# Maximising Returns

## to science, engineering and technology careers

Report for the
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and the
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# *Maximising* Returns

to science, engineering and technology careers

# Information about this Publication

## Project Responsibilities

People Science and Policy Ltd were responsible for overall project management and also undertook the qualitative research, literature and web searches.
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Analysis of the Labour Force Survey was completed by Angela Canny and Peter Elias at the Warwick Institute for Employment Research.
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## Related Publications

1 *Women with Science, Engineering and Technology Qualifications: Evidence from the British Labour Force Survey, 1992-2000* by the Institute for Employment Research, University of Warwick. This report is bound separately, and is available from the Department of Trade and Industry publication order line 0870 150 2500 quote ref URN 01/1334

2. *Annotated Bibliography* and *Review of Schemes*. Both of these are available on the Promoting SET for Women Unit website: www.set4women.gov.uk or on request from the 24-hour information line (answerphone) 020 7233 0743

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Labour Force Survey data were deposited at the UK Data archive, University of Exeter by the Office for National Statistics. Material from the Labour Force Survey is Crown Copyright; has been made available by the Office for National Statistics, through the Data Archive and has been used by permission. Neither the ONS nor the Data Archive bear any responsibility for the analysis or interpretation of the data reported here.

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**Method** Box 1

## Definitions

Within this report, the following definitions agreed by the study Steering Group are used.

SET degrees were identified as those coded in the Labour Force Survey (LFS) as "Engineering and technology" and "Science". The following subjects were excluded:

- Education
- Medicine
- Social science
- Vocational
- Arts/humanities/languages
- Combined

SET graduate occupations were defined on the basis of occupations entered by SET graduates. In each of the following Standard Occupational Classification (SOC) codes at least 20% of those employed had SET degrees according to the amalgamated data from the LFS surveys from September 1999 to August 2000. The exceptions to this were computer engineers and draughtspersons, where lower percentages had degrees. Two categories of SET graduates were identified: key and associate groups.

### Key Groups

Minor SOC Group 20 (Natural Scientists)
Minor SOC Group 21 (Engineers and Technologists)
Minor SOC Group 32 (Computer Analysts and Programmers), plus Software Engineers (unit group 214) and Computer Engineers, installation and maintenance (unit group 526).

### Associate Groups

Minor SOC Group 26 (Architects, Town Planners, and Surveyors)
Minor SOC Group 30 (Scientific Technicians, Architectural and Town Planner Technicians)
Minor SOC Group 31 (Draughtspersons, Quantity and other Surveyors)

The analysis in this report includes those of working age, (women aged 16 to 59 and men aged 16 to 64) plus those aged up to 65 if they were still working at the time of the LFS interview.

A potential SET returner was defined as a person with a first degree in a SET subject who had begun a career in a SET occupation but who was not currently using their subject qualifications, knowledge and experience in the labour market. Studying for a PhD in SET on graduating was included as beginning a career in SET, even if there was no subsequent employment in the SET sector.

Not all potential returners could be expected to return. The concept of a **likely returner** was therefore also agreed. A likely returner was defined as a person with a first degree in a SET subject who had begun a career in a SET occupation but who was not currently using their qualifications and experience in the labour market and who would consider returning to a SET occupation.

From this study four groups of potential recruits to SET have been identified:

- those who gain degrees in a SET subject who enter non-SET occupations on graduating;
- those with SET degrees currently working in non-SET occupations and who may or may not have worked in SET in the past;
- SET graduate men and women who are "inactive – other"; and
- SET graduate women who are "inactive – home".

**Those with SET degrees who enter non-SET occupations on graduating.** This group are not "returners" or potential returners as they have never worked in SET. Therefore, while we strongly recommend that the reasons for them not entering SET occupations are explored, this study has not covered this issue.

**Those with SET degrees currently working in non-SET occupations.** The LFS is a cross-sectional survey and does not collect data about work histories. It is not therefore clear whether these individuals have worked in SET in the past. It has not been possible to use LFS data to identify people with SET degrees who are in employment but who are not using their subject. SET graduates may have used their degree to gain entry to a graduate occupation open to any discipline. In this sense it is not clear that their training has been "wasted".

**SET graduate men and women who are "inactive – other".** The LFS identifies a number of employment statuses. These can be categorised as: employed; student; unemployed; and inactive. Inactive includes five main groups: looking after family or home; sick or disabled; retired; waiting to start a job already secured; and do not want or need to work. For this study we have subdivided inactive into "inactive – other" and "inactive – home".

**SET graduate women who are "inactive – home".** Throughout the period studied almost no men classified themselves as inactive for family reasons. We have compared women with SET degrees with men with SET degrees and women with other degrees in terms of their employment status and occupation and the impact on labour market participation of having dependent children. This has enabled us to identify some barriers that are unique to this group.

# Executive Summary

## Introduction

The aim of this study was to explore ways in which the UK can maximise the return on the investment made in training graduates in science, engineering and technology (SET) and address projected skills shortages. It was designed to:

- quantify the number of people with degree level qualifications in science, engineering and technology (SET);
- identify how many are not currently working in SET occupations and the occupations and activities they are employed in;
- investigate how, if at all, they could be attracted back into SET occupations;
- identify how employers could support those returning to the sector and how more might be encouraged to utilise returners; and
- identify existing schemes and whether these meet the needs of employers and returners.

## Conclusions

1. The single most important finding of this analysis is that only a minority of SET graduates are employed in SET occupations, as defined in this study (40% of men and 25% of women). If ongoing activities, such as the "Roberts Review", show that there is a greater need for scientists and engineers in the labour force, then it will be important to understand:

    - whether graduates are using their subject knowledge in other occupations;
    - why some choose not to use their subject having spent at least three years studying to degree level; and
    - how these choices can be influenced.

2. From 1992 to 2000 an increasing number of female SET graduates were employed within the key SET occupations (see Definitions), save for that generally regarded as the most "junior", scientific technicians. In particular, the number of women in computing has increased markedly.

3. The most effective strategy for addressing skills shortages from the existing labour supply is not clear-cut. It might be argued that the pool that should be targeted, as it is comfortably the largest at just under 600,000 in 2000, is male SET graduates who are not currently employed in SET. However, within this group only 1.7% were unemployed and about 75,000 were "inactive – other" as defined in this study. It is likely that most of the men in the latter group will be waiting to start jobs they have already secured, others will be sick, disabled and retired and a few will not need or want to work.

4. Women with SET degrees are economically less active than their male counterparts or female non-SET graduates. This is despite the fact that women SET graduates enter a far wider variety of occupations than their male counterparts. Currently inactive female SET graduates

provide a pool of approximately 50,000 potential returners, although by no means all of these people will be interested in returning to work, never mind to SET occupations, consequently the pool of likely returners will be smaller.

5. This research has found that about 24,000 women SET graduates returned to employment in the year 2000 and that about a third of them returned to SET occupations. Targeting the two-thirds who go into other occupations and encouraging more to return to work in SET could help to address the skills shortage in SET occupations.

6. This research has also shown that there are significant issues for women seeking to return to work after extended breaks and that the barriers may be greater for those in SET. It has also revealed that employers are unlikely to make the investment needed to attract returners because the likelihood of finding and successfully recruiting women returners is very low for any individual company.

## Recommendations

### Government

1. Taken together the factors described above suggest that there is a role for Government-sponsored schemes designed to help women return to employment in SET.
   (i) We recommend that academia and industry are considered as two separate classes of employer.
   (ii) In industry, a scheme which provides access to technical training and reskilling during a transition period back into employment, reducing the retraining burden on employers, might make returners more attractive when in competition with others.
   (iii) In academia, the role for Government, probably working through the research funding bodies, appears to be twofold. Firstly, providing the backing for people to return to specific posts rather than returners having to design individual research projects. Secondly, to ensure a level playing field for older returners who may be disadvantaged by their age relative to their experience or gaps in their research CV.
   (iv) Government should also publicise case studies designed to showcase creative solutions to individual problems.

### Industry

2. As a major beneficiary of returners, industry has a part to play. The qualitative research has shown that many who have left SET retain negative images of the sector. While these may to some degree still be reflected in working practices, there is a good deal of evidence to suggest the sector is increasingly embracing work-life balance practices and could do more to promote this.

   (i) Individual employers or perhaps industry associations should work with the relevant parts of Government to ensure that the current nature of SET employment is adequately communicated. This would be relevant not only to returners, but to the majority of SET graduates who do not actually enter SET occupations.

   (ii) Companies could do more internally to make line managers aware of the business case for flexibility and how they will benefit. One human resources respondent suggested that the company might make formal statements about the structures put in place to encourage flexibility and we endorse this suggestion.

(iii) Stereotypes need to be challenged by all staff and managers as well as by human resources departments. We see a role for human resources departments in providing support for individuals seeking to develop solutions.

(iv) As beneficiaries of any Government-backed scheme to aid returners, employers should be expected to make some contribution to the training costs as well as paying the returner's salary.

### Schemes for Returners

3. Existing schemes are meeting some needs; however, the experiences of users interviewed in this study suggests that existing schemes can be improved. In particular the following issues might be addressed in order to reduce the burden on potential applicants:
   (i) that scheme managers take a proactive role in matchmaking between prospective returners and employers;
   (ii) scheme managers should build up portfolios of likely employers/hosts for returners.

### Higher Education

4. This study did not investigate the role of the higher education sector as an employer.
   (i) We recommend that this should be explored in the context of implementing work-life balance policies.
   (ii) The workshop of women academics suggested that a Government-backed scheme might provide funds that will enable universities to apply for a grant for a "head of laboratory" position.
   (iii) The workshop of women academics recommended that funders review all schemes to ensure that there is no discrimination (inadvertent or otherwise) and in particular in respect of age.

### Other Organisations

5. We see roles for other organisations interested in promoting SET and competitiveness more generally.
   (i) There is a role for unions, other employer and staff associations and professional institutions in providing support for individuals seeking to develop solutions.
   (ii) Business support intermediaries could play an important role in supporting small and medium-sized enterprises (SMEs) by assessing local skills requirements and promoting opportunities for returners through local media.

## Key Findings

## SET Graduates: Numbers, Employment and Gender

This section draws primarily on detailed analysis of the Labour Force Survey.

### The Graduate Labour Market

There has been a rise in the number of people of working age with degrees (in any subject) from 3.5 million in 1992 to 5.4 million in 2000. The absolute number of SET graduates in the working age population has increased over the period 1992 to 2000, from 1.1 million to 1.3 million. Thus, the proportion of SET degree holders relative to other subjects has declined from 32% of all graduates to 25%.

The employment rate of male SET and non-SET graduates is very similar at about 91%. However, female SET graduates are consistently less likely to be economically active than female non-SET graduates. (See figure 6, chapter 2)

### The Impact on Women's Employment of Dependent Children

There has been a steady increase in the proportion of graduate women with young children who work. Women with dependent children under five are the least likely to be employed and there is little difference between SET and non-SET degree holders. However, women with SET degrees with dependent children all aged over five, were increasingly less likely to be employed during the period of the study and are noticeably less likely to be employed than their non-SET graduate counterparts. (See figure 16, chapter 2)

### Flexibility

There is little difference in the usual hours worked per week or in the prevalence of shift working between female SET graduates working in SET and non-SET occupations. Certainly there is no indication that women are choosing non-SET jobs in order to work fewer hours or to avoid shift work. However, it should be noted that SET graduate women in SET occupations are much less likely to work part-time than those in non-SET occupations.

Considering the length of time that women with SET degrees, who were not working at the time of the LFS interview, have been out of employment, on average between two thirds and three quarters have been out of employment for at least two years and almost 40% have been out of employment for at least five years. These women are the least likely to have experienced personally any of the recent improvements found in employers' attitudes to work-life balance issues. They may, therefore, be difficult to attract back. For anyone considering returning to SET there is a perception that the longer they have been away the more new knowledge there is to catch up on. That said, there have been an increasing number of returners to SET during the latter part of the 1990s. While the numbers are small, with an average of about 5,000 per year, there are increasing numbers returning to computer-based and technology-related jobs. This suggests that to some degree, market forces are having an impact.

## SET Graduates: Leaving and Returning

This section draws primarily upon qualitative research undertaken with men and women holding SET degrees.

### Choosing to Study SET beyond Compulsory Level

The two main reasons respondents had chosen to study science post-16 were:

- natural aptitude; and
- family background.

### Choosing SET Careers

Respondents had initially chosen to work in SET occupations primarily because they had enjoyed their studies.

Those who enjoyed working in SET occupations said that this was because:

- the work was varied;
- they enjoyed problem solving;
- they were not "*office bound*"; and
- there were travel opportunities.

Some of the respondents who had left SET disliked these occupations because:

- the job was boring and repetitive;
- they had little control over what they did and how they did it;
- of poor working environments with little human interaction;
- they could not see immediate results from their work; and
- of low rates of pay.

### Are SET Jobs Different?

There are two main issues that respondents felt make SET occupations different from other graduate level occupations:

- structural issues to do with the way in which work is organised in SET industries. This relates to running experiments and production lines and management styles; and
- the potential for the work to be physically demanding as it was often not desk-based.

There was no suggestion that SET jobs were intrinsically more intellectually demanding than other graduate level jobs. We found no evidence that people were leaving SET because they could not cope with the demands for technical knowledge and skills.

## How do employers support those returning to SET?

### Recruitment

Given limited resources for recruitment, companies focused on new graduates. This is a large, obvious and easily located source of appropriately skilled people.

Human resources respondents reported the beginnings of a change that could facilitate returners' access to employment. Senior managers are now being recruited from outside companies and there is increasing turnover of staff in mid-career. This is partly as a result of the changes in the sectors involved, which have seen mergers, takeovers, company sales, redundancies, etc. Moreover, there is an acknowledgement of the importance of transferable skills, such as interpersonal skills, and a much more mobile labour force where fewer people think in terms of a job, or single employer, for life.

### Policies on Returners

There is a large amount of evidence that companies are making increasing efforts to retain their own staff during family formation, through a mix of maternity packages, flexible working practices and other support mechanisms such as crèche facilities. However there is no evidence that companies are actively targeting returners as a potential source of expertise.

### Flexible Work Practices

Within SET, science appears to be less flexible than engineering or IT, at least with respect to the way in which graduate level work is organised. Areas of research where staff need access to hazardous substances or specialist infrastructure are less flexible in the way in which they are organised than other areas of SET, particularly the information and communications technology (ICT) sector. Production management is also an area that tends to demand that staff are on-site or on-call. Nevertheless, there are aspects of both jobs that can be done more flexibly, to the benefit of both the company and employees.

## Do existing schemes meet the needs of employers and returners?

This research found only four schemes in the UK that were specifically designed to support and encourage women returning to graduate SET careers.

- The Daphne Jackson Trust,
- The Wellcome Trust Re-entry scheme
- Engineering and Physical Science Research Council (EPSRC) PhD studentships
- The Laura Ashley Foundation Return to Research Fellowship.

All of these are essentially for people seeking to return to academic science. However, it may be that there may be more opportunities in industry than academia. It did not appear to us that these schemes have been designed with industrial careers in mind, although the Daphne Jackson Trust is increasingly trying to find placements with industry.

# 1. Introduction

This study has explored ways in which the UK can maximise the return on the investment made in graduates in science, engineering and technology (SET). The Science and Innovation White Paper "Excellence and Opportunity" states that "the real core of the science base is people". Some sectors, such as information technology and communications and electronics (ITCE), are already experiencing skills shortages, which are forecast to persist and worsen in the coming decade[1].

One potential source of skilled employees is people educated to degree level in SET subjects who are not working in SET occupations. While many people with SET degrees never enter SET occupations, others leave after some years experience. These might be valuable recruits for academia and industry. In "Excellence and Opportunity" this issue is highlighted and describes the main objectives of the study.

## 1.1 Objectives

This study was designed to:

- quantify the number of people with degree level qualifications in science, engineering and technology (SET);
- identify how many are not currently working in SET occupations and the occupations and activities they are employed in;
- investigate how, if at all, they could be attracted back into SET occupations;
- explore whether, and if so how, larger employers in the SET sector, committed to work-life balance, encourage SET degree holders to return to SET employment;
- identify what help employers need in order to support those returning to the sector and how more employers might be encouraged to utilise returners; and
- identify existing schemes and whether these meet the needs of both employers and returners and whether they are appropriately advertised.

This study explored the hypothesis that the barriers to returning to SET employment are greater than the barriers to returning to other graduate occupations because of the speed of technological change and scientific developments.

One group it was felt might be especially hard hit by the difficulties of re-entering SET occupations were women who had taken career breaks for family reasons. Women in SET, women's employment and returning to work are all areas that have been studied extensively and have their own substantial bodies of literature. However, the more specific issue of returning to SET has not been explored in great depth. This study therefore investigates:

- how, if at all, the employment experiences of women SET graduates who have taken career breaks differ from those of women with other degrees who have taken career breaks;
- how, if at all, the employment experiences of women SET graduates differ from those of men with SET degrees;

[1] See Skills for the Information Age Final Report from the Information Technology, Communications and Electronics Skills Strategy Group (The Stevens Report), DfEE: Nottingham, 1999.

- the characteristics of potential women returners to SET; and
- the needs of women who have SET degrees who are not using their subject and how they might be encouraged back in to SET occupations.

## 1.2 The Report Structure

The following chapter uses the Labour Force Survey (LFS) to estimate the number of people with SET degrees and to look at their characteristics and trends over the period from 1992 to 2000. Women SET graduates are compared to men with SET degrees and women with other degrees in terms of their employment status, occupation and terms and conditions and the impact on labour market participation of having dependent children. More in-depth and contextual information from the LFS and other research can be found in the report from the Institute for Employment Research, University of Warwick. This report has extracted the key points that address the policy issue of returning to SET careers, especially those that affect women with children.

**Method Box 2**

### Methodology

1 The research methods employed in this study were underpinned by desk research of existing data and studies,. As well as the references provided in this report, an annotated bibliography is available on the "Promoting SET for Women" website www.set4women.gov.uk

2. Analysis of data from the Labour Force Survey (LFS) has enabled an estimate of the number of people with SET degrees not working in SET to be made. It has also provided information about the current employment status and occupation of SET graduates and, for female SET graduates, the impact on their employment situation of having children. Most importantly, it has allowed a comparison between women with SET degrees, men with SET degrees and women with other degrees. This has provided valuable benchmarking data so that we have been able to assess whether, and if so how, women in SET might be uniquely disadvantaged.

3. Focus groups and in-depth interviews with men and women with SET degrees, some of whom have remained in SET occupations, others of whom have not, have provided information on the barriers to working in, and returning to, SET and how these might be overcome.

4. Interviews with employers in the SET sector with good reputations in the area of work-life balance policies have provided insights into how employers can support women and men returners both through the initial return period and subsequently.

