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# 1. Introduction

## 1.1 Background

The Engineering Technology Board (etb) is a national partnership between business, industry, the engineering profession and education that aims to promote science, engineering and technology. A priority for etb in 2005 is the development of a wide range of science, engineering and technology (SET) careers information, including the establishment of an authoritative SET Careers 'portal' for the 11 to 19 age group.

In preparation for the development of the careers portal, etb commissioned a scoping study of the current research portfolio on careers (Pollard *et al.*, 2003). The study found that, while there is extensive policy support for SET, other factors seem to work against their promotion in schools.

Furthermore, the study discussed early experiences of science in schools, noting that these could be off-putting, especially when the subject was not taught by specialists. There was also widespread concern that the nature of the current mathematics and science curricula (in England) may not be appealing, and it was suggested that curricula should be linked more to everyday debates and technologies and based less on abstract theories. Students took account of their previous experience in making option choices and there was widespread concern that they were rejecting science because of their negative attitudes toward the subject. (Pollard *et al.*, 2003; Wikely and Stables, 1999).

Changes in the way that independent careers advice has been delivered in schools were also thought to be contributing to the decline in uptake of the sciences. The Connexions service tends to put most emphasis on young people who are in danger of becoming socially excluded, and has less time for advising mainstream students, who are potentially the main SET students. In addition, gender studies have concluded that girls tended to view SET as an area that is not appropriate for them. They tend to choose careers requiring interpersonal skills, and are deterred by the view that SET subjects and careers are less involved with people and relationships. (Colley and Comber, 2003; Pollard *et al.*, 2003).

The study concluded that early careers intervention and a more ‘joined up’ approach to guidance is required to ensure that SET is not rejected by students before they have had time to fully appreciate the implications for future career choices.

### **Aims of the research**

The etb’s scoping study highlighted a number of gaps in the research evidence. In addition, much of the previous research that was relevant to the topic failed to provide high enough levels of statistical significance. It was therefore proposed to carry out research that consolidated the existing research portfolio within a statistically significant framework.

The aim of the research was to determine how Year 9 students (and indirectly their adult influencers) could be better supported with advice and background information (role models etc.) relating to career opportunities in the SET sector. In commissioning the project, etb aimed to provide statistically significant research findings relating to:

- the subject choices of Year 9 students, especially their attitude towards science and the arts
- their perceptions of the effects that their subject choice could have on future career flexibility
- whether Year 9 students actively seek career information or access it indirectly and their sources of such information
- what type of medium Year 9 students best respond to, or engage with
- what are the most visited SET-related websites for this age group.

The project also sought to determine the relative impact of three key variables, namely gender, level of attainment and social background. It would aim to provide statistically significant research evidence capable of informing the content development process of the etb SET careers portal.

## **Methodology**

In order to achieve the aims of the study and to ensure that the findings were statistically robust, a survey of Year 9 students was proposed. An important further requirement of the survey was that it should be possible to analyse the student data across the three key variables: gender, level of attainment and social background.

NFER statisticians calculated that an achieved sample of 1,000 students would be required to provide statistically robust data, given the number of variables specified for the analysis. The breadth of sample required for robust statistical analysis was to be ensured by surveying only one tutor group in each of 40/50 schools. The choice of tutor group, rather than subject classes, would also help to ensure that the students sampled would represent all abilities.

A sample of schools was drawn and they were contacted to ask if they would participate in the survey. Fifty-three schools agreed to participate and were sent packs of questionnaires. Returns were received by the due date from 42 schools, a return rate of 66 per cent, which provided an achieved sample of 1011 student questionnaires. Subsequently, returns were received from a further four schools but these were unfortunately received too late for inclusion in the sample. Those schools that returned questionnaires were compared with the NFER Register of Schools and the sample was found to be representative (see Appendix 1).

On return, the data from the questionnaires was keyed and verified by NFER's Data Entry Department and verified through SNAP software to ensure the highest possible level of accuracy. The data was then cleaned by the Database Production Group, before being sent to Statistics Research and Analysis Group for analysis. In order to answer the questions set by etb, the NFER statistician assigned to the project developed a regression model capable of establishing any differences in responses relating to student-level factors, including gender, level of attainment and social background.

## **1.2 Report structure**

The structure of the report is as follows:

Chapter 2 reports on the analysis of students' attitudes towards key subjects in mathematics, science and the arts, including the outcomes analysed by gender, attainment and social background.

In Chapter 3, students' responses to questions about careers in science, engineering and technology are analysed and reported.

Chapter 4 considers the key influences on Year 9 subject choices, as reported by the students. This chapter looks at the effects of career advice and guidance provided by the school and others and at students' estimate of the influence and value of websites in finding out about career options.

Finally, Chapter 5 provides a summary of the main points from the preceding chapters and comments on the way forward in light of the survey's findings.

## **2. Students' attitudes towards key subjects in mathematics, science and the arts**

One of the aims of the research was to investigate the subject choices of Year 9 students, especially their attitudes towards science and the arts, in order to discover whether Year 9 students have a greater preference for either the arts or the sciences. It is acknowledged that reforms to the subject choice process no longer allow students to drop key subjects such as science, unless there are exceptional circumstances. However, students' attitudes towards a subject may influence not only their performance but whether or not they continue to study it beyond Year 11; ultimately they would be unlikely to seek careers in which a disliked subject was a key component.

### **2.1 GCSE subjects and options**

The student questionnaire was sent to schools during the spring term of 2005, for completion before the end of term. While the majority of schools sampled had completed their option choice process by this time, about a tenth of the students had not yet finalised their options for the following year and were unable to answer fully questions about the choices they had made.

Students were asked how many GCSE courses they would be taking in the following year. All but 123 of the students were able to answer this question, giving numbers ranging between 'none' and 17 with the majority saying they would take between eight and ten subjects; the mean was 9.14. They were then asked how many subjects they were allowed to choose for themselves and all but 133 students responded, quoting numbers between zero and 14, the mean being 3.77. It is apparent that some of the responses to this question were unrealistic, but these replies were given by a small number of students.

## 2.2 Students' attitudes towards the arts, mathematics, science and ICT

Students were asked about their attitudes towards four main subject areas; the arts, mathematics, science and information technology (ICT). Since the main focus of the study was to discover students' views on science, engineering and technology, it was considered appropriate to use only one subject area (English) to represent arts subjects. Table 2.1 shows students' responses to a question asking how they felt about having to study English, mathematics, science and ICT.

