths Blaster Plus	2
Compton's Encyclopaedia	2

Table E.5: Free time use of micros by students - where was the skill acquired

Type of Skill	Number
IT	10
Hands on experience/discovery	9
Observing another student	4
English	3
French	2
Library	1
Teacher	1

Table E.6: Free time use of micros by students - why was the program used

Response	Yes	No
Academically stimulating/challenging	11	7
Preparing for homework/lesson	8	8
Just playing	4	12
Practising skills	8	7

Table E.7:Free time use of micros by students - did they really need a micro to do this

Yes	No
16	3

Table E.7A: Reasons for using a micro

Response	Number
Easier	9
Work looks better when printed	3
More exciting/fun	2
Good graphics	2
Can work in French language	2
Learn to type	2
Can edit	2
Don't know	2
Not as good on paper	1
Told to by a teacher	1
Bored	1
Quicker	1

Table E.8: Free time use of micros by students - how else could they have done it

Response	Number
Exercise book/paper	8
Handwriting	7
Don't know	4
Typewriter	3
Reading	3
Go to France	1
Drawing	1
Use another software package	1
Have to have a micro	1