5. A survey of schemes to support people wanting to return to SET careers was undertaken using internet searches, a web questionnaire and telephone interviewing.

Chapter 3 uses the results of focus groups and in-depth interviews with individuals to look at why SET graduates with experience of SET employment choose to move on to other careers. It thus seeks to identify the barriers faced by people who try to re-enter SET careers after a break. That chapter tries to clarify the issues that are common to all women and those that are faced by anyone working in SET. We then seek to untangle the issues in order to identify which are either specific to women employed in SET or might be more relevant to women in SET.

Chapter 4 draws on in-depth interviews with Human Resources managers at nine major companies to identify the issues for companies associated with employing returners, how these have been, or might be, addressed and the support that companies offer to retain and support staff.

Chapter 5 identifies the main features of existing schemes to support people wanting to return to SET occupations. Only UK-based schemes have been included, although the detailed information shown on the DTI's Promoting SET for Women website (www.set4women.gov.uk) includes some activities funded by the European Union.

The final chapter, Chapter 6, draws together the findings and makes recommendations about how to support (potential) returners and employers through the transition back to SET employment and thereafter.

# 2. SET Graduates: Numbers, Employment and Gender

## 2.1 Introduction

This chapter uses the Labour Force Survey (LFS) to estimate the number of people with SET degrees and to look at their characteristics and employment experiences. The aim has been to identify potential SET returners. We have explored trends over the period from 1992 to 2000. The LFS has enabled us to estimate the number of SET graduates in the UK and analyse gender and age differences associated with types of degree and employment. This work should complement other activity designed to better understand the graduate employment market in SET, particularly the Treasury-sponsored review, led by Sir Gareth Roberts, on the supply of scientists and engineers, also to be published in 2002.

Potential and likely returners are defined at the start of this report. The study identified four groups of potential recruits to SET:

- those who gain degrees in a SET subject who enter non-SET occupations on graduating;
- those with SET degrees currently working in non-SET occupations, who may or may not have experience of working in SET occupations;
- SET graduate men and women who are "inactive – other"; and
- SET graduate women who are "inactive – home".

### Those with SET degrees who enter non-SET occupations on graduating

This group are not "returners" or potential returners as they have never worked in SET. Therefore, while we recommend that the reasons for them not entering SET are explored, this study has not covered this issue.

### Those with SET degrees currently working in non-SET occupations

It has not been possible to use LFS data to identify people with SET degrees who are in employment but who are not using their subject. This is because some occupations that may appear to be "non-SET", in fact require a SET qualification because of the industry or other requirements. For example, sales and marketing staff in pharmaceuticals and engineering often need technical qualifications. Moreover, LFS does not tell us whether or not they have worked in SET in the past and as the number of SET graduates not in SET occupations does not vary very much over time, it appears that there is a steady flow into other occupations. Additionally, the difficulties of identifying "SET industries" as opposed to "SET occupations" meant that it was agreed not to take this forward within this study.

Other SET graduates may have used their degree to gain entry to a graduate occupation open to any discipline. In this sense it is not clear that their training has been "wasted". Other work has tried to estimate the number of SET graduates the economy requires (Pearson, et al, 1999). Additionally there is the "Roberts review" referred to above.

Method Box 3

## Methodological Issues

A number of methodological issues apply to this study and need to be borne in mind when interpreting the results.

The quarterly Labour Force Survey (QLFS) is a major national source of information on the UK labour market. The LFS analysis presented here is based on information from the spring quarter of the survey (March-May) from 1992 to 2000. The LFS is the largest representative sample of working age individuals in the UK and the spring quarter is the largest of the four quarterly surveys. The sample size is 0.5% of the adult population. Moreover, the spring quarter LFS is used by Eurostat in the European LFS and is therefore recognised in international comparisons.

The analysis presented here investigates trends over the period 1992 (when the British LFS changed from an annual to a quarterly survey) to 2000. Ideally, a longer time period would have been preferable as this would have allowed an investigation of longer term trends in employment. The 1992 QLFS was the first time that SOC90 was used in the survey and it is not possible to compare directly pre and post-1992 LFS occupational data without sacrificing reliability. An analysis based upon pre-1992 data would entail a more restricted and less reliable occupational grouping. (LFS data are not yet available using the revised occupational classification (SOC 2000) so the occupational classification used is the 1990 Standard Occupational Classification (SOC90)).

SET subjects and SET graduate occupations were defined on the basis of occupations entered by SET graduates, as detailed at the start of this report.

The degree subject classification, which is used by the LFS was revised in summer 1997 to incorporate a more detailed subject classification than was available in the pre-1997 classification. The main implication of this change is that post-1997 the 'combined' subject category is significantly larger than pre-1997. This, obviously, has the effect of reducing both the numbers and proportions in the non-combined subjects.

Another anomaly is evident in the 1996 subject classification. The 1996 LFS degree subject classification had a significantly larger number of respondents in the 'no subject' category, compared to other years. It is not clear why this should be so but it results in a decrease in the number of degree holders with SET degrees for that year. Caution is needed in interpreting the 1996 subject data.

For this analysis employment status has been divided into three main categories:

- Employed – those in employment at the time of the survey;
- Unemployed - those who were not in employment during the reference period (the four weeks prior to the survey), but who were actively seeking and available to work; [This is the International Labour Office definition.]

- Inactive - those who were not in employment and who were unavailable to work at the time of the survey.

This last category was subdivided into two groups because of the hypothesis that the main difficulties women face in attempting to (re)enter the labour market relate to their 'home duties' responsibilities. More detailed information can be gained by dividing the inactive group in to two groups:

- inactive- 'home';
- inactive-'other'.

Inactive, active other generally includes students, although students have been removed from this category in the later part of the chapter when we discuss returners specifically.

Consequently the analysis presented here focuses on four groups:

- employed;
- unemployed;
- inactive- 'home'; and
- inactive-'other'.

The analysis is based upon the working age population (women aged 16 to 59 and men aged 16 to 64) plus those aged up to 65 if they were still working at the time of interview.

Despite the large sample size of the spring LFS it is important to remember throughout this report that the number of graduates in the UK is relatively small – just 14% of the working age population. This means that the analysis of sub-groups within this group, such as women SET graduates, is subject to sampling error. This can have the effect of producing fluctuations in the data from year to year. It is therefore important to look at time series data to identify general patterns and trends. The general lack of major fluctuations in the figures in this chapter indicates that the data can be interpreted with a reasonable level of confidence, despite some of the smaller sample sizes.

Within the confines of the LFS data, a returner was defined as someone currently employed who had not been employed 12 months before the LFS interview.

SET graduate men and women who are "inactive – other"
The LFS identifies a number of employment statuses. These can be categorised as: employed; student; unemployed; and inactive. Inactive includes five main groups: looking after family or home; sick or disabled; retired; waiting to start a job already secured; and do not want or need to work. For this study we have subdivided inactive into "inactive – other" and "inactive – home duties".

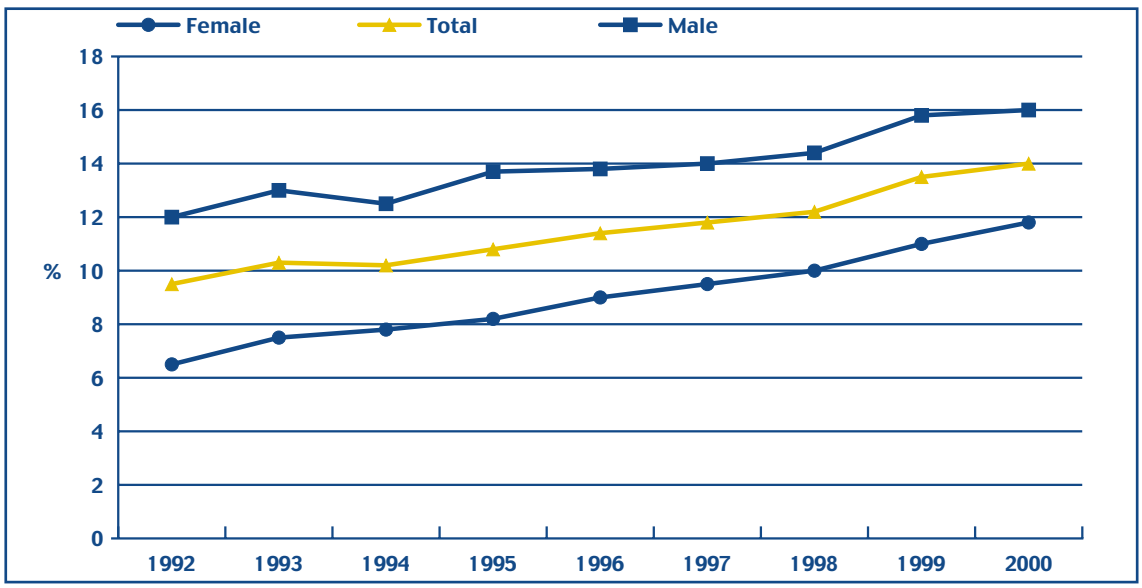
SET graduate women who are "inactive – home"
This group is the principal focus of this study. Throughout the period studied almost no SET graduate men classified themselves as inactive for family reasons. We have compared women with SET degrees and men with SET degrees and women with other degrees in terms of their employment status and occupation and the impact on labour market participation of having dependent children. This has enabled us to identify some barriers that are unique to this group.

This chapter highlights key findings. More in-depth information, including full tables of the data used to write this chapter and wider contextual information from other research can be found in the report by the Institute for Employment Research, published separately by Office of Science and Technology (OST)[2].

## 2.2 The Labour Market

Over the period of the analysis, 1992 to 2000, there have been a number of key changes in the labour market generally, that will have impacted on female SET graduates. The employed labour force is becoming more highly qualified and women are delaying childbearing and continuing to work while bringing up their children. A few key statistics illustrate this.

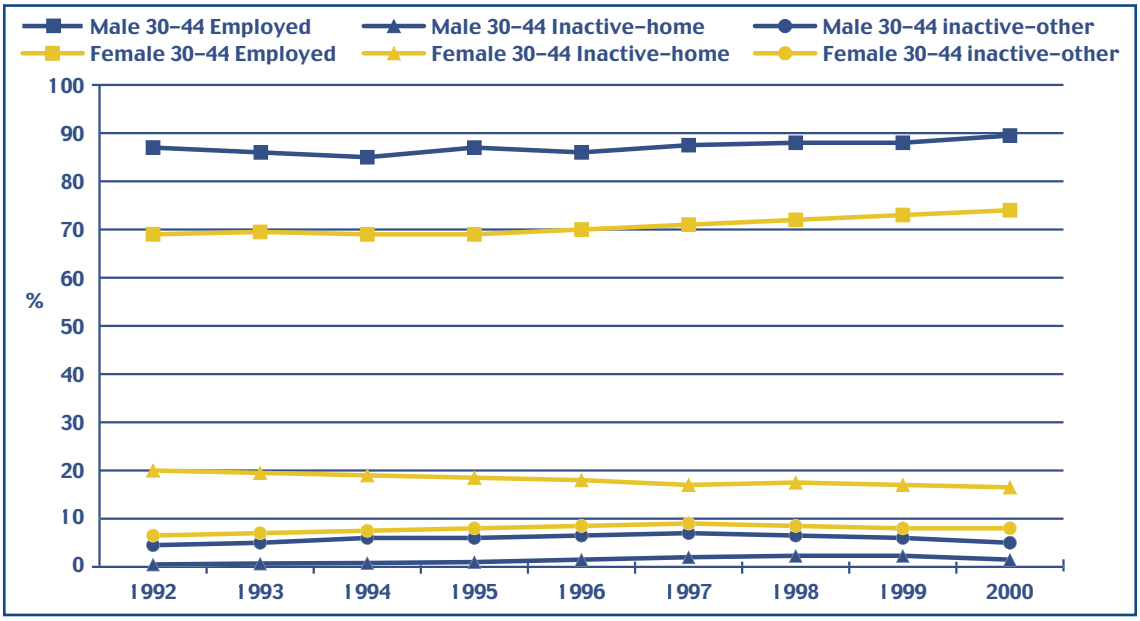
Figure 1: Percentage of the labour force with degrees, 1992-2000




There has been a rise in the number of people of working age with degrees (in any subject) from 3.5 million in 1992 to 5.4 million in 2000. As figure 1 shows, this represents an increase from 9% to 14% of the working age population.

[2] Women with Science, Engineering and Technology Qualifications: Evidence from the British Labour Force Survey, 1992-2000. DTI/Pub5768/0.2K/10/01. Available from the DTI orderline 0870 150 2500 quote ref URN 01/1334

Figure 2: Economic activity of men and women aged 30-44, 1992-2000




Looking at the population as a whole, the average age of women at first birth has risen from 27 in 1986 to 29 in 2000 (Office for National Statistics). The prime child-rearing age is therefore now 30-44 but figure 2 shows that fewer women aged 30-44 were economically inactive for domestic reasons in 2000 than in 1992. The proportion of all women in this age group employed increased from 69% to 73% between 1992 and 2000 while the percentage classified as "inactive-home" decreased from 20% to 17%. However the percentage of all women inactive for domestic reasons still greatly exceeds the number of men inactive for domestic reasons.

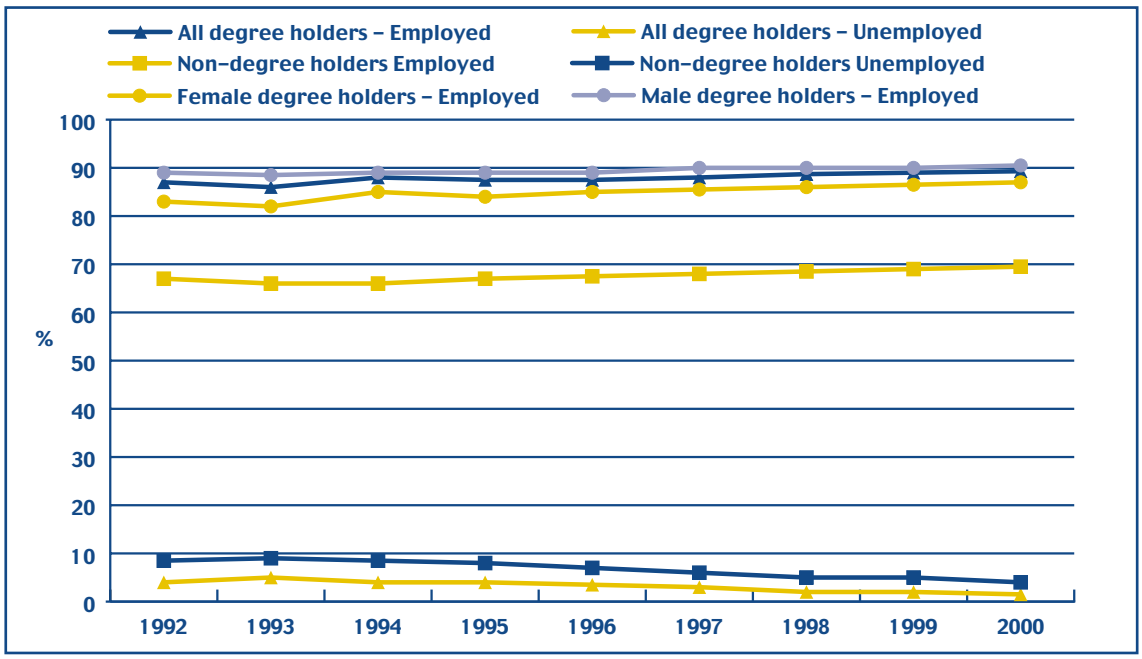
## 2.3 The Graduate Labour Market

The graduate labour market has changed perhaps even more than that for non-graduates over the period 1992 to 2000. While the proportion of men with degrees rose from 12% to 16%, figure 1 shows the proportion of women with degrees rose from 7% to 12%. These rises are obviously concentrated in the younger age groups.

Having a degree makes people more likely to be employed. Figure 3 shows this extremely clearly. Degree holders have consistently higher levels of employment and lower levels of unemployment than non-degree holders. Moreover, non-degree holders are more likely to be economically inactive for reasons other than unemployment.

Figure 3 also shows consistently higher levels of employment amongst male degree holders than female degree holders.