**Table 2.1 How students feel about having to study key subjects**

	<b>Really want to study this</b>	<b>Not keen, but it's important</b>	<b>Can't see any point in studying this</b>	<b>No valid response</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
English	37	57	4	1
Mathematics	36	58	4	2
Science	37	53	8	2
ICT	42	33	23	2

**N = 1011**

*A series of single-response items*

*Due to rounding, percentages may not sum to 100 across the rows*

It is interesting to note that, on the whole, the students seemed to view English, mathematics and science as having equal merit. More than one third of the students expressed a keen desire to study these subjects and over half said they were not so keen but realised their importance. Far fewer students appeared to view ICT as having the same level of importance as the other subjects, although marginally more expressed a keen desire to study it.

## 2.3 Students' views about science, mathematics and English

Students were given a series of statements about science, mathematics and English and asked to say how much they agreed or disagreed with them; the results are shown in the following tables. Responses are discussed only where the replies indicate significant differences in students' feelings about one subject or another. It should also be noted that up to a quarter of students said they did not know or failed to provide responses to some of these statements.

**Table 2.2** Extent students agree with statements about science

	<b>Strongly agree</b> %	<b>Agree</b> %	<b>Disagree</b> %	<b>Strongly disagree</b> %	<b>No valid response</b> %	<b>Don't know</b> %
An easy subject	5	24	42	6	2	20
Mainly for girls	<1	2	33	53	3	9
Mainly for boys	2	3	32	51	3	10
Enjoyable	10	40	17	8	3	22
Important for adult life	18	46	7	2	2	26
Interesting	19	48	12	4	3	15
Challenging	23	56	4	2	3	13
Necessary for a good job	22	33	11	2	3	29

**N = 1011***A series of single-response items**Due to rounding, percentages may not sum to 100 across the rows*

Science appears to be viewed as the most difficult of the three subject areas (Table 2.2); 29 per cent of the students agreed or strongly agreed that it is an easy subject, compared with 39 per cent who reported that mathematics was easy (Table 2.3) and 42 per cent who said the same of English (Table 2.4). Science was considered more enjoyable and more interesting than mathematics, and more interesting than English. On the other hand, it was considered less important than the other subjects for adult life.

In response to the statement that science was mainly for boys, nearly a third of students disagreed and half strongly disagreed. A statement that science was mainly for girls received very similar responses. This could suggest that the stereotypical view of science as a boys' subject is no longer current; however, girls were still less likely to say they really wanted to study science and thereby indicate a real liking for it (see Section 2.4).

**Table 2.3** Extent students agree with statements about mathematics

	<b>Strongly agree</b> %	<b>Agree</b> %	<b>Disagree</b> %	<b>Strongly disagree</b> %	<b>No response</b> %	<b>Not known</b> %
An easy subject	8	31	35	8	3	16
Mainly for girls	<1	2	33	50	3	12
Mainly for boys	1	2	33	49	3	12
Enjoyable	9	32	28	9	3	21
Important for adult life	43	41	3	1	2	10
Interesting	10	32	25	7	3	24
Challenging	27	55	4	2	3	11
Necessary for a good job	44	39	3	1	2	11

**N = 1011***A series of single-response items**Due to rounding, percentages may not sum to 100 across the rows*

More than three-quarters of the students agreed or strongly agreed that science and mathematics were challenging, while two-thirds said the same for English. This could suggest that English was regarded as the easiest of the three subjects, although the number saying that mathematics was an easy subject (39 per cent) was almost as high as for English (42 per cent).

**Table 2.4** Extent students agree with statements about English

	<b>Strongly agree</b> %	<b>Agree</b> %	<b>Disagree</b> %	<b>Strongly disagree</b> %	<b>No response</b> %	<b>Don't know</b> %
An easy subject	10	32	30	5	3	20
Mainly for girls	1	3	31	50	3	13
Mainly for boys	1	2	31	51	3	13
Enjoyable	12	40	20	6	3	20
Important for adult life	39	44	3	2	2	11
Interesting	15	40	18	5	3	21
Challenging	18	50	9	2	3	19
Necessary for a good job	44	40	2	1	2	11

**N = 1011***A series of single-response items**Due to rounding, percentages may not sum to 100 across the rows*

## **2.4 Further analysis of students' attitudes towards the arts, mathematics, science and ICT**

Students' attitudes towards English, mathematics, science and ICT were further investigated through the analysis of the student data by three main variables, their gender, level of ability and social economic status. While it was possible to ask students about gender, the other two variables were investigated using questions that have a good track record of functioning as proxy measures. These were:

- students' assessment of the number of GCSE grades A\*-C they expected to obtain (a proxy for level of attainment)
- students' assessment of the age at which they would leave full-time education (another proxy for level of attainment)
- number of books in the home (a proxy for socio-economic status).

However, not all of the analyses showed significant attitude differences between the identified student groups. It should also be noted that a proportion of students did not provide the information required to carry out this further analysis:

- 20 per cent of students did not give an estimate of the number of GCSE grades A\* - C they were likely to achieve
- eight per cent of students did not provide an estimate of the age at which they were likely to leave full-time education
- seven per cent of students did not answer the question about the number of books they had in their home.

### **2.4.1 Gender differences in attitudes towards the key subjects**

When the responses were analysed by gender (Table 2.5), no significant differences were apparent between boys and girls in their attitude towards English, although a larger proportion of the girls said they really wanted to study it. However, there were significant differences in responses to the other three key subjects (mathematics, science and ICT). More boys than girls demonstrated a real interest in studying these subjects, whereas girls were more likely to have an instrumental view of the subjects, indicating that they would study them because of their importance in life beyond school. As noted earlier, this is despite the fact that the majority of students denied that these subjects were more appropriate for either boys or girls.

**Table 2.5 Gender differences in students' attitudes towards the study of key subjects**

	Really want to study this		Not keen, but it's important		Can't see any point in studying this		No valid response	
	Male %	Female %	Male %	Female %	Male %	Female %	Male %	Female %
English	33	40	60	55	5	3	1	1
Mathematics	42	32	54	62	3	5	1	1
Science	44	31	48	59	7	8	2	1
ICT	50	31	31	38	17	29	2	3

**N = 965**

*A series of single-response items*

*46 students did not say whether they were male or female and their responses could not be included in this table*

#### **2.4.2 Higher and lower attainment and attitudes towards the study of key subjects**

Students' attitudes towards key subjects by expected level of attainment was probed in two ways:

- by looking at the attitude questions in light of the number of GCSE A\*-C grades that students thought they were likely to achieve. Students expecting to achieve five or more GCSE grades A\*-C have been designated 'higher achievers' and the remainder 'lower achievers' (Table 2.6). It should therefore be noted that the 'higher achievers' group includes students who may not necessarily aspire to, or achieve, three good A-levels.
- attitude questions were analysed by responses to a request for self-report information on students' expected age of completing formal education, indicating the interest the students were showing on staying on in education post-16 (Table 2.7).

