The effects of Information Technology on Students' Motivation

Summary Report

Margaret J. Cox

KING'S College LONDON
Founded 1829
University of London

NCET

Preface

Computers have been in schools for many years now, and it is taken for granted that pupils will use IT as part of their normal school activities. Indeed, since the introduction of the National Curriculum, IT has become part of a child's educational entitlement and all pupils are expected to develop their information technology capability during their studies of National Curriculum subjects.

The early use of IT in schools was brought about largely through the activities of a few enthusiasts, who saw benefits for their own pupils when using IT. The benefits noticed were largely anecdotal and unquantified, but nearly always centred on statements such as 'they work much harder on the computer', or 'I can't believe how long they will stick at something on a computer compared with other school work'. Teachers have often had to revise their expectations of pupils' capabilities in the light of their performance with a computer, and these teachers have in turn influenced other teachers to introduce IT into their teaching programmes.

The pioneering days are now over, and mere statements that 'IT motivates students' are no longer sufficient. We need to know how they are motivated, and why they are motivated, and to understand these questions we really need to understand better just what we mean by 'motivation'. In an attempt at answering these questions, NCET commissioned Margaret Cox to undertake a small-scale investigation into the motivational effects of IT.

In this booklet Margaret Cox has broken new ground. She has undertaken a study of students' use of IT and their attitudes towards IT and subjects which use IT, but she has based her study on an analysis of the literature on motivation. She has not restricted this analysis to IT, and has sought ways of linking theories of motivation to outcomes reported in the IT literature. The result is a reinterpretation of all those anecdotal statements in the light of research findings, allowing us to make firm claims about the motivational effects of IT. In doing this, Margaret Cox has performed a service to educationalists; she has also produced a fascinating study of how the students themselves perceive the value and usefulness of IT in their studies. In recommending a close study of this important booklet, let me refer the reader to the conclusions in Chapter 8, where she discusses amongst other matters the students' increased commitment to the learning task, their enhanced enjoyment, interest and sense of achievement in learning when using IT, and their enhanced self esteem. The students themselves are giving us lessons which we ignore at our peril!

Francis Howlett, NCET

ISBN 1-871984-33-5

First Published in 1997 by NCET
National Council for Educational Technology
Milburn Hill Road,
Coventry CV4 7JJ
Tel: 01203 416994 Fax: 01203 411418

and King's College London
Cornwall House
Waterloo Road
London SE1 8WA
Tel: 0171-872-3189 Fax: 0171-872-3182

The effects of Information Technology on Students' Motivation

Summary Report

Margaret J.Cox

Table of Contents

Introduction 1

Evidence from the literature 1

Aims of the pilot project 2

Research plan for the pilot field study 2

Results 3

IT access and use 3

Motivational aspects of IT use 6

Conclusions 10

References 12

Acknowledgements:

I would like to acknowledge the significant contributions to this project from the following people;

Brainard Braimah OBE - Director of the Chapel Town and Harehills Computer School (CHALCS Project);

Patrick Jordan (secondary school IT co-ordinator), George Abbot School;

Noureddin Khassal (secondary school IT co-ordinator) William Penn School;

Dr. Brian Stace - Surrey University

Dr. Gordon Hartman - Surrey University

Kate Cox - University of Leeds

Alex Beattie - University of Durham;

All the other staff and students who participated in the project from:

The CHALCS School; George Abbot School, Guildford; William Penn School, London, and Surrey University;

The National Council for Educational Technology for commissioning and funding the project.

Margaret Cox

1 Introduction

There are many claims made about the positive effects of Information Technology (IT) on students' motivation, several of which have already been cited in IT Works (NCETa 1994). This summary gives a brief description of some of the earlier studies and the results of a small scale questionnaire survey of some school and university students' perceptions of the educational value of using IT. More details of other studies of motivation and a review of other research findings can be found in the full report (Cox, 1997), also published by the National Council for Educational Technology and King's College London.

2 Evidence from the literature

Research studies reported in the literature show that the uses of IT in different subjects and with different types of software have resulted in increased motivation in one or more aspects; for example, in terms of increased commitment to the learning task, enhanced enjoyment and interest, an enhanced sense of achievement, and an increased sense of self worth.

The UK IMPACT project (Watson, 1993), which investigated the impact of IT on children's learning, showed that the pupils' commitment to their work was enhanced by the use of IT. In a study of the attitudes of pupils towards microcomputers, Johnstone (1987) found that the majority of the pupils believed that IT could help them learn and concentrate harder. Sakamoto, Zhao, and Sakamoto (1993), who researched the opinions of 762 4th, 5th and 6th grade primary school children in three Japanese primary schools also found that pupils believed that "computing is one of the most important things we do" and that using them would enhance their learning and long term employment prospects.