Figure 3: Economic activity by qualification and gender, 1992-2000




## 2.4 The SET Graduate Labour Market

Figure 4: Number of degree holders, 1992-2000

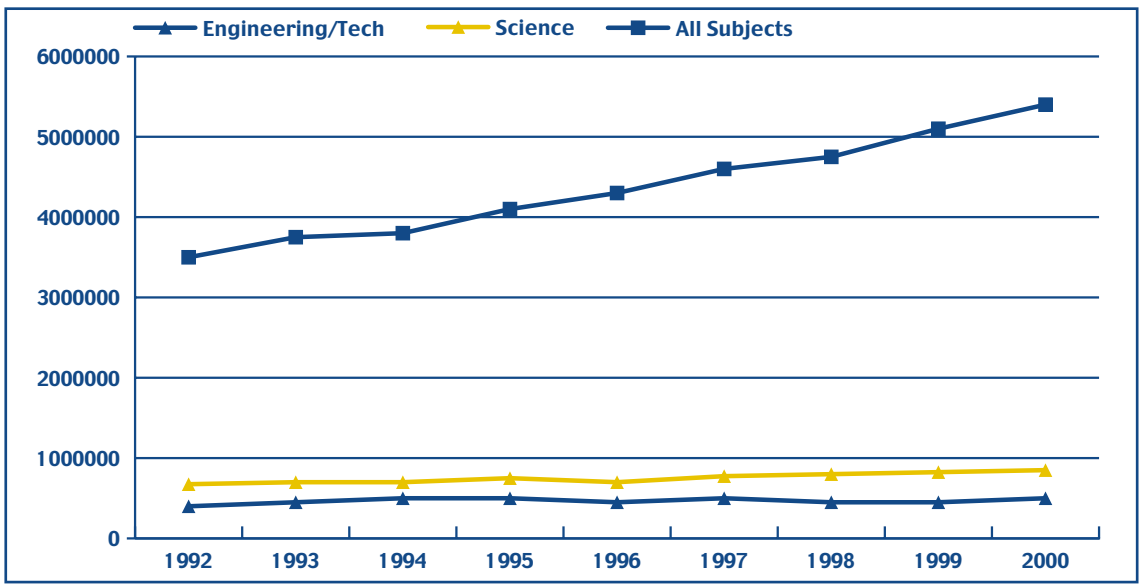
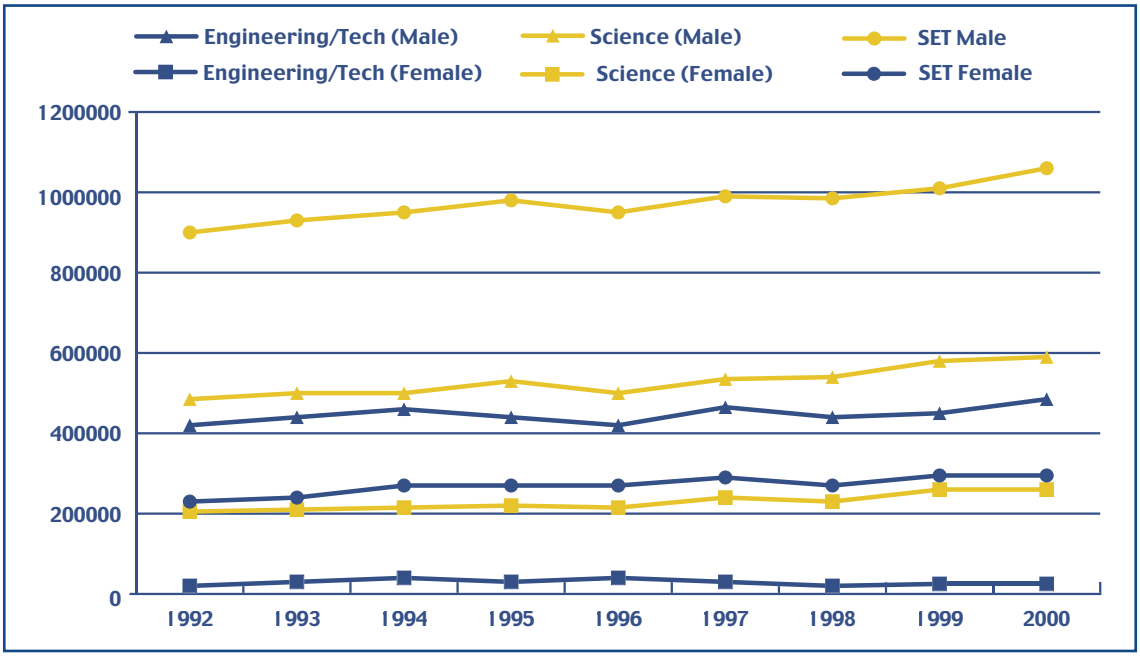


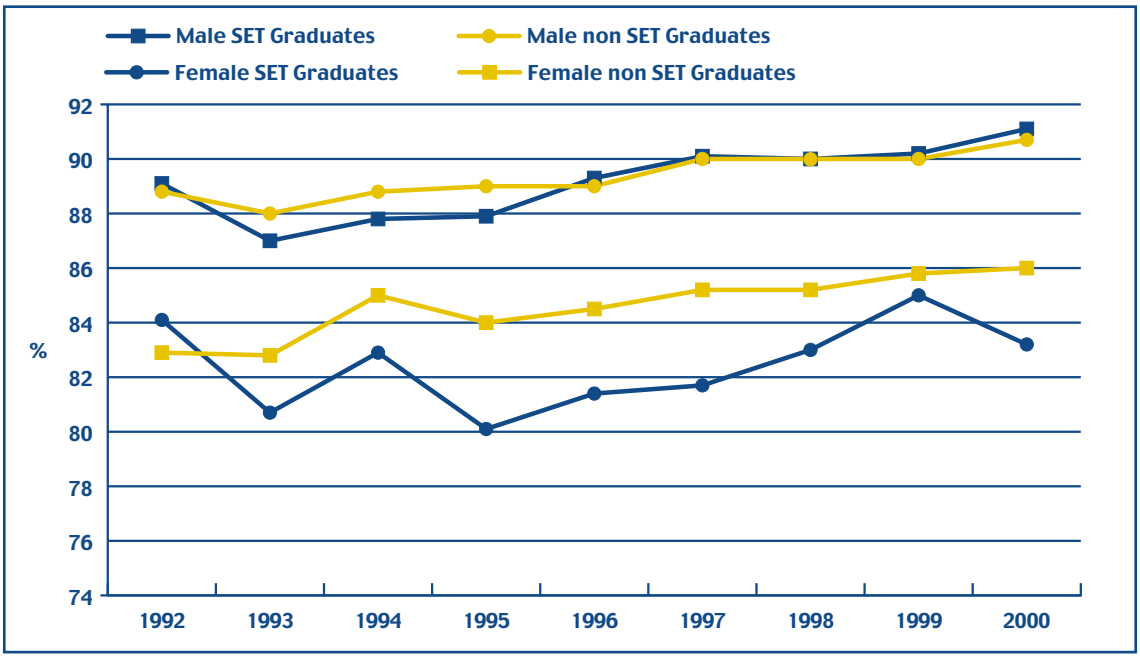

Figure 4 compares the total number of graduates with those holding science degrees and engineering and technology degrees. The absolute number of SET graduates in the working age population, both male and female, has increased over the period 1992 to 2000, from 1.1 million to 1.3 million, an increase of 19%. In the same period however, there has been a growth of 54% in the total number of graduates. Thus, the proportion of men and women holding degrees in SET relative to other subjects has declined from 32% of all graduates to 25%.

Figure 5: SET degree subject by gender, 1992-2000




The proportion of SET graduates who are female has risen from 20% in 1992 to 22% in 2000 but this increase is small compared with the overall growth in the proportion of graduates who are women (see above). However, this masks the relatively large absolute growth in the number of female SET graduates of 26% over the period compared to a growth rate of 18% for men. Figure 5 shows the absolute numbers of SET degree holders. For both men and women there has been a greater increase in the number of science graduates than engineering graduates; indeed, almost all of the growth has been in science rather than engineering and technology.

Figure 6: Percentage of Graduates Employed, 1992-2000



LFS data reveals that the recession of the early 1990s hit SET graduates harder than non-SET graduates (figure 6) and this is reflected in the qualitative research reported in the next chapter. Personal experience of redundancy, or the redundancy of colleagues and friends, has had a negative impact on the image of SET employment held by some of the SET graduates we interviewed, especially those now working in other areas.

**Case Study** **Man A**

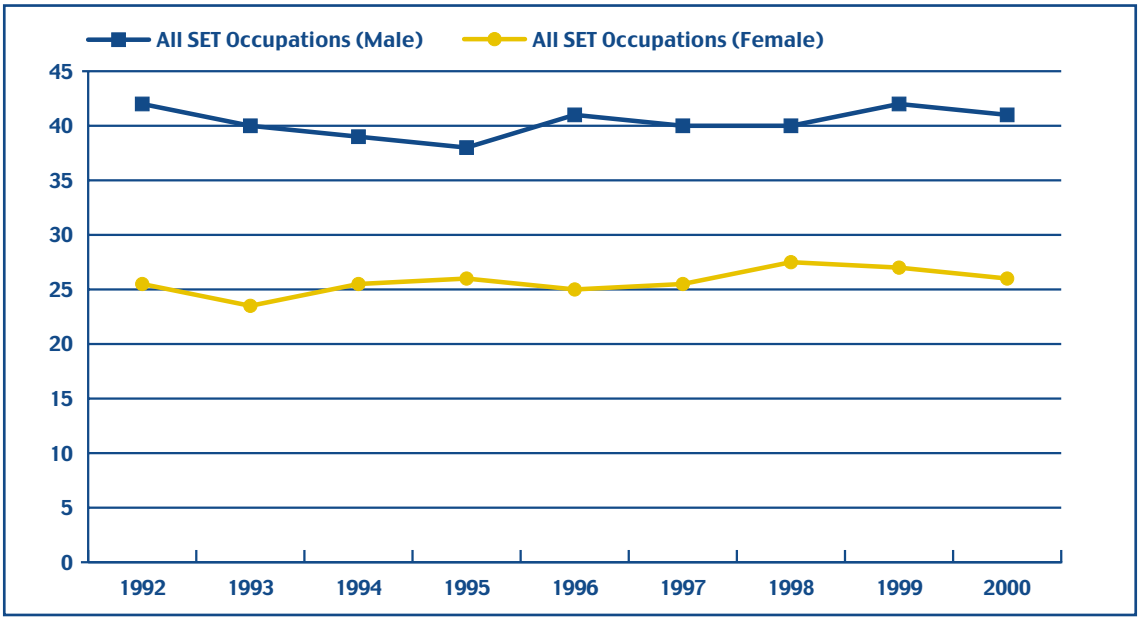
Man A started his career after his computing degree at a large US company with research and manufacturing facilities in the UK. His job on the manufacturing side of the company was made redundant but he moved into sales and marketing with the same company. After a few years he was clear in his mind that he wanted to return to a more technical function, so he applied for a job in a new area of R&D and was successful. This might have been because the area was new, and no one had much experience in it but he also demonstrated the ability to learn quickly. However, he still needed to catch up and put in a lot of time at the weekends and in the evenings in the first year, often in the office, to get up to speed.

Man A said that the experience of working in a completely different area has improved his skills, especially in communication. But he didn't think that it would have been easy to break into this technical position from outside the company. His line manager took a risk because he already knew him. Man A had begun to think that he would have to leave the company and perhaps do a PhD before he would be able to make the transition. Indeed this was how others had made the change.

Towards the end of the 1990s male SET graduates caught up and overtook their non-SET counterparts in terms of their employment rate. However, female SET graduates were consistently less likely to be economically active than non-SET degree holders, although the employment levels of both generally rose during the decade.

Focusing on employment in SET occupations, figure 7 reveals that less than a half of male SET graduates and approximately a quarter of female SET graduates are employed in the key SET occupational groups as defined at the start of this chapter. This reinforces the point made above, that both men and women, but particularly women, appear to use SET degrees as a broadly applicable qualification. It appears that more recently a slightly higher proportion of female SET graduates have been working in SET occupations, while the proportion of men has remained broadly constant over the period 1992-2000. Bearing in mind that the overall number of both male and female SET graduates has increased since 1992, this means that there are now more SET graduates employed in SET occupations.

Figure 7: Percentage of SET degree holders employed in SET, 1992-2000

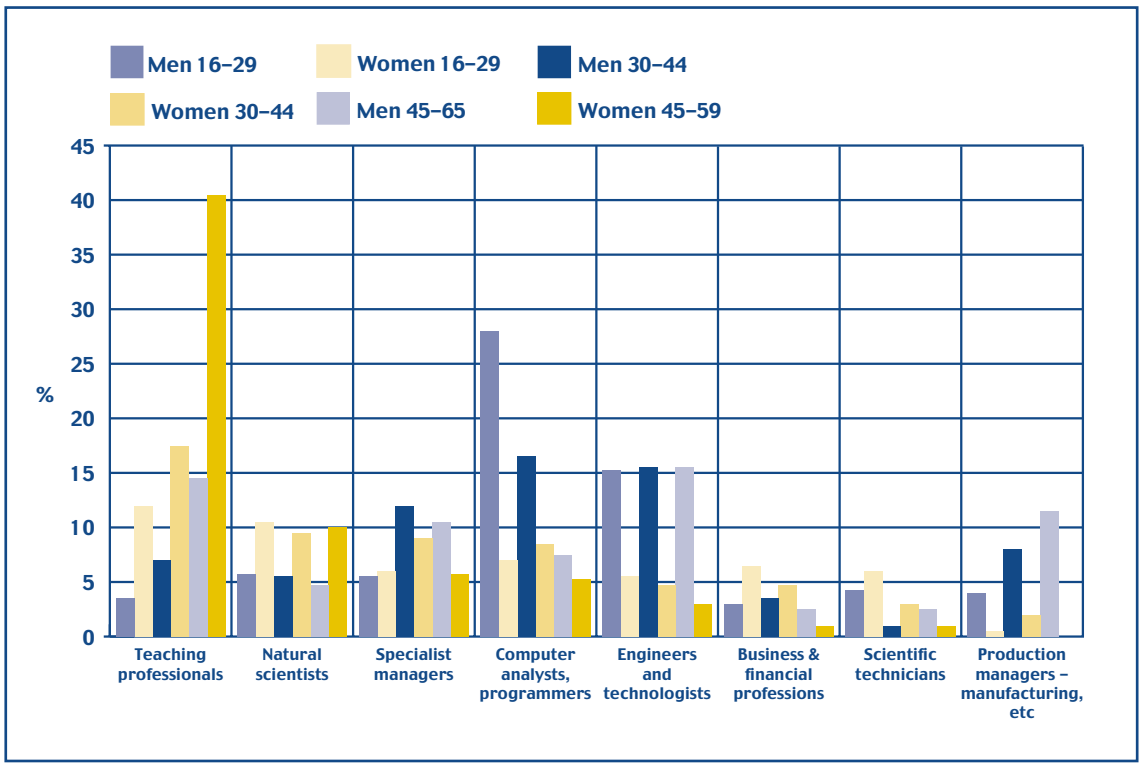



The majority of SET degree holders are not employed in SET occupations as defined in this study. They may, however, be going into related occupations in SET industries, such as sales and marketing. For example GlaxoSmithKline employs 16,500 staff worldwide in research and development but over 43,000 in sales, many of whom will be scientifically qualified. Others use their degree as an entry-level qualification to other occupations. The IER report details the full spread of career options taken up by SET graduates. Figures 8a and 8b show the principal occupations of SET graduates by gender and age in 2000. Principal occupations were defined as those where in excess of 3% of SET graduates of either gender are employed.

There are some interesting results. Over a quarter of male SET graduates aged under 30 are employed in computer-related careers, but the percentage of men in computing declines with age. Young women are much less likely to work in computing than young men but, perhaps surprisingly, a higher proportion of women in the middle age bracket work in this area. This ties in with the later observation that women SET graduates returning to work are more likely to be employed in this sector than other women.

Older men, aged 30 and over, are more likely to be in production or specialist management roles. It is interesting to note that a similar percentage of male SET graduates are engineers and technologists in each age group.

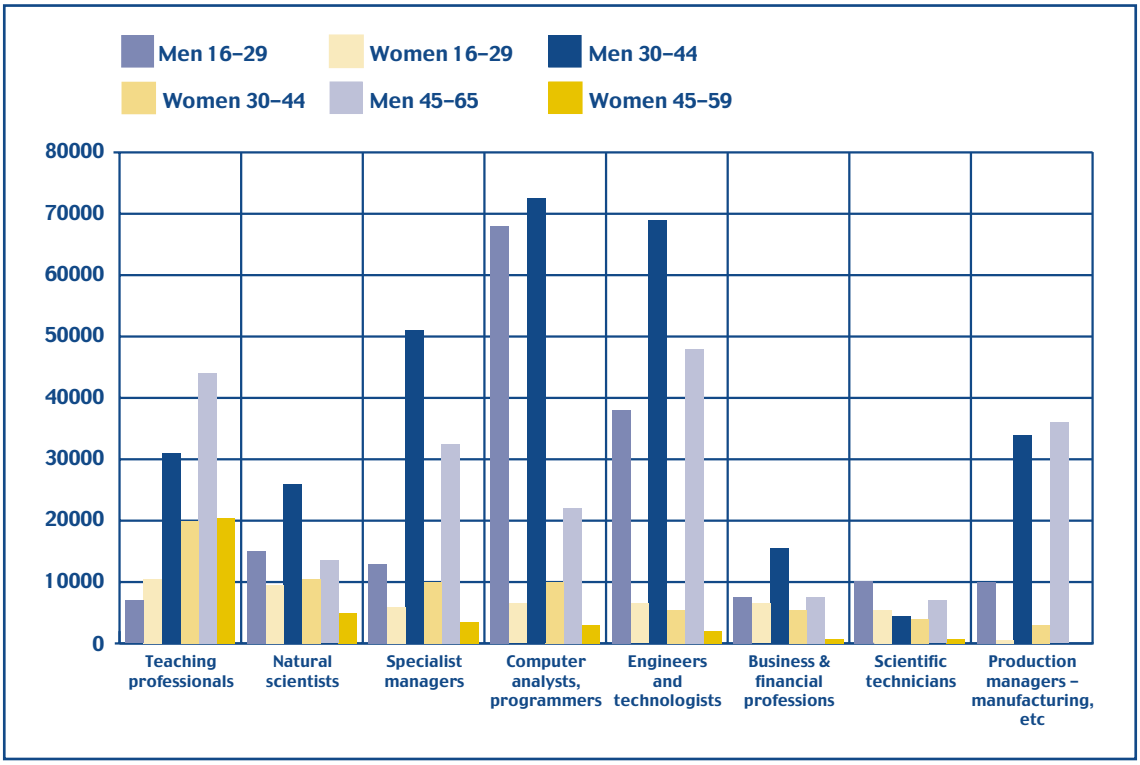
Figure 8a: Principal occupations of SET graduates, 2000 (percentages)




Looking at the situation for women it can be seen that the percentage of women in technician roles declines with age, but more young women than young men are employed in this way. Younger women are employed in the financial and business professions to a greater extent than their older counterparts. This seems to be a clear example of younger women using their degree as an entry-level qualification rather than as something that is essentially vocational. This is reinforced in the more detailed data presented in the IER report, which shows that female SET graduates work in a more diverse range of careers than male SET graduates.

Figure 8a reveals some interesting points with regard to teaching as a career choice. First, it is a principal career option for women SET graduates. It can clearly be seen that teaching is attractive to young women, with 12% of 16-29-year-old women SET graduates employed in the profession in 2000, a higher proportion than in any other single profession. The proportion of women SET graduates who were teachers increases with age and in the oldest group two out of five women with SET degrees were teachers. It has been hypothesised that older women are employed in teaching because fewer occupations were open to them when they graduated than are open to young women graduating today (Blackwell, 2001).