#### **GCSE grades**

Using the first of these measures of attainment, Table 2.6 shows that a larger proportion of higher achievers (41 per cent) than lower achievers (29 per cent) claimed that they really wanted to study English. However, almost two-thirds of lower achievers (64 per cent) realised its importance. Similar results were found for both mathematics and for science, with a larger proportion of those anticipating achieving higher GCSE grades reporting a real desire to study these subjects than students expecting poorer GCSE results. However, the results for ICT show no significant difference in responses from the students when grouped by estimated GCSE grades.

**Table 2.6** Students' attitudes to key subjects by likely GCSE grade

Number of GCSE grades A*-C	Really want to study this		Not keen, but it's important		Can't see any point in studying this		No valid response	
	Under 5	5+	Under 5	5+	Under 5	5+	Under 5	5+
	%	%	%	%	%	%	%	%
English	29	41	64	55	7	3	<1	1
Mathematics	28	41	66	55	4	3	2	<1
Science	27	44	60	50	10	6	3	<1
ICT	38	40	34	35	26	23	2	2
<b>N = 805</b>								

*A series of single-response items*

*206 students did not say how many GCSEs they expected to achieve and their responses could not be included in this table*

### Proposed age for leaving full-time education

As mentioned above, analysing the attitude questions by students' proposed age for leaving full-time education provided another proxy measure for level of attainment. The results indicated that, as with the GCSE grades, those students that intended to stay on in education longer showed increasing desire to study the key subjects. For example, Table 2.7 shows that proportions of students that said they really wanted to study English increases with the leaving age for full-time education.

**Table 2.7** Students' attitudes to English by proposed age for leaving full-time education

	End of Year 11 %	Age 18 %	Early 20s %	Not sure %	Not known %
Really want to study	23	27	48	31	39
Not keen, but it's important	63	70	49	63	51
Can't see point in studying	10	4	3	4	4
No valid response	3	0	<1	1	6
<b>N =</b>	<b>117</b>	<b>138</b>	<b>413</b>	<b>264</b>	<b>79</b>

*A series of single-response items*

*Due to rounding, percentages may not sum to 100 in each column*

Analysis of students’ attitudes to mathematics and science by the age they proposed to leave full-time education produced similar significant results. However, there were no significant differences in the results for attitudes to ICT.

### 2.4.3 Socio-economic status and attitudes towards the study of key subjects

When students’ attitudes towards the four key subjects were analysed by the proxy measure for socio-economic status, three out of four of the subject areas (English, mathematics and science) showed similar results. The proportion of students indicating an interest in studying the subjects increased as socio-economic status increased (Tables 2.8, 2.9, 2.10).

Only a quarter of students who had few or no books in their homes said they really wanted to study English; however, nearly two-thirds responded that, while not keen on the subject, they recognised its importance (Table 2.8). Ten per cent of students who reported having no books in the home stated that they could see no point in studying English.

**Table 2.8 Students’ attitudes to English by socio-economic status**

	Number of books in the home						Not known
	None	Very few	One shelf	One bookcase	Two bookcases	Three bookcases	
Really want to study	22	27	38	33	39	47	43
Not keen, but it’s important	63	65	57	62	57	49	47
Can’t see point in studying	10	6	4	5	4	3	3
No valid response	5	2	1	1	0	1	7
<b>N =</b>	<b>41</b>	<b>144</b>	<b>220</b>	<b>192</b>	<b>150</b>	<b>196</b>	<b>68</b>

*A series of single-response items*

*Due to rounding, percentages may not sum to 100 in each column*

Results for students’ attitudes to mathematics analysed by socio-economic status follow the same pattern as that for English studies. However, it is interesting to note that the proportion of students reporting that they could not see the point of studying mathematics was highest in the top and bottom socio-economic categories (Table 2.9).

**Table 2.9** Students' attitudes to mathematics by socio-economic status

	Number of books in the home						
	None	Very few	One shelf	One bookcase	Two bookcases	Three bookcases	Not known
Really want to study	29	33	39	35	33	43	31
Not keen, but it's important	59	60	56	63	67	49	57
Can't see point in studying	10	3	4	2	1	7	3
No valid response	2	3	2	1	0	0	9
<b>N =</b>	<b>41</b>	<b>144</b>	<b>220</b>	<b>192</b>	<b>150</b>	<b>196</b>	<b>68</b>

*A series of single-response items*

*Due to rounding, percentages may not sum to 100 in each column*

The results for science broadly fit with the pattern for English and mathematics. However, a slightly larger proportion of students reported that they saw no point in studying science (Table 2.10).

**Table 2.10** Students' attitudes to studying science by socio-economic status

	Number of books in the home						
	None	Very few	One shelf	One bookcase	Two bookcases	Three bookcases	Not known
Really want to study	29	26	36	41	42	44	28
Not keen, but it's important	54	58	57	53	54	47	50
Can't see point in studying	15	12	6	6	3	8	12
No valid response	2	5	1	1	1	1	10
<b>N =</b>	<b>41</b>	<b>144</b>	<b>220</b>	<b>192</b>	<b>150</b>	<b>196</b>	<b>68</b>

*A series of single-response items*

As with the other variables examined, further analysis of the questions about students' attitudes towards ICT showed no significant differences when analysed by the proxy for socio-economic status.

### 3. Students' interest in careers in science, engineering and technology

Students were asked whether they would be interested in a career in science, technology or engineering and just over two-thirds (68 per cent) showed interest in at least one of these. They were then given ten statements about conditions that workers might encounter in the workplace (e.g. 'work with oils or chemicals', 'design things') and asked to tick them if they thought a person working in science, engineering or technology might encounter them (Table 3.1).

**Table 3.1 Work people do in science, engineering and technology**

	<b>Do this in science</b>	<b>Do this in engineering</b>	<b>Do this in technology</b>
Work with oils or chemicals	81	58	12
Design things	11	37	91
Work in a laboratory	93	8	13
Develop new ideas	44	49	77
Work with machinery	23	89	50
Work in an office	30	23	53
Discover new facts	89	24	30
Help to save lives	81	22	27
Work in a factory	11	75	46
Work in an interesting environment	69	46	47
No valid response	3	4	4
<b>N =</b>			

*A series of multiple-response items*

The students' responses gave interesting insight into the work environment they envisaged for people in SET careers and also revealed that they did not fully appreciate the range of activities that these careers were capable of offering. For example, few envisaged engineers in roles as designers and thought of them more as factory workers.