Stradling, Sims, and Jamison (1994), surveyed 563 primary and secondary UK school pupils who had used portable computers. The majority of the 118 project co-ordinators reported an improved attitude to school work and home work. They also reported a greater commitment and time spent on pupils' school work. According to an earlier study by Caldwell, Hewitt and Graber (1982), the amount of time spent on a learning task was generally found to be related to the learning which takes place, indicating that the motivation to spend more time on task would lead to improvement in learning.

The Integrated Learning Systems (ILS) project (NCETb, 1994) also reported evidence of interest and enjoyment amongst pupils using computers:

> *If you get something wrong you get another go.*
> *I like the new system because you instantly know whether you are right or wrong.*
> *I learn more than by writing all the time*
> *It doesn't go off and help someone else*
>
> ILS students (NCETb,1994)

These results and many others reported in the full report provide substantial evidence that a range of IT uses has a motivating effect on learners in terms of enhancing their enjoyment and interest in learning, providing greater independent learning, and enhancing their potential for achieving longer term goals.

3 Aims of the pilot project

The aim of the pilot project was to collect information about the IT experiences and opinions of pupils and students in several different types of educational establishments. The specific project objectives were to find out:

- what the students' total levels of IT use and experiences were;
- whether students themselves perceived IT use to contribute to their learning of a subject;
- whether students perceived that IT use made their subjects more interesting, more important and easier to study;
- whether the use of IT was regarded by students as enhancing their job opportunities and long term employment prospects.

4 Research plan for the pilot field study

The research involved designing and using a questionnaire with pupils and students in a number of different institutions to collect the information relating to the aims above.

The students from the institutions listed in Table 4.1, included:

(1) 226 year 7 (13-14) pupils from a large comprehensive mixed secondary school. The school had 250 model 486 computers, IT capability courses for all pupils and IT use in some specific subjects. The teacher participating in the project is the IT co-ordinator for the school.

(2) A class of sixteen 13 year old pupils from an inner London male students comprehensive school. The teacher involved is the IT co-ordinator in the school.

(3) 83 secondary level pupils and 34 primary level pupils of different ages from the CHALCS voluntary school, with a large IT resource enabling all pupils to have individual use of IT and pupils electing to attend the school on a voluntary basis, late afternoons, evenings and week-ends. This school is located in an inner city area of Leeds with high unemployment and large ethnic minority populations.

(4) 83 first year University of Surrey students, mainly from the university's School of Biological Sciences and including a few from a second university.

Table 4.1 - Institutions and students participating in the project

Institution	Females	Males	Unspec.	Age range	Total
George Abbot School - G1	36	59	6	13-14	101
George Abbot School - G2	28	26		13-14	54
George Abbot School - G3	24	47		13-14	71
William Penn School		16		13-14	16
Total Secondary	**88**	**148**	**6**	**13-14**	**242**
CHALCS Primary	20	14		8-11	34
CHALCS Secondary	40	43		11-16	83
Surrey University	29	54		18-25	83
Total Sample	**177**	**259**	**6**		**442**

5 Results

The data provided on the returned questionnaires and computer based responses (G3) gave information about pupils' and students' opinions of several aspects of IT as reported earlier. More details about the questionnaires are given in the full report (Cox, 1997). The results from the information gathered is summarised here.

5.1 IT access and use

In order to relate the students' opinions about IT to their actual IT experiences it was necessary to estimate the extent of IT use. This was rated on a five (home) and six (school and CHALCS) point scale:

at home

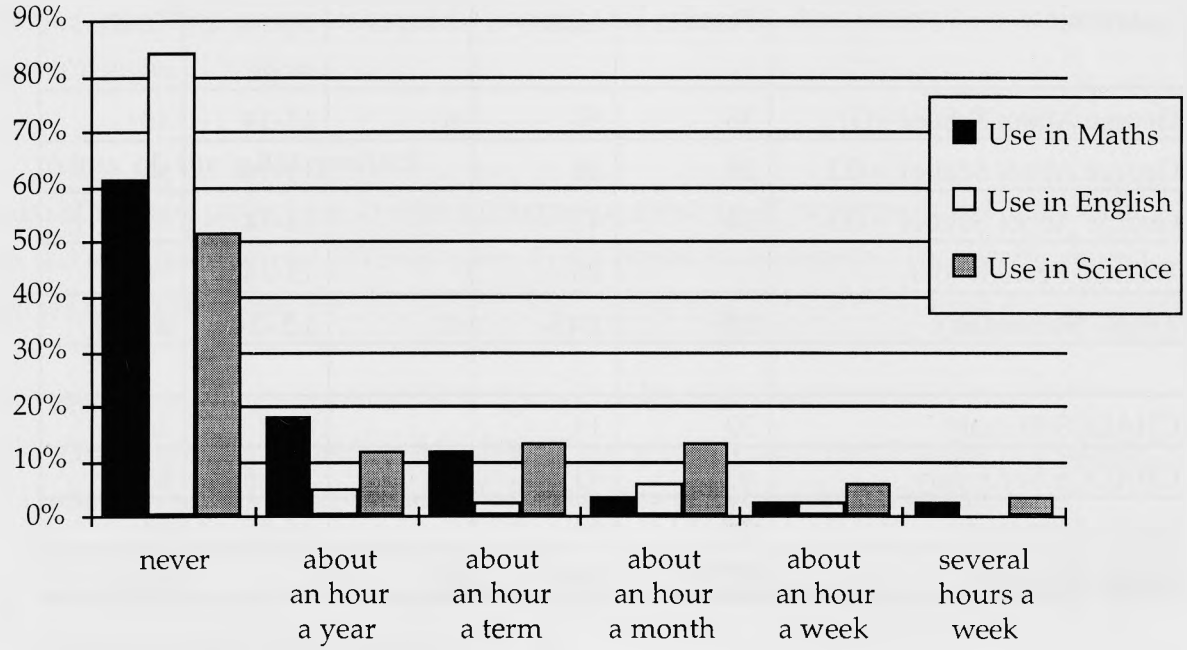
1 - never
2 - about an hour a month
3 - about an hour a week
4 - several hours a week
5 - more than an hour a day

at school / at CHALCS

1 - never
2 - about an hour a year
3 - about an hour a term
4 - about an hour a month
5 - about an hour a week
6 - several hours a week

Figure 5.1 shows the percentage of university students reporting their previous total schools' experience in using IT in the core National Curriculum subjects.

Figure 5.1 - IT use in Core School Subjects (university students)



As can be seen from this figure, the majority of students who left school in 1994 had not used IT in mathematics, science nor English, even though this was six years after the introduction of the National Curriculum. For those students who had used IT, the use was mostly very infrequent. As one student explained:

> *I came through the school system one year before everyone did IT for every year, so I missed it.*
>
> University female student - aged 18

In the case of the current pupils' access to IT at school, this was very different from the older university students' past experiences. Figure 5.2 shows the spread of IT use across the core subjects which again is much greater than that of the university students' reported school use, but still very infrequent, with only 5% using them as much as an hour a week in any core subject. The greatest school use, as might be expected, was in IT lessons.

In the case of IT use in IT lessons, it is interesting to note that 25% of the female and 30% of the male students said they did not use computers in their IT lessons. This may be because their understanding of the meaning of IT is different from that which was intended in this study.

Figure 5.2 - IT use in core subjects (secondary pupils)