Figure 8b: Principal occupations of SET graduates, 2000 (total numbers)

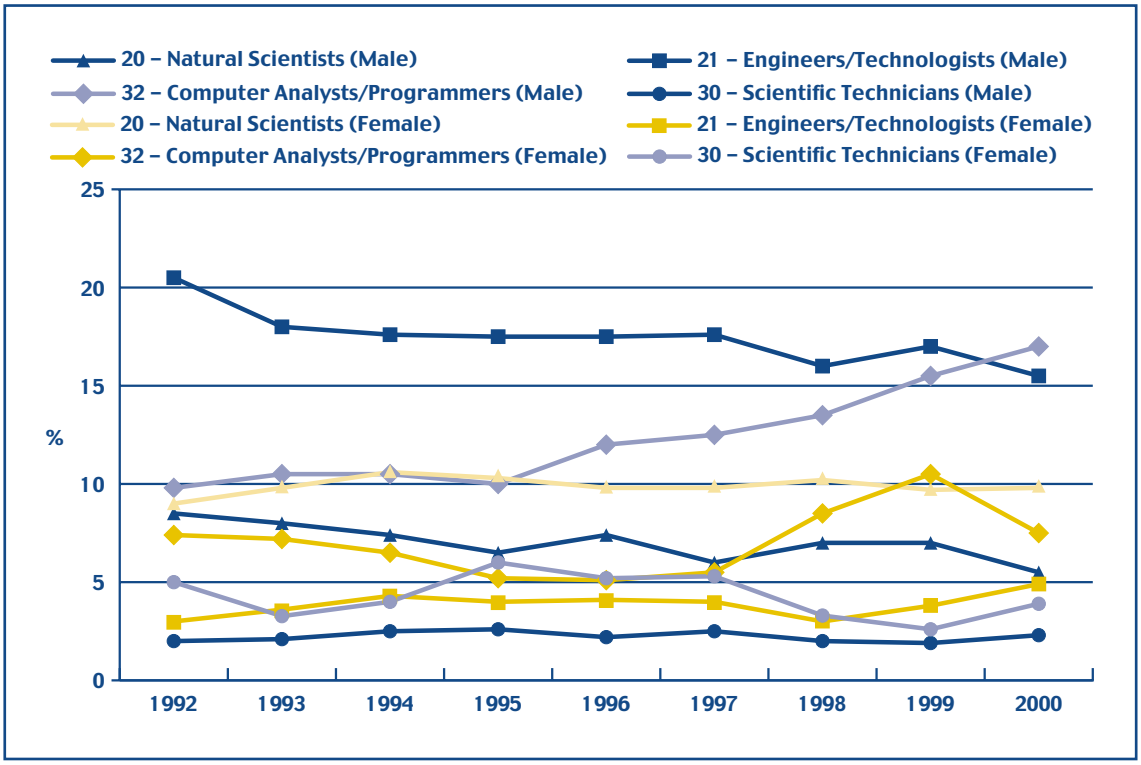



However, it is also true that for male SET graduates, the likelihood of being a teacher increases with age and figure 8b shows that almost half of the SET graduates in teaching are over 45. The qualitative research undertaken during this study identified that for some men this was the result of redundancy while some women saw teaching as something they might consider later in life, when they had children or if other options did not work out. It is worth considering further analysis of the supply of science teachers, if moving into teaching later in life is a reasonably common decision for SET graduates then the concentration of teachers in the older group is not necessarily a concern. If, however, many of the existing teachers in the older age bracket have been in teaching since graduating, then the supply of SET-educated teachers may become seriously constrained. If teaching is a choice made later in life it would appear sensible to continue the efforts to draw in SET graduates to teaching in mid-career. This is a strategy that could work equally for both genders, whose past employment and other experiences will provide teachers with a range of skills and experience.

Figure 8b also confirms that a large number of male SET graduates have reached specialist or production management posts by their mid-forties.

It should be remembered that although the number of SET graduates qualifying is increasing year on year, the number of SET graduates in the 16-29 bracket is smaller than that in the 30-45 range as most people do not graduate until their early twenties.

Figure 9: Occupation of SET graduates within SET, 1992-2000




Looking at employment within SET, women SET graduates are more likely than their male counterparts to be employed in science rather than engineering and technology or computing. This reflects the subjects they are studying to degree level (figure 5). Women SET graduates are also more likely than men to be employed as scientific technicians, although figure 8 shows that employment in this particular occupation is strongly correlated to the age of female SET graduates.

Figure 9 looks at the occupations of those employed within SET. A number of points are evident. First, the percentage of male SET graduates employed as engineers and technologists has been falling over the 1990s while the percentage employed as computer analysts and programmers has risen.

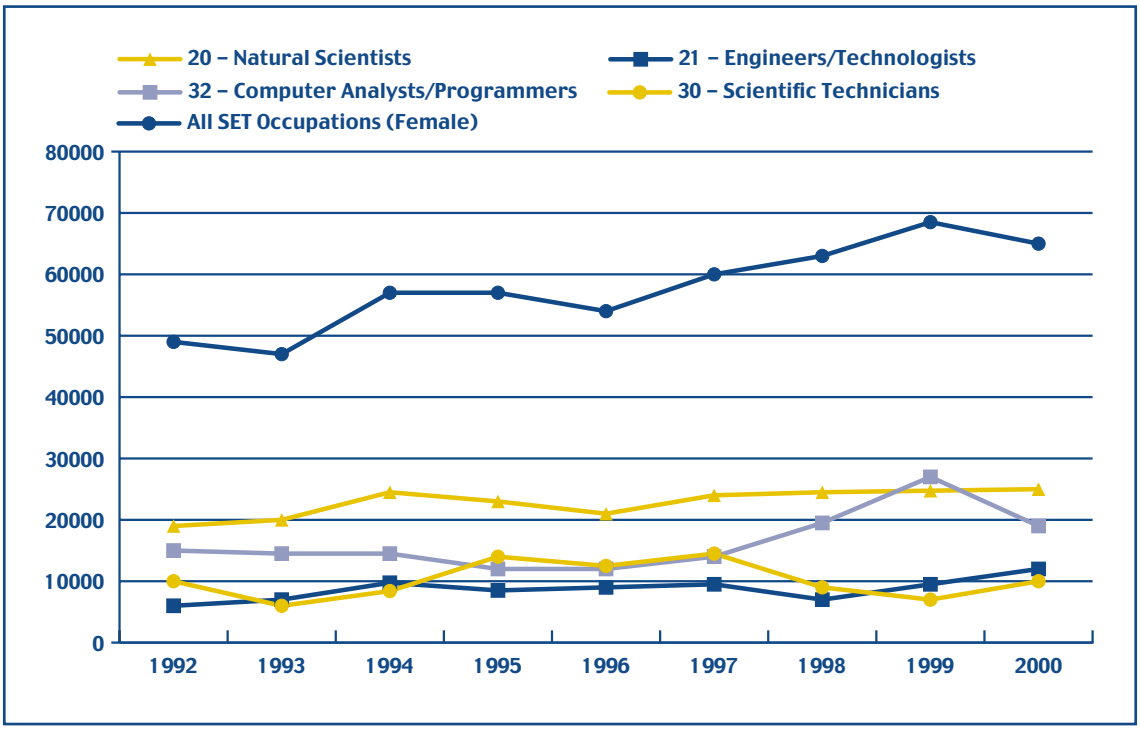
The pattern for women is different. Women are more likely to be employed in the natural sciences than in engineering and technology, although a greater proportion of women SET graduates have found employment in these latter occupations towards the end of the period. The increase in demand for computing staff is evident but there is a suggestion in the data that women may have suffered greater job losses than men from the end of the "dot.com" boom. However, this may be a blip in the overall trend, resulting from the small sample sizes.

Women with children need flexibility, as the next chapter shows. Choosing to work in science rather than computing, engineering and technology may, therefore, not be the best strategy for women SET graduates in terms of the potential for flexible career options later in life. Not only has employment growth been greater in the engineering and technology sector (Wilson, 2000)

but the qualitative research undertaken as part of this study suggests that science occupations may be less flexible than technology and engineering. The interviews with returners and human resources staff, reported in more detail in the next chapters, suggest that this is because jobs in science tend to require at least some time spent in laboratories or with particular facilities. The respondents suggested that technical and to a lesser extent, engineering, jobs can be done off-site, including from home, because research and design work is more likely to be computer-based.

## 2.5 Female SET Graduates

Figure 10: Employment of female SET graduates within SET, 1992-2000




When the total number of female SET graduates employed within the key SET occupations is considered (figure 10), we can see that from 1992 to 2000 there are increasing numbers employed in all of the occupations, save for that generally regarded as the most "junior", scientific technicians. In particular, the number of women in computing has increased markedly.

Figure 11: Employment of Female SET graduates in SET by age, 1992-2000

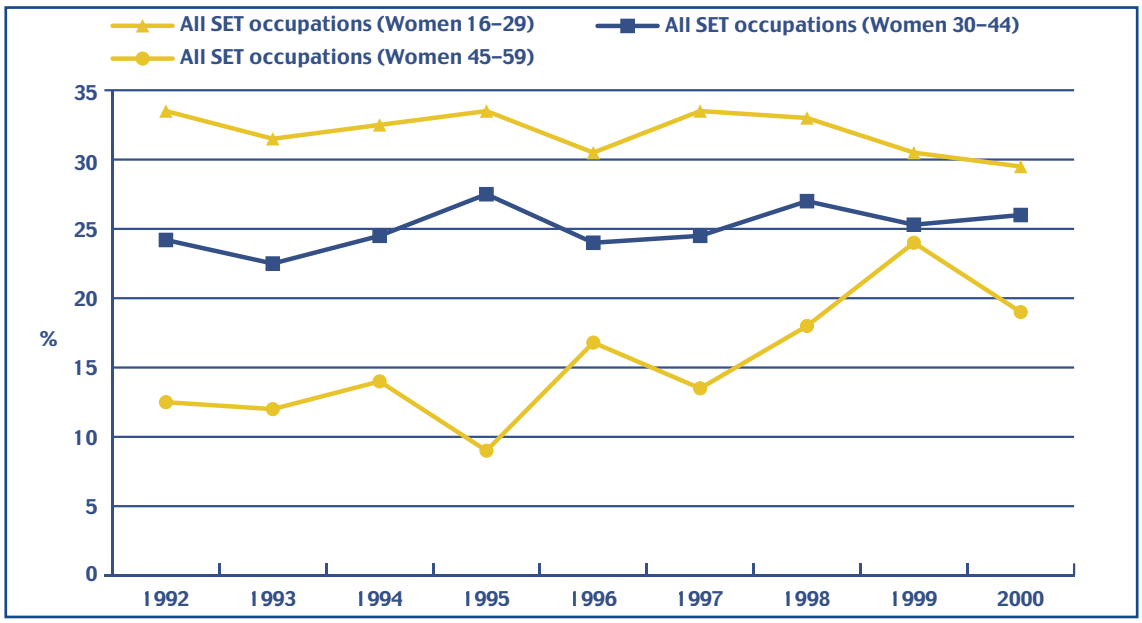



Figure 11 shows the percentages of female SET graduates in each of three age groups employed in SET occupations. A greater proportion of the youngest age group, compared with the older age groups, are employed in SET occupations. Interestingly, the percentage of women in the oldest category who are employed in SET has been rising. The absolute number of older women employed in SET has risen from 4,500 to over 10,000 over the period. This could be due to either more women staying in SET careers or some returning in later life. The IER report provides full data on the occupational categories for all age groups and while the sample sizes are small for the oldest group there is an indication that the number of them employed in computer-related jobs is increasing, suggesting that some degree of retraining and returning is occurring.

Figure 12: Economic activity of women with SET and non-SET degrees, 1992-2000

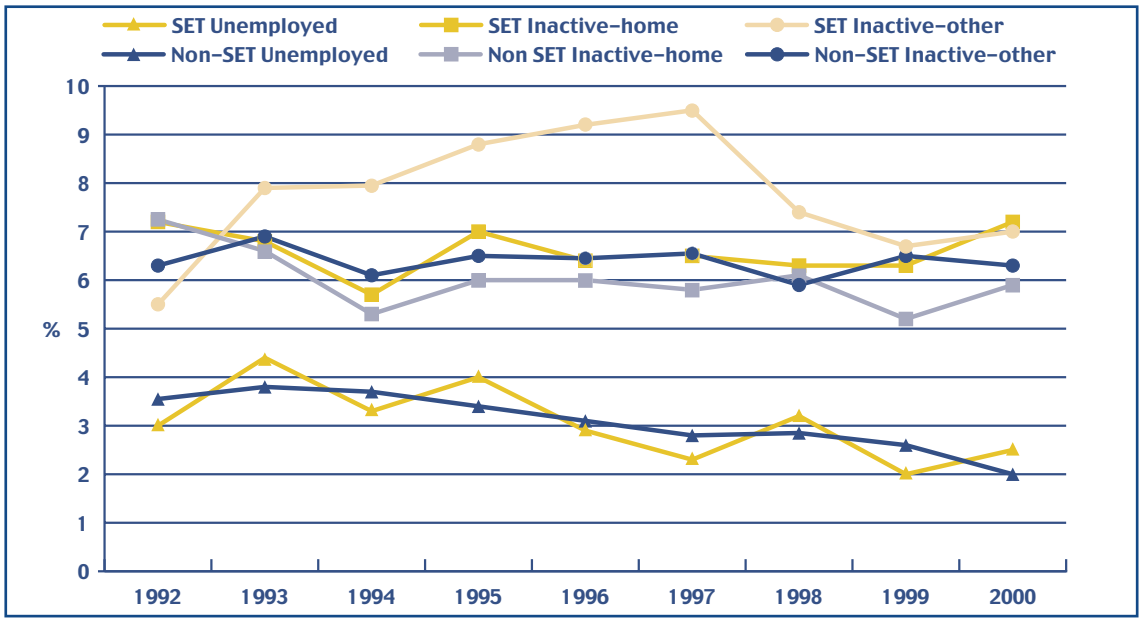


Figure 12 looks in more depth at female graduates who are economically inactive. For female graduates over the period 1992-2000 the levels of unemployment amongst those with both SET and non-SET degrees were very similar. However, there was a consistently larger proportion of SET graduates who were "inactive-home" and higher rates of SET graduates who were "inactive-other" although the gap between SET and non-SET graduates in this last category has diminished in the later years.

In order to investigate this lower level of economic activity amongst SET graduates further, the LFS was used to examine the nature of SET occupations in terms of hours worked and the prevalence of part-time and shift working. The purpose of this analysis was to identify whether or not there are specific problems that women SET graduates working in SET might face when compared to women in other graduate level occupations.

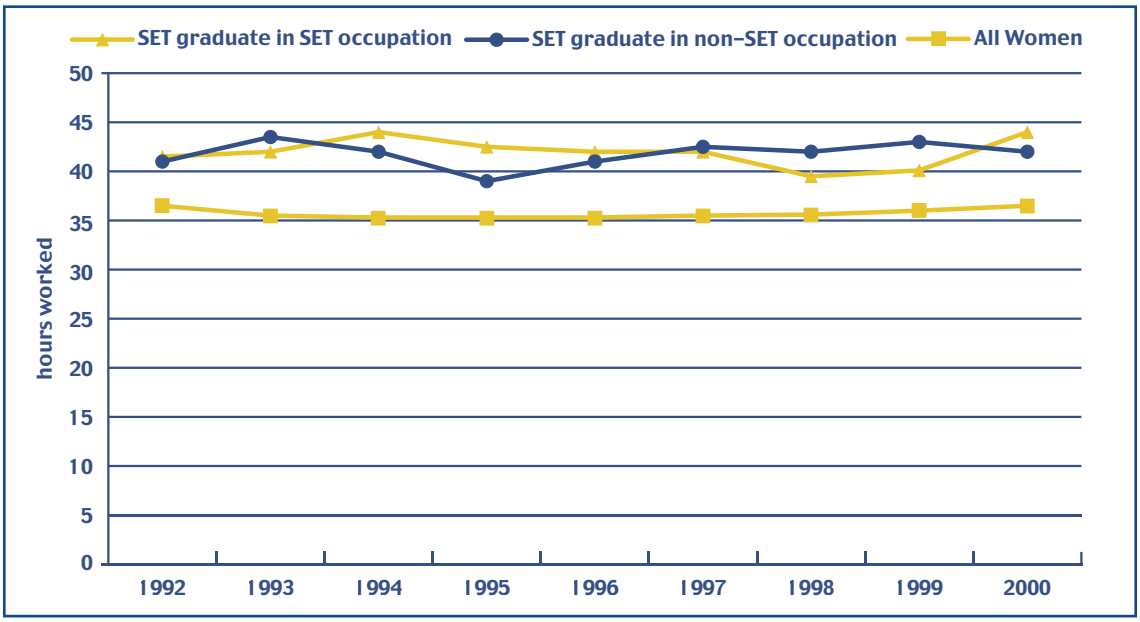
## 2.6 Flexible working

During the qualitative research, some interviewees suggested that SET graduate occupations, as defined by this study, might be less flexible and more demanding in terms of hours worked and flexibility, than non-SET graduate occupations. We therefore compared the hours worked by women SET graduates employed in SET occupations with the hours worked by women SET graduates in all other occupations, benchmarked against all employed women (both graduates and non-graduates). For these same three groups we also compared the prevalence of part-time and shift work.

### 2.6.1 Hours worked

Figure 13 shows the average hours worked by SET graduates in SET and non-SET occupations, compared to the average for all women. Comparing the usual hours worked per week by female SET graduates working in SET and non-SET occupations we can see that taken over the decade there is little difference. Certainly there is no indication that women SET graduates are choosing non-SET jobs in order to work fewer hours.

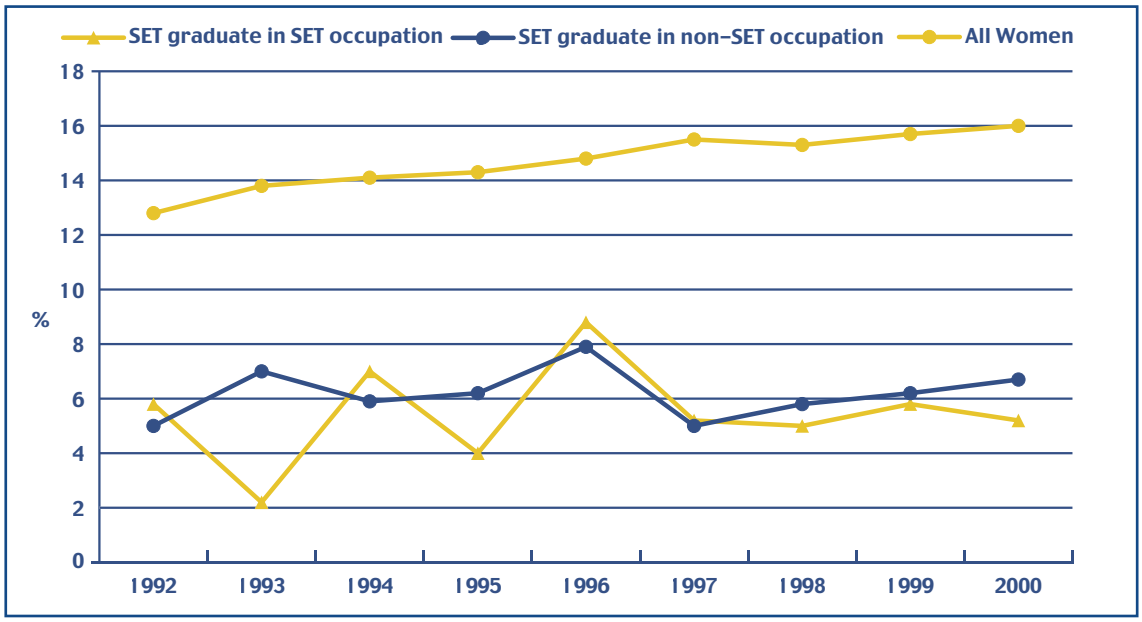
Figure 13: Total usual hours worked (mean), women 1992-2000



### 2.6.2 Shift work

Figure 14 shows that women with SET degrees are far less likely to work shifts than other women. Comparing women SET graduates in SET and non-SET occupations we can see that despite some slight variations over the period, which has been exacerbated in this figure by the small sample sizes, that there is little marked difference apparent.