More than four-fifths of the students appeared to think that people working in science would work with oils and chemicals, would work in a laboratory,

would discover new facts and help to save lives. Two-thirds imagined that scientists would work in an interesting environment.

Students tended to view work in engineering as factory-based and working with machinery. More than half the students thought engineering work involved working with oils and chemicals, while just under half thought it included developing new ideas and working in an interesting environment. Only just over a third thought that engineering work included designing things.

In contrast, the majority of students viewed work in technology as involving design, while more than three-quarters thought it would involve developing new ideas. Half of the students reported that the work would be office-based and would involve working with machinery, while just under half thought the work would be factory-based and would be in an interesting environment.

### **Students' reports of the kinds of things they wanted to do in their careers**

Students were asked about the types of conditions they would prefer when they went into a job or career (see Table 3.2).

### 3.2 How much do you agree/disagree with the following statements?

	<b>Strongly agree</b> %	<b>Agree</b> %	<b>Disagree</b> %	<b>Strongly disagree</b> %	<b>Don't know</b> %	<b>No valid response</b> %
<b>I want to:</b>						
Work with my hands	20	37	9	3	27	5
Have a professional job (e.g. lawyer, teacher, doctor)	32	30	10	3	21	5
Deal with lots of paperwork	3	12	34	19	28	4
Use mathematics/calculate things	9	28	22	10	27	5
Care for people	18	31	16	5	26	4
Measure and record information	8	24	24	7	33	5
Solve problems	13	35	16	4	27	5
Use my communication skills	22	45	5	2	21	5
Work with machinery	10	23	26	12	25	5
Design buildings/ bridges/cars etc.	11	19	27	19	20	5
Be responsible for other people	14	28	18	7	29	5
Make decisions	22	47	4	2	20	6
Sell things to people	7	18	26	13	28	7
Care for sick people	11	19	20	16	30	5
<b>N = 1011</b>						

*A series of single-response items*

*Due to rounding, percentages may not sum to 100 across the rows*

Two-thirds of the students said they wanted work that gave them the opportunity to make decisions and allowed them to use their communication skills. Very few disagreed with either statement. More than half said they wanted to have professional work and to work with their hands. These responses indicate work at consultant or management level which could be consistent with many careers in science, engineering and technology. In particular, students' interest in working with their hands could indicate scientific occupations.

Only 15 per cent of the students said they wanted to deal with lots of paperwork, just 25 per cent were attracted to work involving selling things to

people and 30 per cent wanted to care for sick people. However, these activities are unlikely to relate to jobs in science, engineering and technology.

The other activities that students showed little enthusiasm for may be more worrying. Only 30 per cent wanted to be involved in designing buildings, bridges or cars, while just 32 per cent wanted to measure and record information and only 33 per cent wanted to work with machinery. These last three types of activity are more likely to be required in work in science, engineering and technology.

Students' responses to the items in Table 3.2 were subject to factor analysis (see Appendix 2 for details). Comparing students' responses to individual items suggested that three main types of occupation could be identified: caring work, practical work and office work. For example, the statements (from Table 3.2) that identified an interest in caring work included 'care for people', 'be responsible for other people' and 'care for sick people', whereas office work included 'have a professional job', 'deal with lots of paperwork', 'use mathematics/calculate things' and 'use my communication skills'.

Student rating on these factors, together with the background information collected (see Chapter 2) were used to identify profiles of the types of respondents most likely to seek careers in SET. The analysis was undertaken by logistic regression, a statistical method which can derive models that explain the degree of relationship between individual questionnaire responses (see Appendix 3 for details). As noted at the beginning of Chapter 3, 68 per cent of students said they were interested in careers in at least one area of SET. Fifty-eight students ticked all three SET areas on the questionnaire, while 471 ticked one box and 163 students ticked two boxes. Forty-one per cent of all students expressed interest in a career in technology, which was more popular than science or engineering (both 28 per cent).

Students who ticked all three boxes, indicating a general interest in careers in SET, tended to be boys who intended to stay on in education to HE level and to be attracted to work that was practical and that could be carried out in an office environment.

Similar analyses were undertaken for those students who had expressed interest in each specific area of SET. The profile derived for all students who had indicated an interest in a career in science was as follows:

- higher achievers (those who identified themselves as likely to achieve five or more GCSE grades A\*-C)
- from the upper end of the socio-economic scale (three or more bookcases in the home)
- committed to staying on in HE
- attracted to working in an office
- attracted to careers that involved caring for others.

Students interested in a career in technology tended to be interested in work that was practical. Technology was less attractive to girls, to students that had no books in the home, and to those that wanted to leave school at 16.

The profile of students interested in careers in engineering showed that they were:

- boys
- higher achievers
- at the lower end of the socio-economic scale (very few books in the home)
- attracted to practical work
- not attracted to work that involved caring for others.

These models provide an interesting picture of the types of students who showed an interest in careers in SET in Year 9. However, two major notes of caution must be advised:

- these students may still have up to seven years of full-time education to complete before entering a career
- students of this age have limited knowledge about careers. As noted earlier, some of their responses to questions about work activities indicated a lack of knowledge about what some jobs really entail.

## 4. Key influences on Year 9 subject choice

This chapter reports on the key influences on Year 9 students when they are choosing their optional GCSE subjects. It considers the effects of subject choice on future career options, the reasons for young people's choices, information sources consulted and their perceptions of the usefulness of such sources. It also examines the internet and websites as sources of information in more detail.

Research has indicated that young people are influenced in Year 9 when making options decisions by many factors, for example, parental influence, teacher input, subject enjoyment and the perceived usefulness of a subject to a future job or career (Wikely and Stables, 1999; Adey and Biddulph, 2001). In addition Moon *et al.* (2004) found in their Eppi-review that specific careers and education guidance (CEG) did have an impact on career knowledge and subject choice, but that parental support, alongside socio-background and gender, was important to the success of those interventions. CEG was also perceived to be important by Clemens *et al.* (2003) in their customer satisfaction survey with Connexions, and embedding CEG into the ethos of the whole school was perceived to benefit all young people according to Morris *et al.* (1999).

Below we discuss the findings from the questionnaires.

### 4.1 Perceptions of the effects of subject choice on future career options

The Year 9 students were asked about the level of importance they attributed to their subject choices (Table 4.1). Over half of the students said that it was very important that they made the right choice now and a further third said it was important. Only two per cent of the students thought that it was not important.

**Table 4.1** Students' estimates of the importance of making the right subject choices in Year 9

	%
Very important	59
Important	33
Don't know	4
Not important	2
No valid response	2
<b>N = 1011</b>	

More than three-quarters (79 per cent) of the students surveyed claimed that they already had an interest in working in a specific job or career area and more than two-thirds (72 per cent) of those reported that their option choices were suitable for their area of work interest. However, the students' responses to a series of statements about key elements of occupations indicated some gaps in their knowledge, or misapprehensions, about some careers (see Chapter 3).