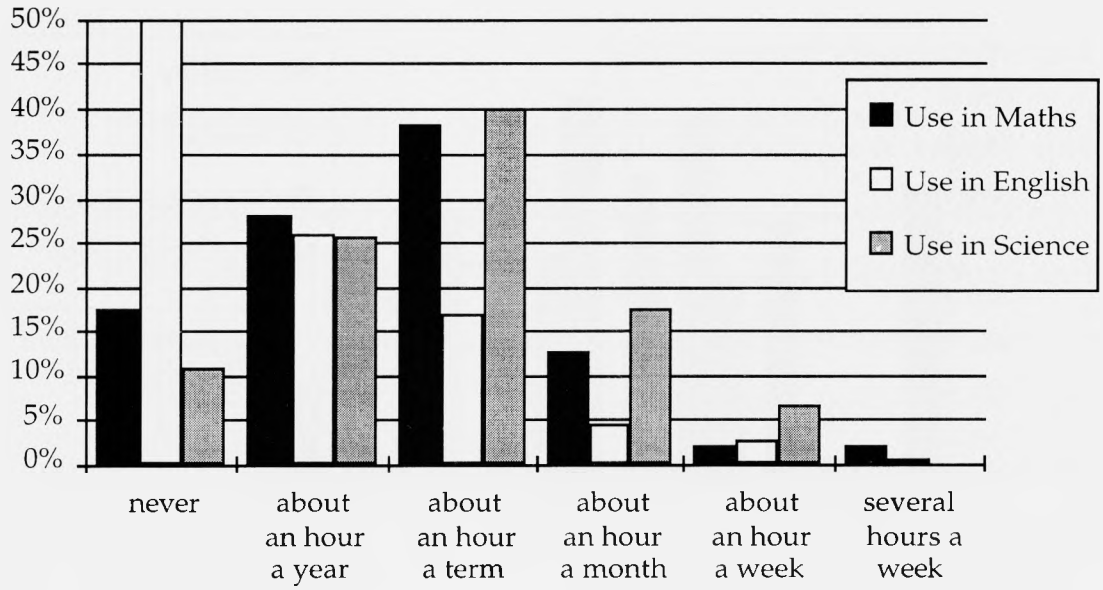


Figure 5.3 shows similar frequency of use for male and female students, with a wide variation in use between students, and 33% of the male students using IT at least an hour a week, compared with only 25% of the female students.

Figure 5.3 - Gender differences: IT use in IT (secondary)

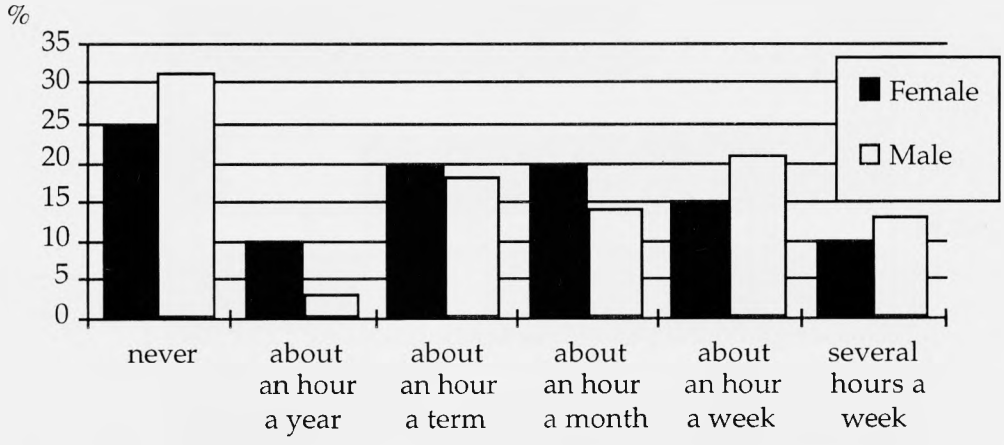
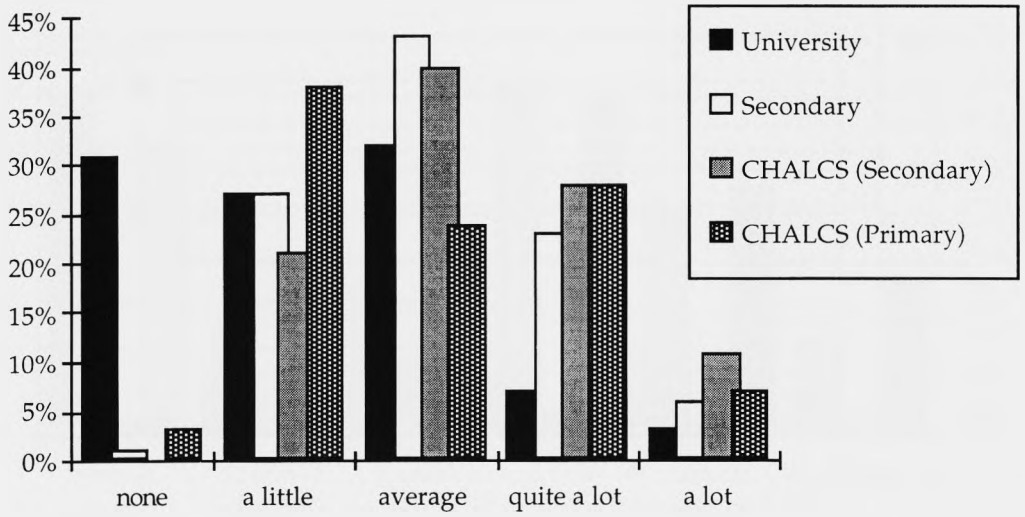


Figure 5.4 shows the opinions of students about their knowledge of computers. As before the university students have the largest proportion who think they know very little about computers compared with the other three cohorts. In this question the CHALCS secondary students include a higher proportion of students perceiving themselves to know a lot or quite a lot about computers compared with the primary students.