Figure 14: Shift work in main job, women 1992-2000



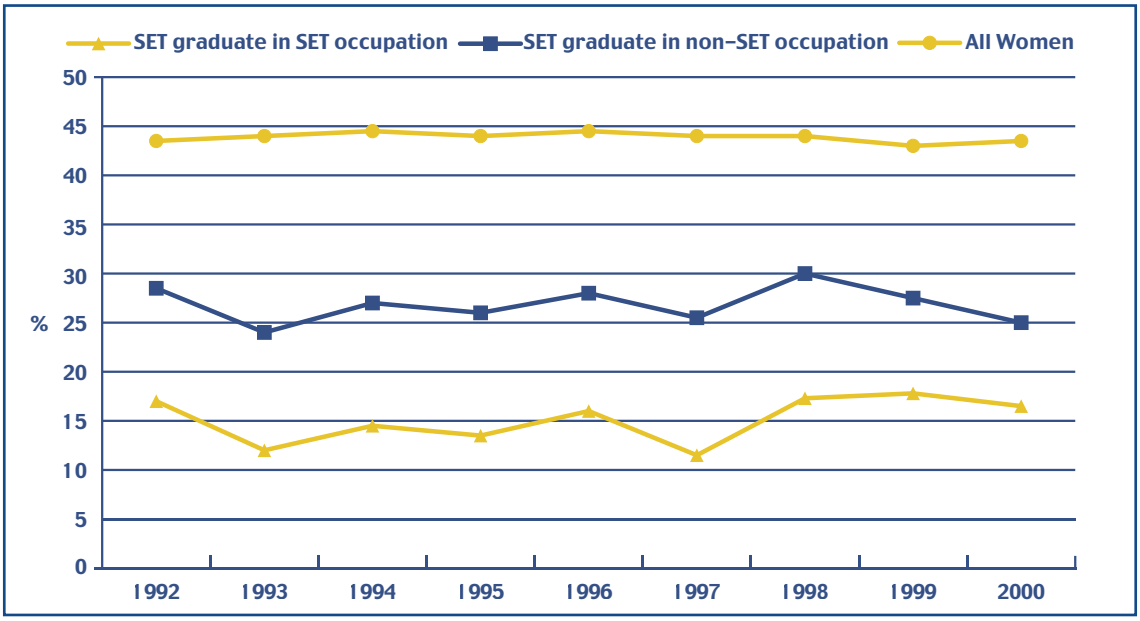

The interviews with employers in the SET production sector found that shift working is likely to be required in the early stages of a graduate career and this is borne out by the detailed data in The IER report. However, these results suggest that shift work per se is not something that disproportionately affects women working in SET occupations.

### 2.6.3 Part-time working

Figure 15 compares the preponderance of part-time working for female SET graduates working in SET occupations compared with those working in non-SET occupations. The chart also shows the percentage of all women who work part-time. It shows clearly that women with SET degrees are far less likely to work part-time than other women. The latter is heavily skewed by the dominance of non-graduates in the labour force. The IER report shows that graduates (from any discipline) are less likely to work part-time than non-graduates.

There is also a significant difference between SET graduate women working in SET and non-SET occupations, with the latter much more likely to work part-time. The interviews with employers that are discussed in chapter 5 cast some insights into the reasons for this. (See also McRae et al, 1991). The availability of part-time work for women in the SET sector is an issue that needs further investigation. This may be a reason why women with SET degrees are less likely to be employed once they have children, an issue that is discussed below.

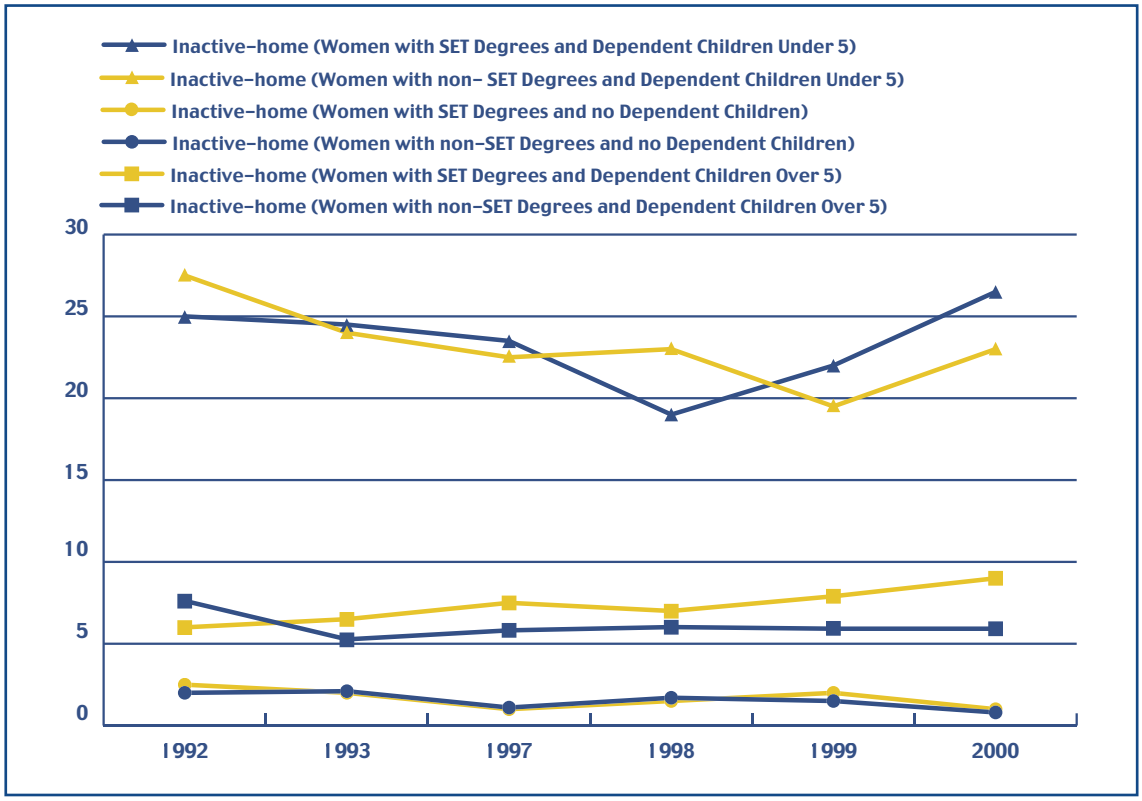
Figure 15: Part-time employment in main job, women 1992-2000




## 2.7 The Impact on Women's Employment of Dependent Children

While economic activity amongst women with children has increased in the labour market, women with dependent children, and particularly dependent children under five years of age, are less likely to be employed than those without children. This is also the case amongst women with qualifications (Adams and Tancred, 2000). Glover (1994), examining the economic situation of women with SET qualifications, found that while the number of children has little effect upon the employment status of women with SET qualifications, the age of the youngest child has a significant negative effect. Those with younger children are more likely to work part-time compared to women with no or older dependent children. Devine (1992) found in her study of women with SET qualifications, that childcare responsibilities were judged the greatest impediment to career progression. Figure 16 illustrates the impact the presence of dependent children under five has upon female employment. This is the case for both women with SET and non-SET degrees, with little noticeable difference when the data is taken over the full period.

Figure 16: Economic inactivity rates of women SET and non-SET graduates, 1992-2000

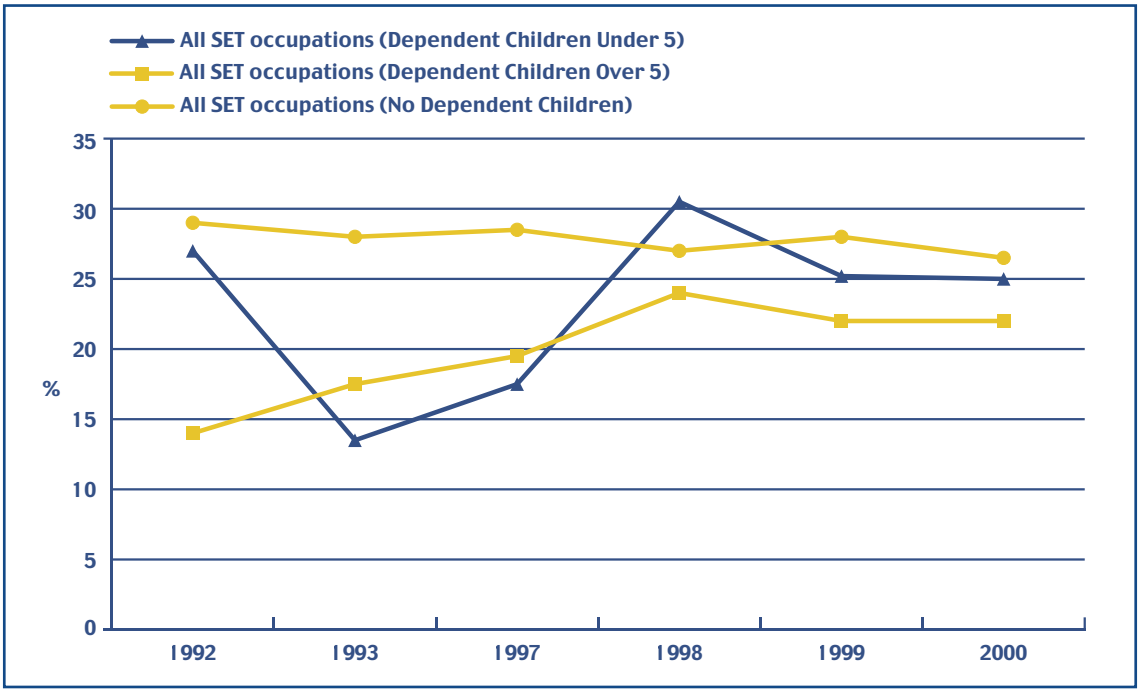



The detailed data in the IER report shows that there has been a steady increase in the proportion of SET and non-SET graduate women with young children who work, although there are considerable year-on-year fluctuations due to the small sample size. To some extent this reflects the increasing tendency of women to take maternity leave and return to their job rather than leaving work (Thair and Risdon, 1999).

Women with dependent children under five are the least likely to be employed and there is little difference between SET and non-SET degree holders. Of much greater interest for this study is that women with SET degrees and dependent children all over five are increasingly less likely to be employed and are noticeably less likely to be employed than their non-SET counterparts. As figure 15 shows and chapter 5 illustrates further, this might be the result of less flexible employment conditions in the SET sector. When children are at an age that childcare has to fit round the school day it can be more difficult to organise than all-day care for pre-school children. In the qualitative research, employers, as well as women with children, recognised after-school and holiday care as "the real issue".

The proportion of women with SET degrees employed in SET occupations has remained fairly steady at around 25% but the family composition of these employees is changing.

Figure 17: Impact of children on employment of women SET graduates, 1992-2000



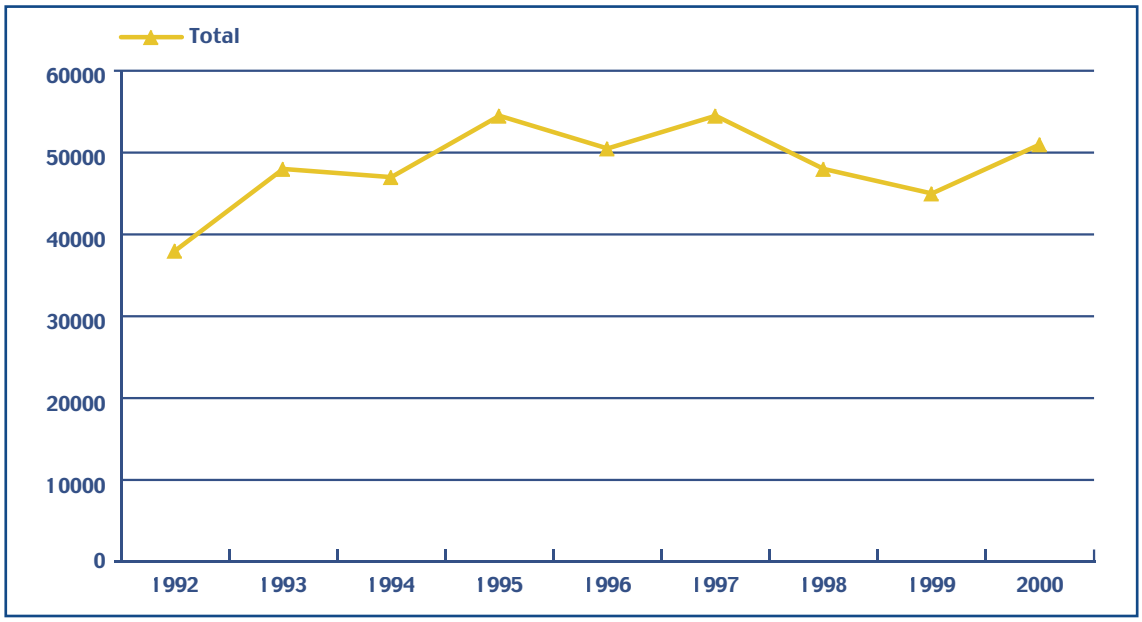

It can be seen from figure 17 that a greater proportion of female SET degree holders without children are employed in SET occupations than those with children. However, over the period of the study the gap has narrowed considerably. This is probably a reflection of increasing emphasis on work-life balance practices in SET industries. Companies have put considerable effort into policies to retain staff after maternity leave. For example, Glaxo Wellcome (as was) introduced flexible work and childcare services and saw the return rate for employees after maternity leave increase from 40% to 97%. The implementation of these programmes is reflected in the fairly rapid increase in the proportion of women with children under five in employment between 1993 and 1999, which has now levelled off.

The difficulties faced by those with dependent children over five are reflected in figure 17. While there has also been an increase in the proportion of women with dependent children over five who work, the proportion is lower than for those with younger children. The LFS analysis presented above suggests that the structure of work in SET may be a reason for this as part-time working is less prevalent. The interviews with employers presented in chapter 5 provide evidence that while it has become "commonplace" and accepted in some industries for women to reduce their hours for a period of years mid-career, this has not happened to the same extent in SET-based industries. While there are practical reasons for this, such as the need to use specialist resources to conduct tests and experiments, human resource personnel believed that some line managers were resistant to change, did not understand the issues facing those with caring responsibilities, nor the business case for flexibility and "[did] not think creatively enough" about solutions to individual circumstances. There was also the suggestion that employees are not prepared to challenge existing cultures.

## 2.8 Returning to Work

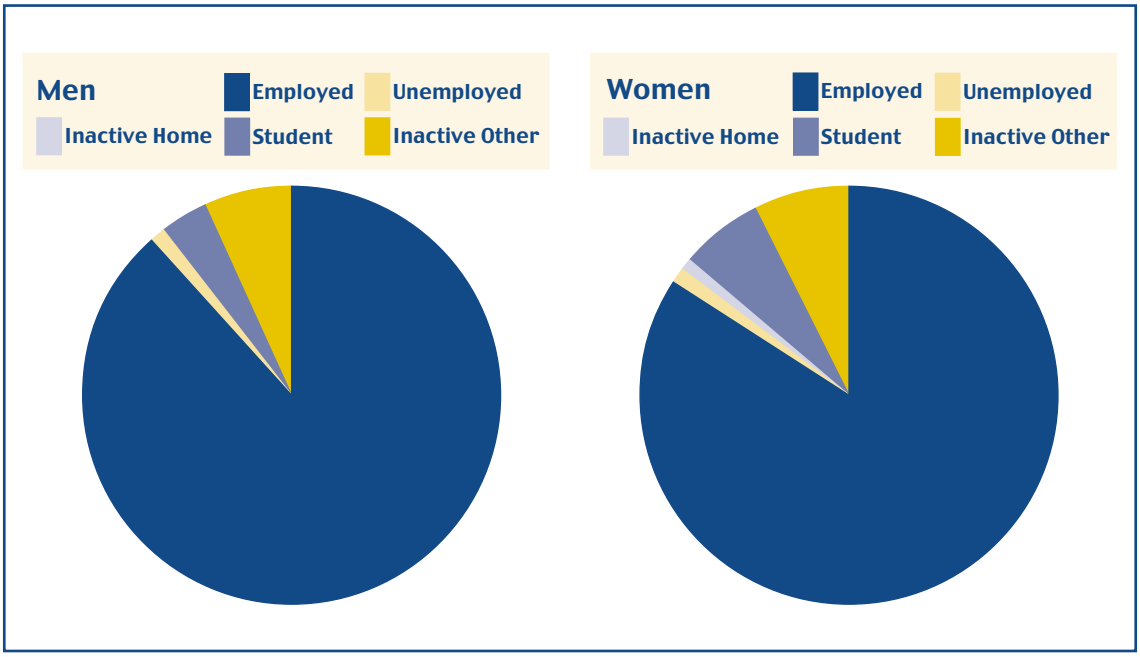
This section uses the LFS data to examine people returning to work in more detail. Within the constraints of the LFS, a returner is defined as someone who was working at the date of the LFS interview but not 12 months previously.

Figure 18: Currently not employed women SET graduates, 1992-2000




The LFS data in figure 18 shows that 51,000 women SET graduates were not employed in 2000. The trend since 1992 has been a gradual increase in the number of female SET graduates who were not employed. Most of the rise is a result of the increasing numbers of people who were either inactive - other or inactive - home a year previously. During the period of the study, the proportion of female SET graduates not employed fluctuated between 16 and 20% of the total number of women with SET degrees. Figure 23 reinforces the message that economically inactive female SET graduates tend to stay out of the labour market for extended periods.

Figure 19: Employment status 12 months before LFS interview - SET graduates currently employed, 2000




Approximately 250,000 women with SET degrees were employed in 2000, a figure that has risen steadily from 200,000 in 1992. Figure 19 shows the employment status 12 months before the LFS interview, for men and women separately. Some 1%, or just under 2,500 women had been inactive - home 12 months earlier, while no men employed at the time of interview were inactive – home one year previously.

Returning to work from looking after a family is therefore predominantly an issue that affects women. Dealing with the practical problems of returning to employment is the responsibility of employers, managers and partners as well as the women returning to work themselves.

However, there are far more male and female SET students and men and women with SET degrees who had been inactive for other reasons, moving into employment each year. In 2000 16,000 female SET students and 36,600 male SET students entered employment. One third of these women and one half of these men went into SET occupations. In addition, 3,000 women and 11,500 men SET graduates returned from unemployment and just under 19,000 women and over 67,000 men SET graduates who had not been working for other reasons, returned to work. They did not necessarily return to SET occupations. These other reasons are primarily: sick and disabled; waiting to start a job already secured; do not need or want to work; and retired. It is likely that most of the men in this group will be job changers waiting to start a job already secured, which suggests labour turnover of about 7% per annum. A sizable proportion of inactive women, however, have been out of employment for more than a year. This suggests they were not simply changing jobs.