A fifth of the students (22 per cent) reported that they were unaware of the suitability of the option choices they had made for the career or work areas they had in mind. Students were almost equally divided in their opinions about whether their chosen options could limit the range of jobs or careers they could do in the future.

## 4.2 Reasons for choice

Students reported that the main reasons for choosing their optional courses were that they were interested in the subject or enjoyed the subject, that they needed the subject for a future job or career or that they perceived themselves to be good at a subject (as can be seen in Table 4.2 below). These three reasons were each given by more than three-quarters of the students, while no other reason was given by more than 35 per cent. This may reflect the guidance given to students in Year 9 by school staff, and although the young people may just be repeating that advice, this may be an indication of where the key motivation lies when making their option decisions.

**Table 4.2** Reasons for choosing optional courses

	%
Interest in subject or enjoy subject	91
Need subject for future career/job/training	87
Good at subject	79
Parents advised me to do subject	35
Teachers advised me to do subject	28
Other family members or friends advised me to do subject	20
Like the teacher	15
Subject doesn't require a lot of coursework	11
Couldn't think of anything better to do	11
Friends are doing the subject	10
Heard subject is easy	9
Only subject on offer/no real choice	9
No response	1
<b>N = 1011</b>	

*More than one answer could be give to this question*

Further analysis reveals that those students with more than 200 books in their home were more motivated by enjoyment or interest in a subject (97 per cent) as were those who intended to continue to HE (95 per cent). By contrast those with no books in the home, although giving the same main reasons for option choices as their peers, were less driven by enjoyment and interest (78 per cent) as were those who planned to leave education at a younger age (87 per cent).

More of those students who intended to continue on to HE believed that they needed their optional subjects for future careers, jobs or training (93 per cent) than those who intend to leave education after Year 11 (79 per cent). Similarly more of those young people who believed they would continue on to HE chose their optional subjects because they believed they were good at the subjects (88 per cent) than those who anticipated leaving education at 16 years old (56 per cent). Also greater numbers of those with more than 200 books in the home (89 per cent) chose a subject because they felt they were good at it than those with no books in the home (68 per cent).

The above analysis would appear to indicate that students of higher ability and socio-economic class or those who planned to continue on to HE were more motivated by an interest or enjoyment in a subject, by the necessity to have the subject for a future career or job or by a belief in their ability at a subject than were their counterparts.

As has been shown, young people intending to leave school at 16 years old were less likely to give the reasons discussed above; they were also more inclined to choose their optional GCSEs for less positive reasons, as Table 4.3 shows:

**Table 4.3 Reasons for choosing optional GCSE courses**

	<b>Students intending to leave school after Year 11 %</b>	<b>Students intending to continue in education until they are over 20 %</b>
Subject doesn't require a lot of coursework	19	7
Heard subject is easy	15	5
No real choice	16	6
Couldn't think of anything better to do	16	7
<b>N =</b>	<b>117</b>	<b>413</b>

*Other negative reasons given were not significantly different by age leaving education*

Girls were more inclined to listen to other family members or friends' advice (23 per cent) than boys (17 per cent), they also valued teachers' advice more highly (girls 30 per cent, boys 24 per cent) and were less inclined to choose a subject because they perceived it to be easy (girls six per cent, boys ten per cent).

A significant number of young people admitted to being influenced by the media. Fifty-six per cent believed the way in which jobs and careers are portrayed in the media had influenced them in their options choice.

### **4.3 Sources of information**

Less than half (44 per cent) of the Year 9 students recalled receiving careers advice from Connexions. The proportion responding positively was higher among those intending to go on to HE (51 per cent) than among those who intended to leave school at the end of Year 11 (37 per cent). This may be due to seeking out more information or having a better recollection of having received advice from Connexions. Those respondents who recalled having received careers advice from Connexions were asked if the advice had

influenced them in their choice of options and half (49 per cent) claimed that it had.

Two-thirds (68 per cent) admitted that they would have liked more information to help them choose their options. Table 4.4 below shows desired further sources of information.

**Table 4.4 Further sources of information**

	%
Someone who works in that job or career	72
School careers teacher	67
Careers website	46
Websites about specific jobs and careers	46
Connexions Personal Advisor	44
Older friends who know about chosen job or career	39
Parent or Guardian	38
Library or learning resources	22
No response	0
<b>N = 690</b>	

*Source:*

*Base: Students who would have liked more information*

*More than one answer could be given to this question*

Nearly three-quarters (72 per cent) wanted information from someone who operates in the field of work that the young person is interested in. This figure was higher amongst girls (77 per cent) than boys (68 per cent); boys, on the other hand, showed themselves more willing than girls to use sources where they could initiate the searching themselves, that is from careers websites (boys 51 per cent, girls 41 per cent) and libraries (boys 25 per cent, girls 19 per cent).

#### **4.4 Usefulness of sources**

Students were asked how useful they had found the sources of information that they had used (see Table 4.5 below).

**Table 4.5 Usefulness of Sources of Information**

	Very useful/useful %	Not very useful/ not at all useful %	Not used %	No valid response %
Subject teachers	72	16	8	5
Adults working in specific jobs and careers	61	9	25	5
Websites	50	19	25	5
Form tutor	49	28	18	4
School careers teacher	45	18	32	6
Books	38	30	27	5
TV programmes	34	32	28	5
Connexions Personal Advisor	30	20	45	5
Magazines/newspapers	27	36	31	6

**N = 1011***A series of single-response items**Due to rounding, percentages may not sum to 100 across the rows*

Students used their subject teachers (88 per cent) and their form tutors (77 per cent) most, possibly because they were most accessible. Three-quarters found their subject teachers useful or very useful whilst one in six found them not very or not at all useful. Half of the students found their form tutors useful or very useful and just over one quarter found them not very or not at all useful. Seventy per cent had consulted an adult in the specific area of employment in which they were interested and the majority (six out of seven) found the information useful, a higher proportion than for any other source of information. Websites were also well used (by 69 per cent of students), and the majority of respondents found them to be useful or very useful.