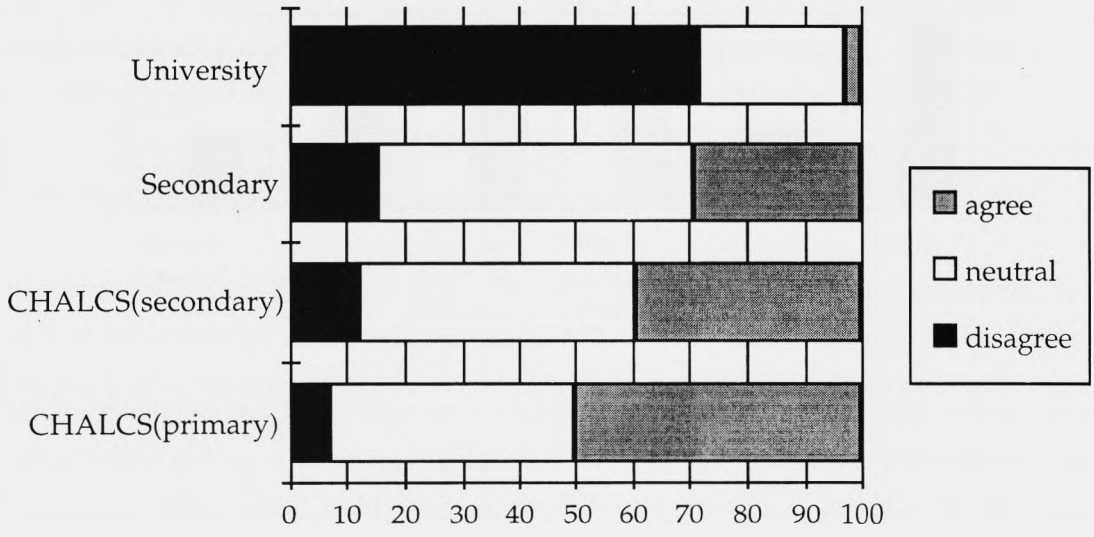
Figure 5.4 - Perceived knowledge of computers



5.2 Motivational aspects of IT use

The following figures show the overall results for different aspects of motivation as perceived by the students and pupils themselves, with typical examples of student comments. Students were asked if they thought that using IT made the subject more important to them. Figure 5.5 shows that 50% of the primary school pupils thought that IT made the subject more important compared with less than 3% of the university students. Since the use of IT amongst university students was minimal when they were at school this result is not surprising.

Figure 5.5 - Using IT makes the subject more important



The individual opinions offered by the students were mainly supportive of the value of IT in their school subjects.

> *If no computer I would probably suffer in my subjects and wouldn't catch on (learn) as quickly.*
>
> CHALCS secondary male student - aged 11

> *If there was no computers I would not be able to do my homework as good.*
>
> CHALCS secondary male student - aged 13

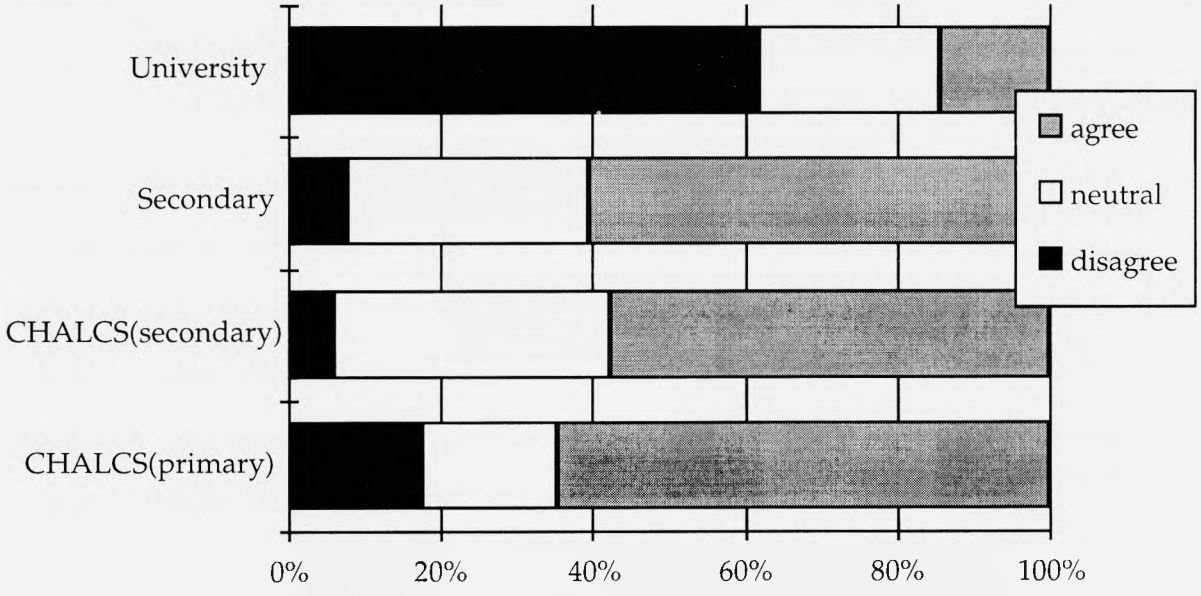
> *If you took computers away I would probably lose out on my education. I would also miss the games you play.*
>
> CHALCS secondary male student - aged 14