The largest stock of experienced SET qualified people not working, at 51,000, is therefore, women not working, almost half of whom are looking after their families. It is therefore important to determine whether the proportion of these women who have returned to work in the last year, have returned to SET occupations or not.

Figure 20: Occupational distribution of female SET graduate returners, 1992-2000

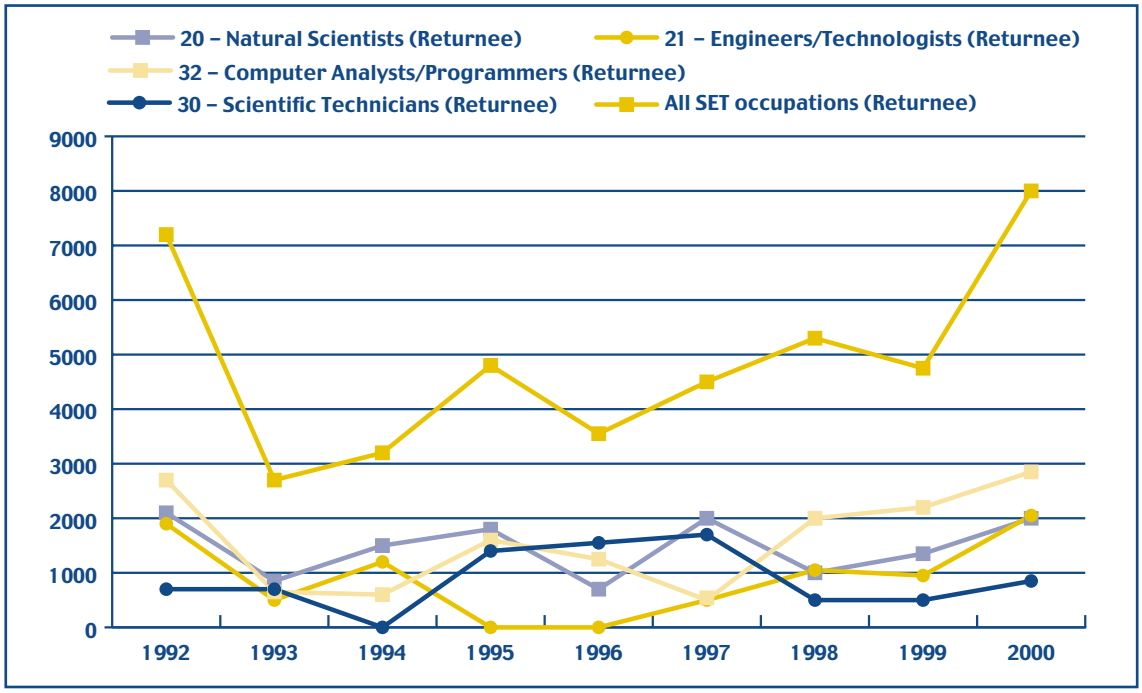



Figure 20 shows that in 2000 approximately one third of SET graduate women returners (8,000) returned to SET occupations. This means that women SET graduates who returned to the labour market in that year were more likely to be employed in a SET occupation than those women who are employed, but not returners. The more detailed data in the LFS shows that this is not a consistent trend over the analysis period, with the level of employment in SET occupations for returners fluctuating around the 25% level for all female SET graduates seen in figure 7. Within SET, women returners were more likely to be employed in engineering and computer occupations. The sample size is too small to allow us to look at women returning from inactive – home separately.

Although the small sample sizes of returners produce considerable year-to-year fluctuations in the data, and a longer time period would benefit the analysis, it is clear from figures 21 and 22 that returners were more likely to work part-time than other women but not to undertake shift work.

Figure 21: Part-time employment - women SET graduates, 1992-2000

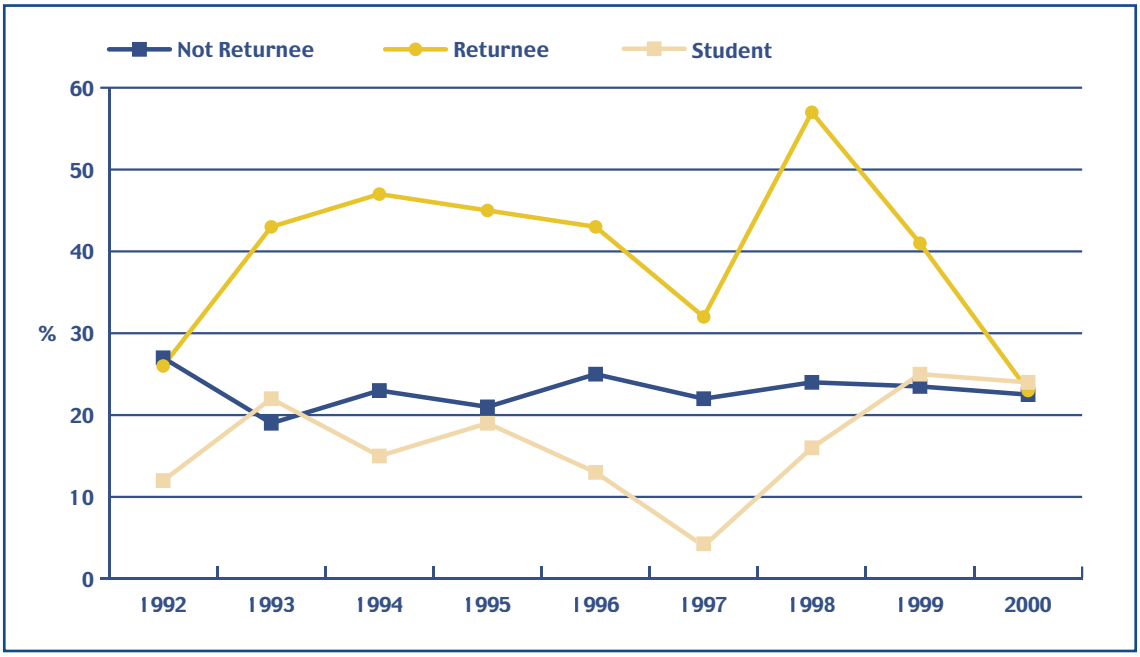



Figure 22: Shift work - women SET graduates, 1992-2000

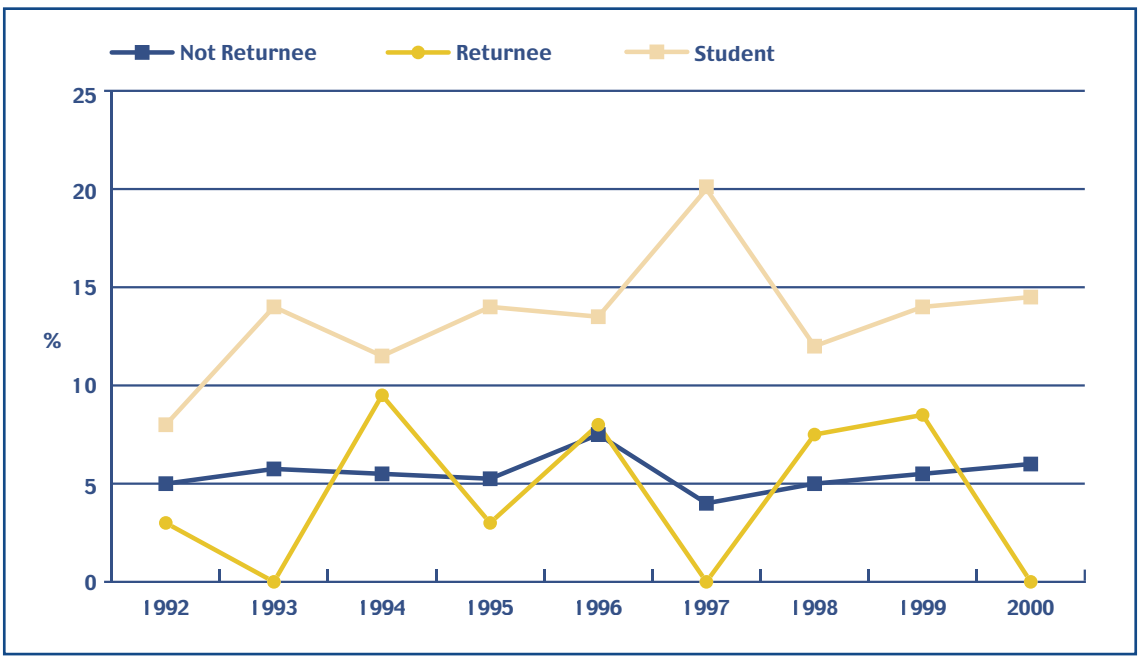
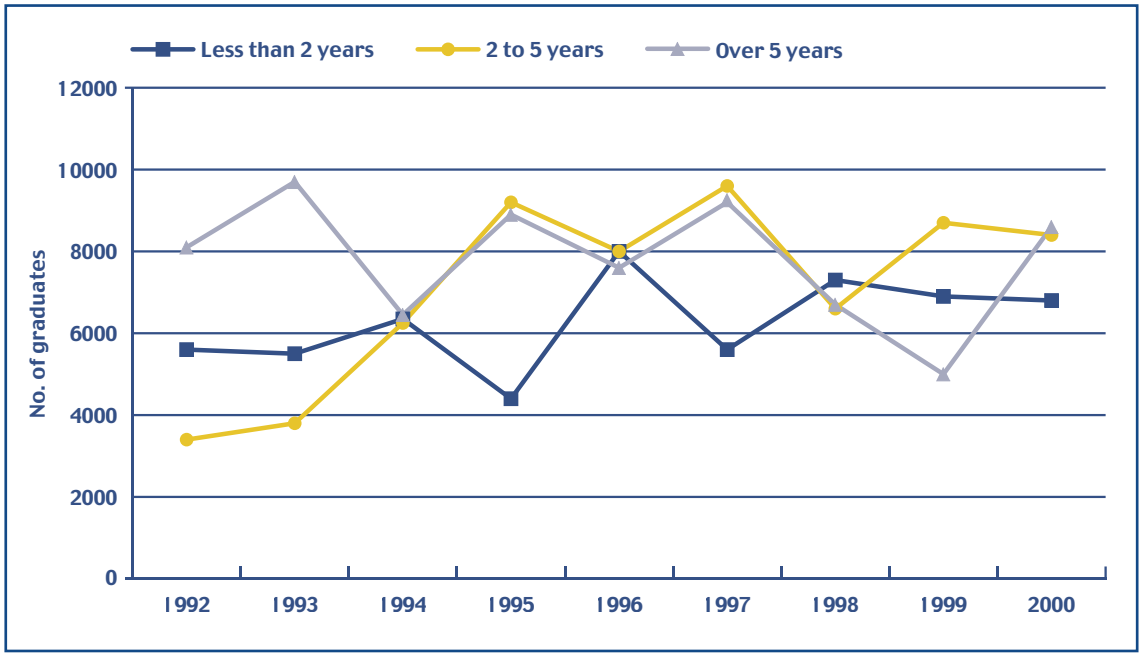


Figure 23: Years ago left last job - women SET graduates (30-44) not employed at the time of the survey, 1992-2000




There are some indications from figure 23, which looks at the 30-44 age group, that women were taking less time off for family formation in 2000 than in 1992, although the small sample size results in some fluctuations year-on-year. In 1992 50% of this age group, who were not employed at the time of the survey, had left their last job more than five years previously but in 2000 this had declined to 37%. However over 70% of these women had not worked for at least two years.

## 2.9 Conclusions

The single most important finding of this analysis of the labour market in terms of addressing potential skills shortages in SET is that only a minority of SET graduates are employed in SET occupations, as defined in this study (40% of men and 25% of women). Figure 8 shows that although the financial sector draws in a significant number of SET graduates, this is small compared to the number in SET occupations. If ongoing activities, such as the "Roberts Review", show that there is a greater need for scientists and engineers in the labour force, then it will be important to understand:

- whether graduates are using their subject knowledge in other occupations;
- why some choose not to use their subject having spent at least three years studying to degree level; and
- how these choices can be influenced.

The most effective strategy for addressing skills shortages from the existing labour supply is less clear-cut. It might be argued that the pool that should be targeted, as it is comfortably the largest at just under 600,000 in 2000, is male SET graduates who are not currently employed in SET.

Within this group only 1.7% were unemployed while about 75,000 were inactive – other. It appears likely that most of these inactive – other men will be waiting to start jobs they have already secured, others will be sick disabled and retired and a few will not need or want to work.

Women with SET degrees on the other hand are economically less active than their male counterparts or female non-SET graduates. This is despite the fact that women SET graduates enter a far wider variety of occupations than their male counterparts. Currently inactive female SET graduates provide a pool of approximately 50,000 potential returners, although by no means all of these people will be interested in returning to work, never mind to SET occupations; consequently the pool of likely returners will be far smaller.

Women with SET degrees and children are less likely to be employed than women with children and other degrees. In particular, women with SET degrees and older children are less economically active than their non-SET counterparts.

When we look at the length of time that women with SET degrees, who were not working at the time of the LFS interview, have been out of employment we can see that on average between two thirds and three quarters have been out of employment for at least two years and almost 40% have been out of employment for at least five years. These women are the least likely to have experienced any recent improvements in employers' attitudes to work-life balance issues personally and may, therefore, be difficult to attract back.

We have found that women with SET degrees employed in non-SET occupations are more likely to be working part-time than those working in SET occupations. The next chapters explore whether and why SET occupations are less flexible than others and whether there are other barriers to employment in SET faced by women qualified in SET. However, we have seen from the LFS data that there is less part-time working in SET occupations than non-SET occupations. For people who have been out of the labour market for some time and who have been the primary carer for a number of years, this may reduce the opportunities to re-enter a SET career.

For anyone considering returning to SET there is a perception that the longer they have been away the more new knowledge there is to catch up on. That said, we have seen an increasing number of returnees to SET during the latter part of the 1990s. While the numbers are small, with an average of about 5,000 per year, there are increasing numbers returning to computer-based and technology-related jobs. This suggests that to some degree market forces are having an impact.

# 3. Attitudes to SET Occupations

## 3.1 Introduction

This chapter uses the results from qualitative research with men and women holding SET degrees and some experience of working in SET occupations or of teaching SET, to identify barriers to people re-entering SET occupations following a career break. By examining the experiences of men who have left SET completely or who have left and re-entered SET occupations, it has been possible to identify generic issues to returning and factors that might affect women disproportionately. References have been used to give a broader context to the primary research conducted for this study as appropriate. Throughout this section the italicised quotes are from respondents.

## 3.2 Choosing to Study SET beyond Compulsory Level

The two main reasons respondents had chosen to study science post-16 were:

- natural aptitude; and
- family background.

For the most part respondents, both men and women, had chosen to study SET subjects because they felt they had a natural aptitude for these subjects. Comments such as *"it was my best subject"*, *"I found it easy"* or *"I just found it interesting"* were the most common. References were also made to enjoying the problem solving and challenges of the science, having a *"logical mind"* and not liking subjects that are *"all opinions...I like facts and stuff"*.

Several respondents said that their schools had tended to channel young people into science and non-science streams and that students had not questioned this.

Respondents often referred to their family being *"more science oriented"* or one or both parents being employed in a SET occupation, although in most of these cases respondents did not feel that members of their family had unduly influenced them towards studying science. In addition, a few people referred to being aware of family members or friends, sometimes cousins or aunts and uncles, who had jobs in science that sounded interesting. In these cases relatives or friends of parents acted as some form of role model but on the whole this enhanced some, already evident, natural ability. Some parents, however, discouraged their children from taking SET options because of the perceived rates of pay in the sector.

The role models mentioned spontaneously were always people known personally to the respondent. These included family members, friends of the family and teachers, and careers research identifies that these are still the biggest influences (Centre for Research in Education Marketing, Southampton University (2001)). When the issue of *"famous"* role models was explicitly explored with respondents it was felt that these operated on a different level. Some felt that famous examples of SET workers served to illustrate how a subject could be used or how one might develop a career later in life once initial decisions on what to study had been taken.

**Method** **Box 4**

## Research Method

The research method used for this part of the study involved interviewing a cross-section of people with various characteristics thought to be important for the issues under study. Participants were interviewed in small groups, in pairs or on their own. The purpose of this work was to uncover the range of issues that are relevant to SET returners. The results are in no way representative and it is inappropriate to try to establish numerical data from the findings. One person may mention something that is of no concern to anyone else; on the other hand it may be a widespread concern. This methodology will identify issues, but will not uncover how many people think something or behave in a particular way. Consequently, no numbers are mentioned in reporting this type of data.

Ten mini-focus groups were undertaken in four towns:

- Reading;
- Birmingham;
- Manchester; and
- Stockton-on-Tees

The mini-groups were held in January 2001. In total 37 people were included in the groups. Using mini-focus groups of three or four people, rather than standard groups of eight enabled the research to explore individual circumstances, while at the same time benefiting from the memory triggers and wider exploration of views that groups enable.

Two mini-focus groups were held with each of the following types of people, all of whom had SET subject degrees and some experience of using their degree subject after graduating:

- Women who have continually worked in SET, with and without children.
- Women currently on a career break looking after the family or home and seeking to return to work, whether to SET or another area.
- Women who were previously on a career break looking after the family or home and have returned to work in a non-SET occupation/industry.
- Women currently working in non-SET occupations/industries having worked in SET in the past but whose move out of SET did not follow a career break of any sort.
- Men who have worked in SET in the past but who no longer do so.

SET subjects studied by the participants included:

Life sciences, electrical engineering, mathematics, environmental studies, physics, chemistry, pharmacology, aeronautical engineering, mechanical engineering, computing studies, cybernetics, food science, psychology and sports science.

Their current occupations included:

Teaching (science, design and technology, maths and English), sales – both technical and non-technical, purchasing, occupational therapy, web design, regulatory affairs, school support, environmental health, police scene-of-crimes service, sports and leisure, technical design and sales, speech therapy, nursing, environmental consultancy and ownership of a chemical sourcing company.

No ages were specified in the recruitment process but participants were aged between about 25 and 55 with the majority being in their 30s and 40s.

In addition, another focus group of women and 11 in-depth interviews were conducted, including five with men. These interviewees were men and women who had returned to SET following a break from working in SET. The breaks included periods for childbirth, travelling and studying as well as time spent in non-technical occupations.

These interviews were conducted with employees of the employers interviewed as part of this study, the results of which are reported in the next chapter. Six of the interviews were conducted on the telephone. The interviewees were all in England and the areas covered were:

- the South-West;
- the North-East;
- East Anglia; and
- the Home Counties.

A one-day workshop was also held to canvass the views of women who had taken career breaks and were working in, or trying to return to, academia. The workshop was advertised using a number of email lists and trade unions that reach women academics.