Interestingly only half of the students remembered consulting a Connexions Personal Advisor,<sup>1</sup> but of those who did recall, three-fifths found them useful or very useful. Connexions Personal Advisors gave advice to more of those who intended to leave school at 16 years old (62 per cent) and a similar proportion (two-thirds) found them useful or very useful. In contrast only 46 per cent of students who intended to continue on to HE used Connexions and slightly more than half found them useful or very useful. This may reflect the fact that Connexions Personal Advisors focus more on young people they may

<sup>1</sup> According to the finding reported in Section 4.3, only 44 per cent had received careers advice from Connexions.

perceive to be in need of advice (those intending to leave education after Year 11).<sup>2</sup>

Three-quarters (77 per cent) of young people who expected to achieve five or more A\*-C grades in their GCSEs found their subject teachers useful or very useful and 47 per cent found their form tutors similarly useful. Those expecting to achieve less than five A\*-C grades were more positive about their form tutors (57 per cent) and less positive about their subject teachers (61 per cent). This would appear to indicate that the more able students turn to their subject teachers, who have specialist knowledge, for advice.

Respondents were also asked whether they found information on optional subjects or information on possible careers and jobs useful. Young people did not differentiate between types of information, rating material on optional subjects (74 per cent) and material on possible jobs and careers (77 per cent) similarly useful. More of the students who intended to continue on to HE found subject (83 per cent) and career (84 per cent) information useful than their peers who intended to leave school at the end of Year 11. Fifty-six per cent of the latter found information on optional subjects useful and 63 per cent valued career and job material.

#### **4.5 Websites visited**

The most visited websites at school, according to the young people, were specific websites recommended by subject teachers and careers websites, whilst at home games and music websites were most popular. Table 4.6 below provides more detail.

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<sup>2</sup> Connexions provides a differentiated service according to the needs of the young people, following policy changes in 1998 which focused the work of careers advisers on young people deemed to be 'most in need' (National Audit Office 2004).

**Table 4.6 Websites Visited**

	At school %	At home %
Specific websites recommended by subject teachers	56	20
Careers websites	51	24
Games websites	39	70
Music websites	31	65
Sports websites	26	41
News/current affairs websites	21	22
Health and beauty websites	11	26
Chat rooms	10	50
No response	14	13
<b>N = 1011</b>		

*More than one answer could be given to this question*

Music and games websites were reported to be the websites most visited at home and this was particularly true for those young people who intended to continue on to HE (71 and 75 per cent respectively). Perhaps not surprisingly, more students who intended to leave school at 16 years old reported visiting chat rooms (15 per cent) and health and beauty websites (18 per cent) at school than their peers who expected to continue on to HE (seven and eight per cent respectively).

More students with no books in the home claimed to visit sports websites (49 per cent) at school than their counterparts (22 per cent), and 42 per cent of students with more than 200 books in the home visited sports websites at home compared with 34 per cent of those with no books at home. This could indicate a more responsible attitude to school from students with lots of books at home; it could also suggest that those without books may not have personal computers at home. Music websites were visited at home by a higher proportion of potential HE students (71 per cent) than those planning to leave school at 16 (56 per cent). This could similarly suggest that high achievers were more likely to have PCs at home, or the ability and interest to access them.

The games websites appeared to appeal more to boys than girls, with 75 per cent of the former visiting them at home, and 49 per cent at school, in contrast to 68 per cent of the girls playing on them at home and 30 per cent at school. Consistent with male/female stereotyping, more girls than boys visited the

health and beauty sites, both at home (41 per cent of girls and 12 per cent of boys) and in school (15 per cent of girls and seven per cent of boys).

Respondents were asked whether they used the Connexions website. Only 14 per cent stated that they used it and over four-fifths (82 per cent) said they did not.

#### 4.6 Preferred website characteristics

Overall the aspects of a website that were considered to be most important by the young people were that it was easy to access, it was interesting, easy to navigate and was fun and useful. The table below gives details.

**Table 4.7 Preferred Website Characteristics**

	Very important %	Quite Important %	Not very Important %	Not at all Important %	No Response %
Easy to access	67	25	2	1	5
Useful	66	23	4	1	5
Interesting	65	27	2	1	5
Easy to navigate	58	32	3	1	6
Fun	57	32	6	1	5
Interactive	47	39	7	1	6
Colourful	47	33	11	4	6
Games	36	29	24	4	6
Popular with friends	34	25	24	10	6
Quizzes	23	28	36	7	6

**N = 1011**

*Due to rounding, percentages may not sum to 100 across the rows*

Further analysis revealed that more of those students with more than 200 books in the home felt it to be very important that a website was easy to access (74 per cent) and was easy to navigate (67 per cent) than those with no books in the home (54 per cent and 44 per cent respectively). Also more of those students who intend to continue on to HE (76 per cent) than those who want to leave school at 18 years old (64 per cent) or leave at 16 (67 per cent) felt it was very important that a website was easy to access. It is suggested that this increased desire to have a website that is easy to access and navigate, amongst young people from the higher socio-economic background and from those

intent on continuing with their education until they are over 20 years old, may reflect their increased knowledge of or expertise with websites.

## 4.7 Communication of sites

Four-fifths of students (81 per cent) revealed that they had heard about their favourite sites from their friends. This figure rose to 85 per cent amongst those who intended to continue on to HE and dropped to 71 per cent for those who anticipated leaving school at 16 years old. Details of how else young people have heard about their favourite sites are listed in Table 4.8 below.

**Table 4.8 How young people heard about favourite sites**

	%
Told about by friends	81
Through search engines	58
Read about in magazines	47
Through hotlinks from other sites	40
Told about by teachers	27
Told about by parents/guardians	22
No response	6
<b>N = 1011</b>	

*More than one answer could be given*

More boys (64 per cent), students with more than 200 books in the home (71 per cent) and students who intended to continue on to HE (69 per cent) learnt about their favourite websites through search engines than girls (55 per cent), those with no books in the home (46 per cent) and those who intended to leave school at 16 years old (42 per cent) did. This pattern was echoed for those who learnt about favourite sites through hotlinks from other sites, apart from the gender divide where no significant difference emerged. These two profiles may indicate that the more able students (and possibly boys) are more comfortable or are more knowledgeable about seeking out sites through search engines and hotlinks.

Approximately three-quarters (73 per cent) told their friends about favourite websites; this figure rose slightly amongst those students who intended to continue on to HE (76 per cent) and dropped to 65 per cent amongst those who expected to leave school at 16 years old.

Two-thirds (65 per cent) of the Year 9 students would like to hear more about websites on careers, jobs or work areas, whilst 30 per cent said they would not like to hear more and five per cent did not respond.

## 5. Key findings and implications

In this chapter we summarise the key findings from the research, and highlight the implications for etb.

### 5.1 Subject choice

With a few exceptions for particular reasons, all students take the key subjects of English, mathematics and science at GCSE. Other subjects may be classified as compulsory by schools, and some subjects can be chosen by the individual student, usually within prescribed limits.