> *I think we should use a lot more of computers in our school subjects to make them more interesting and easier to understand.*
>
> Secondary female student - aged 13

> *I use computers very often at home and enjoy learning from computers rather than books. It makes the subject more interesting.*
>
> Secondary male student - aged 14

The students were also asked if they thought that using IT at school helped them understand their subjects better. The responses to this were more positive than for the previous 'importance' aspect, with well over 50% of all the school aged pupils agreeing that using IT helped them understand their subjects better.

Figure 5.6 - Using IT at school helps me understand the subject



Many of the comments supported these results, for example:

> *It tells me more about the subject.*
>
> Secondary male student - aged 14

Last year, I was in a science class (at CHALCS), I learnt a lot better. I think the computers were quite a part of this, especially as we were doing some 6th form work, and I'm in 9th yr.

CHALCS secondary female student - aged 13

If we didn't have computers life would be very difficult because they help a lot with all difficult subjects and make you understand the 'problem' better.

CHALCS secondary female student - aged 13

However, not all students found IT to be beneficial as is also shown in the results:

I would not miss much about the computers apart from the games. I am not really into them. I haven't got time, apart from games.

CHALCS secondary female student - aged 14

I am not very good at using computers, so it makes the lesson more difficult.

Secondary female student - aged 14

I think that using computers is interesting and could be fun if it wasn't for some teachers who ask you what work you want to do on computers and if it is not enough or not important enough they will throw you out. This discourages people from using the computers again.

Secondary male student - aged 14

The questionnaire also gathered opinions about whether or not the IT based subject use at school made the subject more interesting and enjoyable. Figure 5.7 shows the responses for the total secondary cohort (excluding CHALCS), with the majority of students clearly agreeing that using IT made the subject more interesting and useful.

Figure 5.7 shows that more than 75% of the 242 secondary students agreed (or strongly agreed) that using computers made their subjects more interesting, and 60% agreed that it made the subjects more useful. Less than 5% of these students disagreed with this statement.

When I'm older I would like to do a lot on computers now and then. I enjoy being on them.

Secondary female student - aged 14

I think we should use a lot more of computers in our school subjects to make them more interesting and easier to understand.

Secondary female student - aged 13

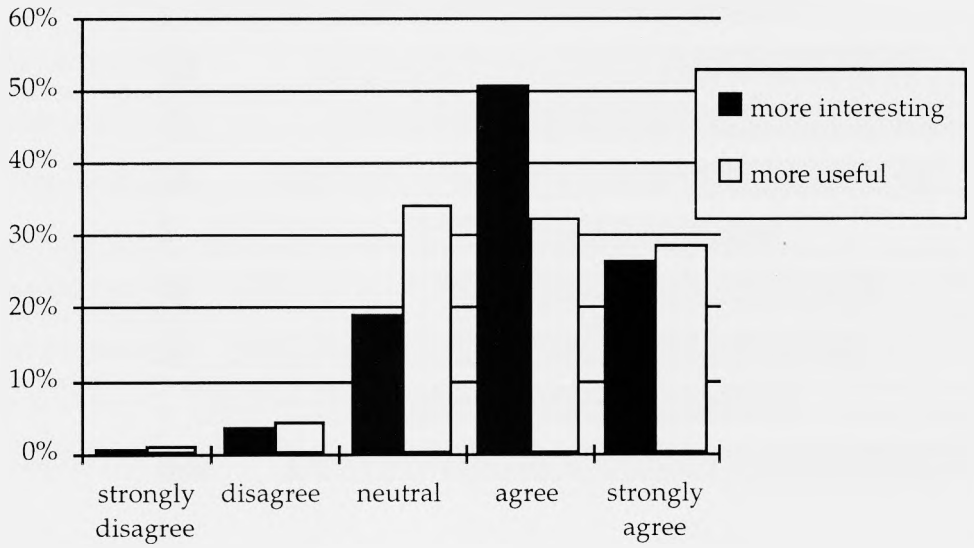
I use computers very often at home and enjoy learning from computers rather than books. It makes the subject more interesting.