Eleven women came on the day from various parts of England, Scotland and Wales. They represented a broad cross-section of disciplines including biology, physics, chemistry, environmental science and astronomy. The morning focused on identifying the problems and barriers faced by women returning to science and engineering departments, while the afternoon focused on identifying potential solutions.

The qualitative research in its entirety was designed to identify the barriers to returning to SET employment after a period away. More specifically the questioning tried to identify:

- how, if at all, returning to a SET occupation is different from returning to other occupations after time out of the labour market and directly from another occupation;
- any problems on re-entry to SET and how they have been overcome;
- how, if at all, these problems are different for men and women; whether the same problems are easier for men to solve;
- reasons that women with SET qualifications and experience return to non-SET jobs after a period out of the labour market;
- reasons for leaving SET;
- whether men and women who leave SET occupations do so for different reasons; and
- issues for women working in SET occupations and how, if at all, these are different from issues for all working women, or other women professionals.

A few of the male respondents who had left SET employment felt that they had drifted into a *"male"* subject and occupation that was acceptable to their families and teachers without thinking about it very much (similar findings are reported in Webster, 1996). In retrospect they said that with *"better"* advice they might never have studied SET.

In families where at least one of the parents had attended university or had followed a fairly structured career path, it appeared that daughters choosing to study a SET subject was not questioned. In families where the respondent was the first, or one of the first, to go to university, choosing a SET subject was reportedly seen as more unusual and was questioned, although generalising from such a small sample is not reliable. One respondent said that her mother had been quite opposed until she became aware of efforts to get girls to take up SET careers, at which point she became quite proud of her daughter.

There was a feeling that when some of the respondents had been undergraduates, 20 years or so ago, some lecturers had been *"sexist"*. In addition, some of the male students were hostile to, or just unsure how to deal with, women on a SET course as they were unused to this. This was raised especially by those who had studied engineering subjects. In general, all the respondents thought that *"it is now a lot easier"* for girls, who have different expectations, although they were aware that there were still not that many women in SET occupations.

## 3.3 Choosing SET Careers

Respondents had initially chosen to work in SET occupations because they had enjoyed their studies.

All those included in this study had held a job since graduating that 'used the subject knowledge from [their] degree'. Everyone, therefore, had experience of working in a SET occupation.

There was generally a feeling from all respondents, even those only in their 20s, that the careers advice that they had received had been inadequate. Consequently there was a feeling that finding a job on graduating that used their subject knowledge and that they enjoyed was, to some extent at least, a matter of luck. It was also dependent on the economic climate on graduation and what jobs were available.

Some respondents had taken jobs in related subjects rather than those that directly used their subject knowledge. In particular, chemistry and biochemistry graduates had gone into aspects of industrial chemistry that were not what they had envisaged. Some had initially sought jobs in pharmaceuticals unsuccessfully and had therefore gone into jobs in which they were less interested, but others were simply unaware of the working conditions in the sector. More is said about this later. Environmental scientists also had to take work in related industries. It must be remembered that this is not a representative survey and generalisations cannot be made from these observations. However, many respondents said that only from experience of a sector could one decide whether it was the right job. Many agreed that it was to be expected that some people would move on.

## 3.4 Working in SET

### 3.4.1 Pros...

Those who enjoyed working in SET occupations said that this was because:

- the work was varied;
- they enjoyed problem solving;
- they were not *"office bound"*; and
- there were travel opportunities.

Some of those who were currently working in SET and happy there could not envisage an *"office job"*. These respondents had jobs that were more people-oriented and included individual consultations, laboratory work, site visits, factory working and IT training. Others who were in more *"desk bound"* scientific jobs, such as product or web design had travel opportunities or felt that the *"dot com"* environment was very relaxed. Some IT based staff tended to work alone, at a computer in an office or at home. However, these respondents were generally part of a larger project team that met regularly to discuss progress and further develop ideas. Some of these projects involved spending time at production sites.

### 3.4.2 ...and Cons

Some respondents disliked working in SET occupations[3] because:

- the job was boring and repetitive;
- they had little control over what they did and how they did it;
- of poor working environments with little human interaction;
- they could not see immediate results from their work; and
- of low rates of pay.

Some of these respondents found that *"it [a SET job] was not what I expected"*. In their SET occupations they said that their job satisfaction had been low for a number of reasons. They found the work *"boring"*, *"repetitive"*, *"process driven"* and *"predictable"* and said that they did not have control of the way in which they did their job. There was reportedly little variety or problem solving involved. The working environments were thought to be unfriendly and lacking human interaction, with little short-term feedback from managers or visible progress on projects. These negatives were not ameliorated by pay rates that were felt to be low.

**Case Study** **Woman A**

This woman has a degree in chemistry that she really enjoyed. On graduating she got a job in a chemical factory in research that she found boring and repetitive. There was no interaction with other people, her day was mapped out in advance and she had little opportunity to influence her work or they way she did things. There was also very little feedback on her performance and no obvious outcomes from her work. She is now working in the police where she is able to see results of her work, attend court and never know in the morning what the day will hold. Despite the longer hours she has a job with "more spice"

[3] It should be noted that the objectives of this research led to the inclusion of more participants who had left SET careers than were currently working in SET.

One respondent, now working as a scene-of-crime officer for the police (a job which does not require a technical training on entry), kept referring to the lack of *"spice"* in her previous job in chemicals and another said that there were *"few bangs per buck"*. Both men and women who had left SET careers shared these views.

## 3.5 Are SET Jobs Different?

The two main issues that were identified as making SET occupations different from other graduate level occupations are:

- structural issues to do with the way in which work is organised in SET industries. This relates to running experiments and production lines and management styles. (Michaels et al, 1995 identified similar barriers);

- the nature of the work, for example where it was physically demanding, such as jobs on oilrigs, which one respondent had experienced.

Both of these can impact on women disproportionately and, in the case of the former, especially those with children. The next chapter looks at how some employers are beginning to deal with these issues.

There was no suggestion that SET jobs were intrinsically more intellectually demanding than other graduate level jobs. We found no evidence that people were leaving SET because they could not cope with the demands for technical knowledge and skills.

Structural issues are those that relate to ways of working. Women said that running experiments and production lines makes any form of flexible working difficult. This includes part-time work, flexi-time, job sharing and remote working, whether from home or from another site. Job sharing was said to be particularly difficult because the small number of women in the sector means that there are few women with whom to share. It was reported that men are not usually interested in this type of working arrangement, although one woman had briefly job shared with a man. The Labour Force Survey analysis in chapter 4 shows that part-time working is much less common in SET occupations and that women returning to employment following a break are more likely than other women to work part-time. Previous research highlights the importance of part-time work to returners (e.g. Hirsh et al 1992).

One of the male respondents who had left management to return to a more technical role, had tried remote working for part of the time on projects based away from his original home site. However, he had found it very difficult to manage a team without being at the same site as the team.

Some women had worked in jobs where they had been on-call for significant periods of time, sometimes 24 hours, often at night, to keep production lines running or deal with other types of emergencies, in one case in the environmental care industry, in another case in food production. Some companies appeared to rely on calling out technical staff in the event of a problem out of hours, rather than employing shift workers. Women had given up these jobs because they felt the commitment required was too great. This was true of those with and without children,

although those with young children felt that this was not appropriate for anyone with *"responsibility for young children"*. Some women also claimed that many male managers were unsympathetic to women with childcare responsibilities.

It is still true that women bear the brunt of the domestic duties, including childcare (Pilcher, 2000). Women reported that requests to start late in order to take children to nursery or school were refused even when making up the time in the lunch hour was proposed. However line managers' attitudes can vary considerably and there were other examples where the management relationship was focused entirely on maximising the benefits for all parties.

## 3.6 Leaving SET Occupations

Reasons respondents had left SET occupations included:

- career development;
- childbirth/childcare;
- desire to work in a more *"people-oriented"* environment;
- discovery of a wider set of skills, talents and interests;
- boredom, predictability and lack of variety and responsibility in their job;
- redundancy; and
- low pay, although this was generally mentioned last with the tone of *"to cap it all the pay is not very good"*.

Some respondents felt that to develop their career and to develop personally they needed to move on to new challenges. It has been mentioned above that some people (men and women) wanted to work in more people-oriented, less isolated, environments. The difference between men and women appears to be that women have an opportunity to reassess their skills during a break for childcare, whereas men tend to work continually and so they do not have a natural reassessment point, although redundancy or the threat of redundancy provided it for some.

Most of the mothers who had taken career breaks had been involved in a number of activities stimulated by having children. These had made them aware that they had a wider range of skills, abilities and interests than they previously thought (Holtzman and Glass, 1999 report similar findings). The types of activities they had been involved in included:

- looking after other people's children;
- running mother and toddler groups;
- being parent governors.

Men are less likely to have, or perhaps take, these opportunities to discover and develop new interests and abilities.

Moreover, as mentioned above, some SET jobs were reportedly very routine and the individual worker had little control over their job and how it was carried out. Some people (both men and women) moved out of SET to jobs that they said enabled them to be more in control of their day-to-day tasks and for work that was less predictable and more immediately rewarding. By rewarding they meant that they saw more immediate results from their work, received quicker feedback from colleagues and were better paid, including receiving bonuses for good

performance. Some were required to be available for evening and weekend work in their non-SET job which they had not been when working in SET but they felt that the increased commitment was worthwhile because they could see rewards.

The experience of redundancy, either personal or of friends and work colleagues, had led some participants to seek career moves that would enable them to be more in control of their futures. These respondents had moved into occupations that they believed were more widespread in the economy, more secure, and that allowed the development of more transferable skills.

**Case Study** **Man B**

Man B had been made redundant from a Government-run biological research institute. His mother had worked in pathology and this was how he had first got interested in the subject. Over a period of three years or so he had watched his colleagues being made redundant and held out for redundancy. Making the decision he was never going to be in that situation again, and despite applying for similar jobs, Man B finally moved in to the marketing of technical products. He is now much happier and much better off financially. Despite effectively being on call continually and working long hours from Monday to Friday, he feels that he is more in control of his own destiny than he was as a scientist.

He has a broader range of skills that can be used in a wider variety of industries and so feels more secure about being in employment until he chooses to retire. He said that the work is more varied, more challenging and more rewarding than laboratory work.

## 3.7 Other Careers

Those men and women who had moved into other occupations had gone into jobs in:

- General management;
- Sales;
- Purchasing;
- Regulation;
- Caring professions (healthcare occupations were not regarded as SET occupations within this study); and
- Teaching.

For some respondents this was a positive move into new career fields, reflecting new-found skills or interests. For others the change was forced by circumstances, including redundancy and the availability of work that was seen as either interesting or appropriate. As with the quantitative analysis it is difficult to assess the degree to which an individual's background in SET influenced subsequent career choices.

**Focus Box 1**

## Teaching as an option

Teaching was seen as a positive option by some because:

- it involves working with people, some were especially keen to work with children;
- there is a high degree of job security;
- there is some measure of flexibility after school hours for marking and planning; and
- not working in the school holidays solves a major childcare problem for those with school-aged children.

Some women said that having children had broadened their horizons and made them realise that they had a wider skill set and range of interests than they had previously thought. This had led many of the women participants to seek careers in more people-oriented occupations. Primary school or science teaching were often-cited career changes. Some men had moved into teaching on being made redundant. Some other, younger, participants had considered teaching and thought that it was something they would consider more seriously when they had children or if other options did not work out. It was seen as a career that could be taken up in later life. The LFS data in chapter 2 strongly reinforces that this perception is reflected in people's actions. Of male SET graduates aged 16-29 approximately 7,500 are teachers; this rises to 44,000 in the 45-65 age range. There is a similar pattern for women where 10,500 SET graduates in the 16-29 category are teachers and 21,000 of the 45-59 year olds are teachers. This last figure represents 40% of the entire population of female SET graduates in that age bracket.

The attraction of teaching as a career was enhanced by the school holidays, which solved a major problem for many of holiday childcare. However during term time, teachers in the study generally did not leave at the end of the school day because of lesson planning and other duties. These other duties also necessitated working during the school holidays. Nevertheless, the flexibility of being able to mark books at home, often after children had gone to bed, was useful, although this often led to interviewees getting to bed at midnight or beyond. Planning science lessons was reported by the interviewees to take longer than planning other subjects because of the practical sessions.

The downsides of teaching identified by those who were or had been teachers included:

- lack of flexibility, it is not possible to take holidays in term time;
- the rigid structure of the school day and consequent difficulties in working part-time;
- the behaviour of some students;
- the pressure to get students through exams with high grades;
- the requirement to teach wider social skills rather than just their subject.

→

The school day is highly structured around terms and lessons and some teachers seemed to have rather rosy ideas of terms and conditions in other occupations, citing friends who could *"arrive when they wanted, take as long for lunch as they wanted and leave when they wanted"*. There were some complaints about the hours they had to put in during the holidays and after the school day during term time and about not being able to take holidays in term time. For example, one school employee said:

*"I'm missing being able to visit universities with her, her Dad's able to take time off to do this."*

This lack of flexibility led at least one participant to prefer supply teaching to a permanent position.

Teaching part-time was thought to be difficult because of the lesson structure and the need to go in every day to cover the curriculum.

Other disincentives to teaching included:

- the absence of social skills of the pupils;
- a desire to focus on teaching the subject and not wider social skills;
- the conflict between getting high numbers of A-C passes at GCSE rather than imparting a real understanding of the subject and developing enquiring minds; and
- the perception of continual changes imposed on teachers over the last decade or so by successive Governments.

## 3.8 Returning to SET Employment

### 3.8.1 Generic issues

Analysing the interviews, it appears that there are three main issues that affect people at the point of returning to SET employment after a break:

- self-confidence in returning to work;
- concern over basic work skills such as IT; and
- concern that their specific SET skills are out of date.

The men who had returned to SET employment who took part in this study had usually been employed in another occupation. Those who had been out of the labour market (generally travelling) had not been so for more than a year. Employers and employees/prospective employees both thought that a year was not long enough to get out of date, even in the fast-moving area of IT.

Strenuous efforts were made to locate men for this study who had taken a break from SET. Some of the men who had been away from SET for a number of years had tended to work in related areas, including IT support, sales, general management or had taken a break to do a related

academic course. No men in this study had taken a break of some years from SET because they had been caring for their family. The women, on the other hand, were more likely to have been out of paid employment altogether and to have been away for much longer, usually five to ten years. The LFS data in chapter 3 reinforces this qualitative finding, showing that economically inactive female SET graduates are likely to have been inactive for a number of years and that this is not a characteristic of their male counterparts.

**Case Study** **Woman B**

Woman B has a degree in the life sciences and had returned to laboratory work in a job share for a hospital having had several years break for childcare during which she worked part-time in administration. She found the experience traumatic, despite having the full support of her husband, and now works as an administrator for a local church group.
"I used to come home crying every night."

The men interviewed in this study, returning to SET, consequently had fewer challenges to face. Their confidence levels were higher and their basic work skills more up to date than the women's because they had been away from work for shorter periods and often not at all. Men, therefore, primarily had to cope only with the transition back to SET.

### 3.8.2 Family formation

Women whose break from SET had been triggered by childbirth had an additional set of problems to confront. These women had, mostly voluntarily, taken on the main childcare responsibilities for their household. *"He was my first born and no one else was going to look after him,"* said one respondent. She went on: *"It's been a bit of a struggle financially but now I've got two nice little boys."*

Consequently, in addition to overcoming the barriers identified above, they also had to find alternative childcare. Most women with children in the UK work, at least part-time. However, these women lived in households where their partner and their children had come to expect, over a number of years, that they were the primary childcare provider. Their return to work was a lifestyle change for the entire family, often in an environment where, while extra income was welcome, it had been missing for a number of years. One woman said:

> *"..it's time to do something for me.....I think my children are nicer people now they have to accommodate that."*

Finding alternative childcare, dealing with the children's illnesses and working around school hours continued to fall to these women. The same woman said:

> *"A man gets up, gets washed and dressed and goes to work. A woman has to involve her parents, her neighbours and her friends to deliver, collect and look after the children. She has to get the children dressed, do their lunches and make sure they've got the right kit for the day. Then she can get ready herself."*

Consequently, even when the initial "catch-up" hurdles have been overcome, these women, in order to remain in employment, tended to face ongoing domestic responsibilities if the reason for their break was to care for a family. Women without children and men without primary caring responsibilities may therefore find it easier to put in the time necessary to update their skills.

Both men and women returners were aware that some time would be needed to update their subject specific SET skills and knowledge. While some of this could be done on the job and at the employers' expense, there was recognition that some would have to be in their own time. Women with the primary responsibility for childcare, who often preferred to work part-time, were likely to be disadvantaged by this, although significant commitment to (re)training was apparent from the career paths of some women respondents.

The men returners were willing to accept being at a lower status than in their previous job because they had made conscious decisions to leave one job and move to another area or to take time out. They were confident that they would be able to regain their status and income level relatively quickly because of their other work and life experiences, although most had not had time to see if this would prove to be the case at the time of interview. Similarly, women who had taken career breaks of over a year to look after their children tended to accept that their career would take second place to their family.

These findings support the hypothesis that returning to SET careers is different for the majority of women who try to return compared with the majority of men who do so. This is because these women tended to have been away from their specialism for longer and were more likely to have been out of the labour market completely. The reason for the longer and complete break from SET is almost entirely related to the reason for their break – childcare. Furthermore, after an initial returning or catching-up period, women with children need flexibility to cope with childcare failures and children's illness that many of the returning men did not (Bryson et al 1999). Moreover, these returning women may need greater help than women who have never stopped working beyond a short maternity break because of their family's expectations; this study was not designed to explore this issue.

### 3.8.3 Mobility

Returners with families have geographically restricted job search areas as their partner usually has a job locally and their children are settled in local schools. This can limit their employment options, especially for those who are very specialist. None of the men interviewed as part of this study who decided to change direction and return to SET had children, although many had partners.

Being geographically mobile, not just within the UK but internationally was, respondents thought, fairly specific to SET occupations. *"Science is international"* was repeated more than once. The SET graduates interviewed were, not surprisingly, often partnered with SET graduates and when promotion prospects came up they *"[went] with the highest paid job"* which was invariably the man in the cases included in this study. Recent research from the Equal Opportunities Commission (2001)[4] shows that even in professional occupations, women earn 91% of male earnings. However, there was some evidence from the interviews with employers that the balance is beginning to change and cases of men leaving employment because of their partners' jobs were cited.

[4] Equal Opportunities Commission (2001) "Women and Men in Britain: Professional Occupations", Equal Opportunities Bulletin.

**Focus Box 2**

### 3.8.4 Academic careers

Academics trying to re-enter the academic labour market after a break face specific problems for several reasons:

- tendency to be employed on short-term contracts in the early years;
- emphasis on age in career progression; and
- need for publications rather than any other type of experience.

Academic staff are frequently employed on short-term contracts for the first five or six years after completing their PhD. This means that any woman who gives birth during this period may not have a post to go back to after maternity leave and may not be eligible for the more generous maternity schemes that some employers use to retain staff.