Most but not all of the Year 9 students surveyed had already chosen their optional GCSE subjects. They were asked to give their reasons for option choice, as well as their views of the key subjects. Mathematics and science were regarded as more challenging than English, and science was the least likely to be classified as an easy subject (although it was considered more interesting and enjoyable than mathematics). On the other hand, the number of students who ‘really wanted’ to study English, mathematics and science was about the same (more than a third in each case); the number who really wanted to study ICT was even higher. Among the young people likely to be higher achievers, at least 40 per cent really wanted to study each subject, and science was the most popular, with 44 per cent.

This is encouraging, but on the other hand it should be noted that a certain amount of gender stereotyping persists. Although very few students agreed that science or mathematics was ‘mainly for boys’, both subjects were more popular with boys than girls.

Most students who did not really want to study a subject nevertheless recognised its importance, although science was much less likely than mathematics or English to be considered necessary for a good job. This is perhaps not surprising; young people will be aware of many jobs which do not require scientific knowledge, while mathematics and English are required for a much broader range of occupations.

The vast majority of young people believed that it was important or very important to choose the right optional GCSEs. Their main reasons for their choice were that they enjoyed or were interested in a subject, they believed the subject to be important for a future job or career and they perceived themselves to be good at a subject.

## **5.2 Career plans**

The results from this questionnaire survey revealed the extent of students' consideration and planning of future careers during the Year 9 option choice process. It illustrates that young people were already seriously thinking about jobs and they considered it very important to make the right choice.

Two-thirds of the students, the majority of whom were boys, expressed interest in careers in at least one area of SET. Technology was more popular than science or engineering. Students expressing interest in SET tended to be higher achievers who wanted to stay on in education to HE level and who were attracted to work that was practical but also office-oriented. Those interested in science and technology tended to be from higher socio-economic backgrounds, but this was not true of engineering. This may reflect students' understanding, or lack of understanding, about SET careers. A large majority saw engineering in terms of working with machinery in a factory, and only just over a third realised that it involved designing things. Science attracted young people who were interested in careers which involved caring for people; this may reflect the fact that over 80 per cent saw scientists as helping to save lives.

It is possible that more young people might be attracted to a career in engineering, for example, if they had a clearer understanding of what was involved. It should be noted, however, that in response to another question, less than a third of students said that they wanted to design buildings, bridges and cars.

### **5.3 Implications for etb**

The survey findings indicated that two-thirds of the Year 9 students had some degree of interest in SET careers. This suggests that there is a large group of young people who would welcome more information about the wide range of opportunities in that area, and help them decide which, if any, is the right one for them. The profiles created from questionnaire responses indicate which young people are likely to fall within this target group.

Other students may have shown a lack of interest because they have misunderstandings about SET careers. Although they may be a more difficult group to attract, it is important that they too are given accurate information which will dispel misunderstanding and may help some to realise that SET is a worthwhile option for them.

Students generally appeared to lack knowledge about the variety and range of SET careers, and understanding about what they might involve. It is therefore important for etb to help them realise that engineering, for example, involves skills and knowledge that they already have or would like to acquire, and that its study can lead to an interesting and fulfilling career. This also applies to career opportunities for scientists and technologists.

Clearly there is a pressing need for organisations such as etb to find ways of ensuring that all young people have relevant information about the wide range of SET careers available so they can make positive choices. How and when can this best be done?

Questionnaire responses indicated that young people wanted to learn more about careers from people who actually worked in them. While it would be difficult to arrange for engineers (or example) to visit every school, students could learn about engineering from engineers through the medium of interactive websites and DVDs that could be accessed or used in the classroom. It would be important to use case studies about real people (especially young people that students could relate to), shown in their places of work. This would enable etb to show young people what it could be like to work in the field of SET. The advances with whiteboard technology could also provide a very suitable medium that is widely accessible in schools.

Young people are strongly influenced by the media and this needs to be used to maximum effect, perhaps by tapping into advertising in the cinema, by more subtle use of the TV and through interactive websites and DVDs. The indications are that the more able young people would cope well with any technological medium, once they knew how to access it.

The students surveyed were also interested in accessing careers information through websites. Specific websites recommended by subject teachers and careers websites were most visited by students at school. At home young people used games and music websites most of all. The aspects of a website that were considered to be most important by young people were that it was easy to access, it was interesting, easy to navigate and was fun and useful. These factors need to be borne in mind when designing an attractive website for young people.

Using a website to inform about SET careers would provide the opportunity to stratify and filter the resources to appeal to a wide range of students. However, in order to be successful, etb would also need to develop suitable methods of marketing that would capture the students' imagination and lead them into accessing the website.

Survey findings indicated that the majority of young people are thinking about future careers when they make their option choices in Year 9. Nearly 80 per cent claimed that they already had an interest in working in a specific area, and they considered that their option choices were appropriate for that area. This emphasises the need for etb to connect with young people early, possibly in Year 8 or Year 9, to provide information about SET careers before they decide that SET is not for them and choose a different career path. Alternatively, or additionally, etb could target Year 10 and Year 11 to tell students that their subject choice at Year 9 did not prevent them considering SET careers, so long as they achieved a grade A\*-C in mathematics. Interested students could then be invited to discuss SET careers before they made their post-16 choices at Year 11.

When discussing option choice, young people said they would have liked further information from schools careers teachers. The most useful source of information already received was subject teachers. This highlights the need for etb to provide appropriate information for school staff, as well as material

aimed directly at the young people themselves. Teachers are in a key position to influence students, and it is important that subject teachers do not pass on any misconceptions of their own. It is also essential that careers teachers should be willing to promote the website and any other resources which etb creates for students.

## Appendix 1 Representation of the sample of schools

In order to ensure that the sample of schools that responded to the survey was representative, it was compared with a list of all the relevant schools on the NFER Register of Schools (see table below). The results indicate that the sample used in the sample was indeed representative.