Secondary male student - aged 14

Using computers can be very useful and makes the subject a lot more interesting.

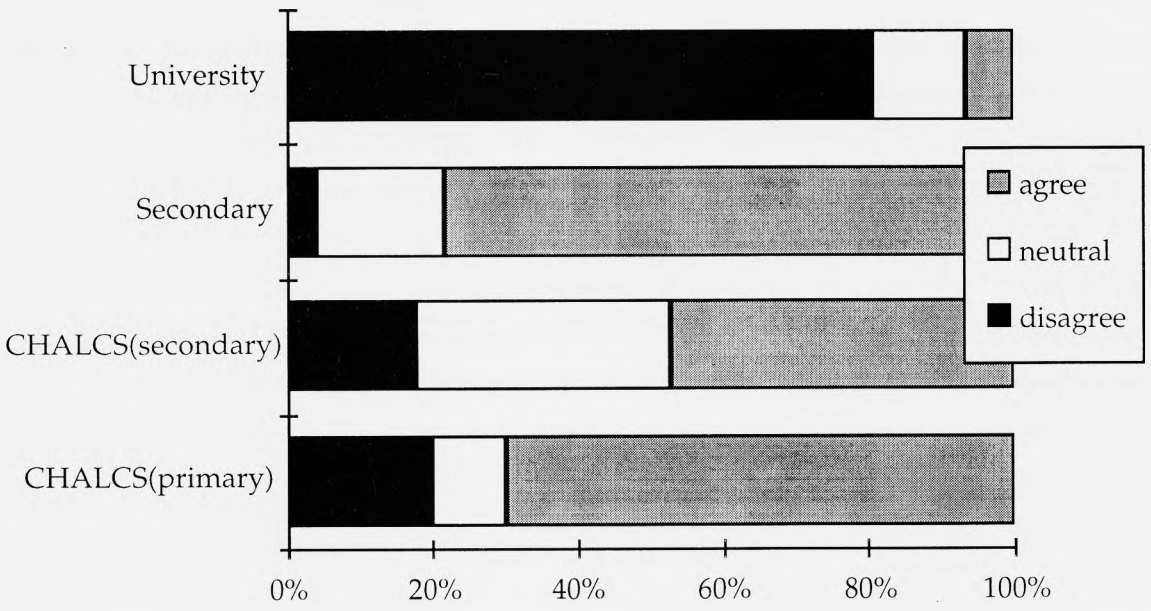
Secondary male student - aged 13

Figure 5.7 - IT made the subject more interesting and useful (secondary)



In order to see if students believed that using IT in school would enhance their long term prospects, students were also asked if they thought using IT would help them get a job. Apart from the university students, the majority of the total secondary cohort agreed that using IT would help them get a job as is shown below in Figure 5.8

Figure 5.8 - Using IT at school will help me get a job



Some of the reasons given by the students supporting this belief were

> *I think computers are a very useful way of learning and increasing knowledge. Computers help you get to college then a job. Maybe owning your own business will be a result of knowing how to use computers.*
>
> CHALCS secondary male student - aged 14

> *I think the IT computers will be very useful in the future for me because computers are coming in the world more and more and by the time I am grown up and looking for a job, people who know about computers will have a better chance of getting a certain job.*
>
> Secondary female student - aged 14

> *Computers have played an every day part in our lives. It would be very difficult to manage without them. We have grown to take these wonderful machines for granted. Computers help with many things like printing out letters. They generally tidy up your work. They are much easier to use than typewriters because if you make one mistake then you can just press delete. But with type writers you have to remove the paper and then tip-pex it out.*
>
> Secondary male student - aged 14