**Table A1.1 Representation of the sample of schools**

		All Schools (relevant types only)		Schools returning data	
		Number	%	Number	%
Secondary school type	Comprehensive to 16	1,278	39	17	40
	Comprehensive to 18	1,680	51	23	55
	Other Secondary schools	167	5	0	0
	Grammar	161	5	2	5
Region	North	907	28	11	26
	Midlands	1,002	30	14	33
	South	1,167	36	16	38
	Wales	210	6	1	2
% eligible FSM 2003 (5 pt scale)	Lowest 20%	201	6	3	7
	2nd lowest 20%	728	22	10	24
	Middle 20%	824	25	10	24
	2nd highest 20%	771	23	11	26
	Highest 20%	552	17	7	17
	Unknown	210	6	1	2
Achievement Band (KS3 Overall performance 2003)	Lowest band	675	21	8	19
	2nd lowest band	625	19	9	21
	Middle band	593	18	9	21
	2nd highest band	572	17	8	19
	Highest band	593	18	7	17
	Not applicable/Unknown	228	7	1	2
Achievement Band (Total GCSE point- score 2002)	Lowest band	659	20	5	12
	2nd lowest band	659	20	15	36
	Middle band	626	19	7	17
	2nd highest band	591	18	5	12
	Highest band	493	15	8	19
	Not applicable/Unknown	258	8	2	5
Total schools		3,286	100	42	100

*Since percentages are rounded to the nearest integer, they may not always sum to 100*

## Appendix 2 Factor analysis of student attitudes

Exploratory factor analyses were carried out to consolidate the data on the Year 9 student questionnaire relating to students' views of what they want from a job. These produced more robust measures of students' attitudes than with other variables, than would have been possible if using each of the individual variables.

Factor analysis looks for variables and items that correlate highly with each other. The existence of such correlations between variables suggests that those variables could be measuring aspects of the same underlying issues. These underlying issues are known as factors. Thus, the aim of the factor analyses was to derive a smaller number of 'attitude' composite variables from selected questions on the questionnaire which could be used to explore the attitudes of students in further detail.

Items that appeared to relate closely to one another were grouped together as a scale, and after subsequent analysis, three separate factors were identified relating to different aspects of students' attitudes. These three factors were related to:

- students' attraction to office work
- students' attraction to practical work
- students' attraction to caring work.

These scales were then submitted to a test of reliability (Cronbach's alpha) to examine the extent to which the items which made up the scale were mutually correlated and thus measuring essentially the same construct. Values close to one are perfectly correlated, and values around 0 would imply no mutual relationship. As shown below, the factor related to students' attraction to practical work had the lowest reliability coefficient (0.66); however, it was sufficiently high for it to be included in the subsequent analyses.

A description of the individual items on the questionnaire that made up each factor, and the reliability of the factors is presented below. For each item students were asked to give their level of agreement with the statement on a five point scale from 'strongly disagree' to 'strongly agree'.

### **Factor 1 Attraction of Office Work**

- 13b I want to have a professional job
- 13c I want to deal with lots of paperwork

- 13d I want to use maths/calculate things
- 13f I want to measure and record information
- 13g I want to solve problems
- 13h I want to use my communication skills
- 13i I want to make decisions.

Reliability = 0.74

**Factor 2      Attraction of Practical Work**

- 13a I want to work with my hands
- 13i I want to work with machinery
- 13j I want to design buildings/bridges/cars etc.
- 13m I want to sell things to people.

Reliability = 0.66

**Factor 3      Attraction of Caring Work**

- 13e I want to care for people
- 13k I want to be responsible for other people
- 13n I want to care for sick people.

Reliability = 0.75

## Appendix 3 Logistic regression analysis

As part of our analysis we were interested in finding which elements of the background information we had collected about students were related to students' desire to pursue a career in SET. Since students' feelings towards future careers in SET were captured in the form of simple 'yes' or 'no' questions logistic regression was the correct method to go about exploring this issue. Using this method it was possible to quantify the extent to which students' likelihood of seeking careers in SET were related to their sex, likely attainment, social background, and attitudes towards work tasks.

Regression is a technique used to model relationships between a response variable and one or several predictor variables. The model obtained from the analysis is formulated as a mathematical equation. Such models are useful for predicting the value of an outcome when we have information on the predictor variables, estimating or describing the relationship between an outcome and background variables, or finding predictors that have a strong relationship with an outcome variable. Logistic regression is a form of regression which is used when the dependent is a dichotomy and the independents are of any type.

The results of the logistic regressions are shown below. A positive number in the column labeled 'B' indicates that the given background variable is related to an increased likelihood of interest in a career in SET, whereas a negative number indicates the variable is related to a reduced likelihood of interest. As can be seen from the column labeled 'Sig' all the background variables listed here have a significant relation with interest in a career in SET at the five per cent level.

Further details on output from logistic regression can be found at [www.ats.ucla.edu/stat/spss/output/logistic.htm](http://www.ats.ucla.edu/stat/spss/output/logistic.htm).

**Table A3.1 Logistic regression analysis for any interest in careers in SET**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>Df</b>	<b>Sig</b>	<b>Odds ratio</b>
Female	-0.86	0.16	28.37	1	0.0000	0.42
No books in home	-1.00	0.39	6.54	1	0.0106	0.37
Leave education in early 20s	0.40	0.17	5.47	1	0.0193	1.49
Attraction of the office	0.18	0.05	10.72	1	0.0011	1.19
Attraction of practical work	0.51	0.05	102.27	1	0.0000	1.66
Constant	-2.30	0.40	33.19	1	0.0000	0.10

**Table A3.2 Logistic regression analysis for interest in careers in science**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>Df</b>	<b>Sig</b>	<b>Odds ratio</b>
Expected number of achieved A*-C grades	0.10	0.03	8.47	1	0.0036	1.10
3+ bookcases of books in home	0.44	0.18	5.87	1	0.0154	1.55
Leave education aged 16	-1.07	0.34	10.03	1	0.0015	0.34
Leave education aged 18	-0.76	0.26	8.42	1	0.0037	0.47
Attraction of the office	0.30	0.06	28.83	1	0.0000	1.35
Attraction of caring work	0.08	0.03	5.67	1	0.0172	1.08
Constant	-3.79	0.42	82.64	1	0.0000	0.02

**Table A3.3 Logistic regression analysis for interest in careers in technology**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>Df</b>	<b>Sig</b>	<b>Odds ratio</b>
Female	-0.44	0.15	8.85	1	0.0029	0.65
No books in home	-1.00	0.42	5.50	1	0.0190	0.37
Leave education aged 16	-0.63	0.23	7.50	1	0.0062	0.53
Attraction of practical work	0.39	0.04	88.38	1	0.0000	1.47
Constant	-2.09	0.25	68.28	1	0.0000	0.13

**Table A3.4 Logistic regression analysis for interest in careers in engineering**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>Df</b>	<b>Sig</b>	<b>Odds ratio</b>
Expected number of achieved A*-C grades	0.10	0.04	6.74	1	0.0094	1.10
Female	-1.81	0.21	73.76	1	0.0000	0.16
Very few books in the home	0.58	0.25	5.67	1	0.0173	1.79
Attraction of practical work	0.57	0.05	113.94	1	0.0000	1.78
Attraction of caring work	-0.09	0.04	5.53	1	0.0187	0.91
Constant	-3.79	0.49	60.90	1	0.0000	0.02

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