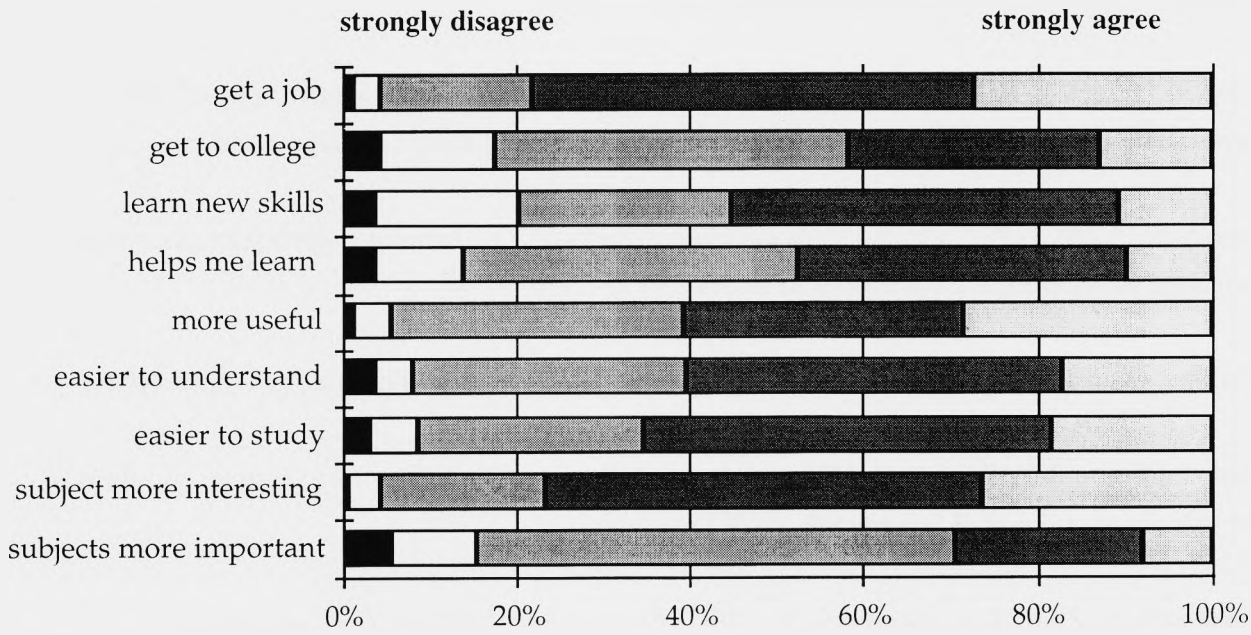
It is clear from the above comments and Figure 5.8 that the majority of the school students in the sample believed that using IT is very important for their future prospects and that its use will enhance their abilities towards long term goals, such as getting a job and going to college. Research into the psychological aspects of motivation indicates that if students perceive an enhancement in their long term achievement prospects they are more likely to engage in a higher quality of involvement in their learning. The committed continuous attendance of more than 110 students at the CHALCS centre also supports the evidence presented here.

6 Conclusions

Although the questionnaire used to gather opinions from the 442 students was limited to a few questions relating to the contributions IT made to their education and future prospects, the overall response of the school students shown in Figure 6.1 shows that there is much greater agreement than disagreement for most contributions claimed about IT, particularly making the subject more interesting and leading to getting a job, two strong indicators of motivation.

Although the project only gathered opinions from the students and did not include any investigation into the resultant behaviour, other research has shown that there is a positive correlation between students' positive attitudes towards IT and consequent motivational behaviour, therefore it is reasonable to conclude that positive responses to many of the questions is evidence of positive motivation.

Figure 6.1 - using IT in schools



Findings in this study have shown that regular use of IT across different curriculum subjects can have a beneficial motivational influence on student learning. It is now up to the teachers to provide sufficient and appropriate regular use of IT in education to ensure that this will happen for all students.

References

Caldwell, J.H, Huitt, W.G. & Graeber, A (1982) *Time spent on learning, implications from research.* Elementary School Journal Vol. 82 (5) 471-480

Cox, M.J. (1997) *The Effects of Information Technology on Students' Motivation - Final Report* The National Council for Educational Technology and King's College London.

Johnstone, V. M. (1987) *Attitudes towards microcomputers in learning: pupils for software for language development.* Educational Research 29 (1) 47-55

National Council for Educational Technology (1994a) *Information Technology Works.* NCET

National Council for Educational Technology (1994b) *Integrated Learning Systems. A report of the pilot evaluation of ILS in the UK. NCET*

Sakamoto, T, Zhao, L.J, Sakamoto, A. (1993) *Psychological IMPACT of computers on children.* The ITEC Project: Information Technology in Education of children. Final Report of Phase 1. United Nations Educational Scientific and Cultural Organisation.

Stradling, B, Sims, D, & Jamison, J (National Foundation for Educational Research) (1994) *Portable Computers Pilot Evaluation Report.* National Council for Educational Technology.

Watson, D.M. (Ed.) (1993) *IMPACT - An evaluation of the IMPACT of the Information Technology on Children's Achievements in Primary and Secondary Schools.* King's College London