Academic career progression depends on publication volume and is strongly linked to chronological age, although there have been moves towards creating an 'academic age' by some funding organisations. Anyone whose publication record is considered 'short' for their age by recruiters is likely to be held back in a market sector that is highly competitive. Women who have had periods of maternity leave and/or part-time working are more likely to find themselves in this situation than men or women of equal ability, who have not taken any breaks.

Age also affects pay rates and postdoctoral staff in their early 30s are perceived by universities as being more expensive to employ than younger postdoctoral staff. Academic researchers who cannot get tenure in their 30s are destined for something of a twilight existence – too old to be a research assistant but without the seniority to apply for research grants in their own name.

The women who attended the one-day workshop run as part of this study, believed that they were given no credit for their extra maturity and experience by universities, as they would be in industry. Neither were they given the opportunity to accept jobs at lower pay rates. Consequently the barriers become harder to overcome, as it is difficult to obtain a lower level position from which to launch a comeback. Even those who are able to find a postdoctoral contract post find themselves continually having to obtain new contracts whereas women in other sectors are more likely to be on permanent contracts with the right to return after maternity leave.

The workshop participants developed a number of ideas, some of which built on other research findings, which will be explored in chapter 7.

This study found four schemes specifically designed to help women return to academic research, set out in chapter 6, although many research fellowships now allow for part-time working.

## 3.9 Staying in SET

Once the initial return and updating has been overcome, men seemed able to continue in their new role relatively easily, although at least one said that there was always a gap in his knowledge from having transferred from another area. Women returners with children, on the other hand, continued to face additional challenges. No-one in this study had other caring responsibilities (for example elderly parents) but the subject did arise in discussion as being another reason why flexible working practices were desirable.

As we have seen, these women had the primary childcare responsibility in their family. To enable them to fulfil this responsibility, employers need to be able to offer flexibility of hours to these women (McCrae et al 1991). Some of the women complained that there was no part-time working option at their SET employer. And interviews with personnel staff identified a reluctance among some SET line managers to allow part-time working, even where it was company policy.

However, many of the women were complicit in this, stating themselves that SET jobs are different from other jobs because of the need to be on-site for the duration of experiments, on-call at anti-social hours, or to work shifts, even though they felt this discriminated against employing women with children, if indirectly.

The next chapter looks at how some employers are responding to the needs of their female SET employees.

## 3.10 Conclusions

It seems that women face additional barriers in returning to work in SET compared to men who return. Men are likely to have been working in another occupation and so will not have concerns about low levels of confidence and basic IT skills, they only have to deal with updating their specialist skills. Men are less likely to have primary responsibility for childcare and so are able to give more time to their updating. Our male respondents were not working part-time whereas some of the women expressed an interest part-time working. The LFS data in chapter 4 shows that returning women may well return part-time. Once over the initial learning curve, women may need flexibility to deal with their childcare responsibilities that men do not.

Some of the concerns of women SET graduates returning to employment after several years as the primary childcarer are common to all women graduates. However, the combination of up-dating subject skills and employment practices in SET occupations that are, or are perceived to be, less flexible, might present women returning to SET with additional problems compared to women returning from being the primary childcarer to other graduate level occupations.

These findings lead to the conclusion that a key issue is the extent to which SET employers can develop their working practices to accommodate people through family formation. This will include not simply the maternity and, perhaps, paternity packages offered but the way that careers are managed. The next chapter explores how some leading SET-based companies are trying to achieve this.

# 4. Work-Life Balance and Returners: Company Policies and Practices

## 4.1 Introduction

The main purpose of this part of the research was to identify what mechanisms employers, especially smaller employers, might need in order to be able to support returners to SET. It was hoped that the mechanisms developed by the larger employers included in the study to support and develop their staff, especially those with caring responsibilities, will help other employers to identify good practice.

For the employers we interviewed as part of this study, returning to employment following a break was largely seen in the context of retaining highly skilled employees, especially women after childbirth. It is an issue of concern to these employers, as they have invested in their recruitment and training. However, there was little evidence of returners from outside of the companies' own employees being targeted as potential recruits. This is perhaps not surprising given the relatively small size of the pool of potential returners and the likely geographical constraints discussed in the previous chapter. However, given the national skill shortages in some areas of SET, employers may be keen to support people wishing to return to SET employment more widely, in order to increase the supply of this type of labour.

## 4.2 Recruitment

The companies that took part in this study were all large and long established, albeit most had been subjected to mergers, de-mergers and the like over the last decade or so, and some had been through several such changes. They therefore had long established recruitment practices for their graduate level staff.

Their recruitment policies tended to be of the traditional 'grow your own' management structure whereby graduates are recruited on graduation or after a PhD and then groomed for management and senior management within the organisation. Consequently the focus of recruitment for graduate staff was the 'milk round' or some more focused version of it.

There are other factors that make new graduates more attractive than other groups of potential employees to large employers. These factors include:

- the ease of access to undergraduates;
- new graduates will generally be mobile;
- the view that graduates represent a long term investment;
- the pyramid nature of most (large) organisations that requires large numbers of junior staff; and
- the difficulty of locating inactive female SET graduates who might return.

It is not therefore surprising that none of the companies we spoke to make specific efforts to recruit returners, although all said that they would be happy to consider returners who applied of their own volition.

**Method Box 5**

## Research Method

Interviews were conducted with nine employers. All were multinational companies: BT; Ove Arup; Corus; Marconi; Shell; Unilever; GKN; Hewlett Packard; and Merck Sharpe and Dohme. These companies were chosen to represent a cross-section of industries within the SET sector and a mix of research and production divisions. All acknowledged that they faced some skill shortages at technical graduate levels. At each employer an interview was conducted with a representative of the human resources department. Notes were taken of these interviews, which lasted about an hour. In some cases copies of company policies were given to the researchers for further information. Respondents were assured of confidentiality in terms of interview content although all agreed to have their company names included in the list of organisations that participated in the study.

However, the human resources staff interviewed were generally becoming aware that wider search strategies for staff were needed to meet the company's demand for technical staff. The issue for human resources staff is how to find, and where to access, smaller pools of potential employees. One possible route is word of mouth, which more than one company had found produced high quality applicants. However, this chapter reveals that employers are unlikely to make the investment needed to actively recruit returners because the likelihood of finding and successfully recruiting women returners is very low for any individual company. Taken together these factors suggest that there is a role for Government-sponsored schemes designed to help those women who wish to return to employment in SET.

Human resources respondents did report the beginnings of a change that could facilitate returners' access to employment. There is an increasing turnover of staff in mid-career, partly as a result of the changes in the sectors involved, with mergers, takeovers, company sales, redundancies, etc. over the last couple of decades. Moreover, there is an acknowledgement of the importance of transferable skills, such as interpersonal skills, and a much more mobile labour force where fewer people think in terms of a job, or single employer, for life. Returners offer a potential alternative to growing your own staff or "poaching" staff in mid-career.

This trend towards increasing recruitment mid-career should work in favour of returners as this research found that there are increasing opportunities for graduate qualified staff to be recruited mid-career. However, we were told that:

> *"we would look at an application from any returner with the right background but they would have to be sufficiently up-to-date to compete successfully against other applicants or able to convince the company that they are sufficiently committed to put in the extra time needed for retraining."*

It seemed that, where possible, companies would recruit currently employed applicants, with up-to-date skills, rather than invest in updating returners.

Most large technology companies operate in a global labour market. Not only do they have sites in different countries and move people between these sites but they recruit from anywhere in the world. While some returners may be mobile, women returning from child-caring operate in a very local labour market and may be unable to move even within the UK. Moreover, many of the men we interviewed with children said that they were not very geographically mobile because of their children's schooling and sometimes their partners' jobs. Existing domestic arrangements are likely to constrain where returners, of either gender, can locate themselves geographically and the offer of relocation packages is unlikely to tempt them if their partners will become unemployed, although some companies will help partners find employment.

We found that it was fairly common in these companies to have dual career couples in the company and packages to encourage them to relocate together were in operation. This might help those who are either ex-employees of the same company as their partner or who have the correct skills set for their partner's employer. This group could easily be accessed by word of mouth or company newsletters.

## 4.3 Policies on Returners

All the employers had policies and practices designed to encourage their own staff to return to work after childbirth. None had anything in place to specifically attract people wanting to return to a SET career following a break from SET for any other reason. Indeed, those who had returned to SET from breaks for reasons other than childbirth that these employers identified, were all either members of staff who had taken a break during their employment or who had been recruited from a post-graduate course.

Human resources personnel could not recall having received applications from external candidates who wanted to return to SET following a break. When questioned on the likely response if they were to receive such an application, the human resources respondents, as we have quoted above, claimed that these individuals would have to compete with the other candidates. It seemed that there would be a trade-off between recent knowledge and background in the specific area.

The main reason for breaks from work *entirely* that we encountered during this study is maternity leave and its extension to care for children in the early years. The organisations interviewed tended to provide better than the statutory minimum levels of maternity leave and pay, along with other benefits such as career breaks, which varied with length of service and seniority. Techniques such as staging of maternity payments, career breaks, crèche provision, and part-time working were designed to encourage and help women through the first months of returning so that they would get back into the habit and routine of work. Some of these employers provided ongoing support for those with responsibility for children. Not all employers opened all such schemes to men as well as women.

The *"Work Life Balance 2000; Baseline Study"*, Hogarth et al 2000 discusses the importance of flexible working options for women returning from maternity leave.

## 4.4 Work Practices

Anyone returning to a technical area of work after an extended break will probably require extra management support over and above that required by other staff. This requires a management culture that understands the business case for meeting the needs of individual employees' circumstances when they can. For women who have been the primary source of childcare in their family for five to ten years to successfully return to employment, whether full or part-time, may require longer term flexibility than that needed by others without caring responsibilities.

The companies we spoke to saw returning as principally an issue for women with children. When we asked to speak to staff who had returned for other reasons they were able to identify only a handful from among several thousand staff (usually by an email asking for volunteers or from personal knowledge of individual cases, rather than from records). This section therefore focuses on how companies have tried to adopt policies and adapt their culture to make the workplace more inviting to women – both with and without children.

Clearly companies need to have a sound policy, properly endorsed at senior level, to make any progress and all had these in place for women with childcare responsibilities. Nevertheless, during the research it became increasingly clear that work-life balance policies at company level were difficult to translate into family-friendly practices throughout the company. Human resources staff frequently felt that there was room for more change. However, the way in which work was organised, appeared to have begun to change to address the obstacles reported in chapter 4, for women with children and/or who want to work part-time.

It has been seen in the previous chapter that women with children, especially young children, need flexibility in their jobs to enable them to cope with unforeseen changes in childcare (such as childminders being ill or leaving) and sickness. Many that we spoke to wanted to work part-time. One human resources manager spoke of the importance of understanding what tasks had to be done on site and those that could be done remotely.

Most of the economically inactive women interviewed in this research had been out of the SET graduate labour market for five to ten years. They perceived employment in the SET sector to be inflexible with little part-time working, job sharing, home working or flexitime and a culture of long hours. At the policy level in the large multinational companies interviewed as part of this study, things have begun to change in the time these women have been away from work. The LFS shows that SET graduates now have many choices of occupation. The SET sector may need to change quickly if it is to attract and retain more of the increasing number of female SET graduates. More remains to be done at the practical level but this research suggests that these changes will not be forthcoming unless employees are prepared to challenge the status quo.

### 4.4.1 Experiments and Testing

The argument proposed during the discussion groups that long hours were essential so that experiments and tests could be completed has been overcome, in the companies interviewed, by team working. No individual was required to stay for the duration of a piece of work, rather a member of the team needed to be present. For longer tasks different members of the team would be present at different stages. This type of change has been relatively easily adopted.

### 4.4.2 Line Management

With policies designed to encourage more flexible working, much depends on individual staff and their line manager coming to an agreement over the local practicalities. Several human resources respondents said that it was up to staff to propose ideas and solutions to their own problems, which would then be considered by their line manager and the human resources department. This push towards staff taking more control of their own careers was mirrored in other aspects of career progression. Some human resources personnel indicated that some line managers were rigid in their views about working practices. This was unlikely to encourage their staff to propose non-traditional solutions to their problems.

**Case Study** **Woman C**

Woman C works in computing largely on projects with staff in other locations with whom she communicates by email, telephone and occasional meetings. She has little contact with the other staff at her location but her line manager would not allow her to arrive a few minutes late to take her child to childcare and make up the time during her lunch break.

### 4.4.3 Flexibility

Human resources staff appeared to be working to an agenda that encouraged more flexible working to the benefit of staff and organisation. More than one human resources respondent stated that their department would always challenge line managers to justify reasons for refusing particular solutions. Policies were often geared towards giving people *"permission"* to work flexibly. Perceived benefits to the organisation included productivity increases and greater levels of commitment by individual employees, who perceived themselves to be valued and trusted. Increased commitment was seen as indicating greater job satisfaction, which in turn could result in lower staff turnover.

There was a general consensus that it might be possible for some jobs to be done more flexibly than at present. Possible solutions include part-time working (the most common) home working (probably on the increase, at least for some workers for some of the time) job sharing, flexible hours, compressed hours and term-time only working. Examples of all of these were discussed. Job sharing seemed to present the most difficulties. These ranged from finding a suitable partner to maintaining the relationship and retaining both partners in the company. However, one respondent felt that job share was a good option as the company *"gets two brains for the price of one. People don't stop thinking just because they're not in the office".* Another cited an example of a senior female manager who redesigned her job so that she could job share with a lower grade executive assistant. This is an excellent example of thinking creatively.

Human Resources managers suggested that the greater the levels of flexibility offered, the more positive was the response from employees. This was not just in terms of commitment because they were grateful for the flexibility, although this is undoubtedly an issue, but also in terms of number of hours worked. A relationship of give and take was established and human resources staff on more than one occasion stated that their SET graduate staff are professionals who would *"do what it takes to get the job done".* Flexible working in this context was not a big risk to the company.

### 4.4.4 Other Sectors

In terms of working practices, some industries were found to be more flexible than others. Human resources staff said that research and other professional/technical jobs were often the most flexible occupations in the company, in principle if not in practice. With their experience of other occupations they reported that it can be more difficult for staff in support functions (for example, personnel and finance) to work flexibly, as for the business to function effectively, there must always be someone on call.

Human resources staff with experience of other sectors, for example finance, reported that in general working practices were more attuned to the needs of staff, particularly women, with family responsibilities. One HR respondent described as normal practice in the financial sector women working full-time until they had children, taking a step down in hours for a few years while their children were young and then returning to full-time work. The experience of this respondent was that the predominance of men in SET occupations seems to have led to this not being considered in SET environments.

Blackwell, 2000 describes different family formation patterns of women with science degrees working in different sectors, which suggest the lower the proportion of women in a given sector, the less likely they were to have children. A clear implication of this is that the fewer women there are in a sector, then the smaller will be the drive towards family friendly policies.

### 4.4.5 Science, Engineering and IT

Within SET, science appears to be less flexible than engineering or IT, at least with respect to the way in which graduate level work is, or can be, organised. Areas of research where staff need access to hazardous substances or specialist infrastructure are less flexible in the way in which they are organised than other areas of SET, particularly the ICT sector.

In the case of *"wet science"*, health and safety concerns may impose constraints on where certain aspects of the work can be conducted, as may access to equipment. The need to adhere to health and safety legislation also meant that site opening hours could be limited, again reducing the possibility of some more flexible working arrangements.

Production management is also an area that tends to demand that staff are on-site or on-call. Staff management often requires middle managers to be with their staff and this can reinforce the development of a 'long hours culture'.

Nevertheless, there are aspects of both jobs that can be done more flexibly, for example report writing, computer-based research and some administrative tasks. Human resources personnel felt that line managers were not always prepared to think creatively or to be flexible in their approach because they could see no benefit to the company.

Other industries, such as IT and engineering design could be flexible in location where issues of health and safety were less prominent. In these sectors home and out-of-hours working, using remote computer links, are possible because certain stages of projects are sometimes lone endeavours. Some companies had started to provide flexible working options, including introducing career breaks for all staff and providing additional equipment to facilitate homeworking.

Homeworking does not suit everyone and may be least suitable for those returning from long periods of being the main family carer. A small number of respondents told us that it is difficult for children to understand that they are not available for them at certain times, and that someone else is responsible for caring. It is difficult to explain to a child that even though they are at home the respondent is actually "at work". Some of those working on computing projects sometimes preferred to go into the office. Frequently different computers are used for different functions. Even where additional resources for homeworking had been provided by the employer the need to subsequently reconcile the data on computers at two sites meant that office-based working was preferred by the employee.

Chapter 3 shows that women are more inclined to take science subjects than IT and engineering subjects at university. They are, therefore, choosing subjects that currently lead to inherently less flexible employment options. Research into why this is happening, to explore what attracts women to science rather than IT and engineering would be useful in designing a strategy to address this, especially as the Stevens report of 1999 sees the latter areas as the main shortage occupations.

### 4.4.6 Other Countries

Respondents, with experience of overseas working said that working practices overseas seemed more attuned to work-life balance needs. Line managers abroad appeared to be more flexible in their approach and to have a better appreciation of the business case for that flexibility and the advantages of accommodating employees as individuals. No one could quite say why the UK had a more rigid attitude to working fixed hours on a fixed site or why this was different in some other countries.

## 4.5 Career Progression

In the long term a goal should be that returners of either gender are viewed by themselves and employers as just one more pool of skilled people. It may be that an increasingly flexible career structure within SET will help to achieve this.

The companies interviewed as part of this study were trying to move away from the traditional time-serving career path that usually resulted in scientists and engineers moving away from their technical specialism as they rose through the hierarchy.

Companies were moving towards assessing staff against achieving certain competences, and requiring a broadening of skills for technical jobs to include softer skills such as communication and team working. In these objective-focused appraisal systems some, but not all, companies set suitable objectives for part-time staff, recognising the hours worked. This should help those wanting to return part-time.

There had also been the development of technical career paths that allowed talented technical staff to increase their status and pay without having to take on management responsibilities. At least one company said that it wanted to be a world leader in certain areas of science and this meant having some staff who were recognised internationally as leaders in their field. Generally though, there were very limited opportunities in this route and therefore career progression normally implied management responsibilities.

These changes have resulted in human resource respondents being aware of staff who moved successfully between technical and non-technical posts in both directions. Indeed, it appeared from these interviews that moves backwards and forwards were likely to be encouraged and to increase. Updating of technical skills may, therefore, become routine and, with time, could perhaps expand to include returners from outside the company.

## 4.6 Conclusions

This study focused on large employers where there was some evidence of good practice in place so that this could be identified and promulgated. Many small and medium-sized enterprises also provide working opportunities for SET graduates and investigation of the practices and attitudes within smaller SET-based companies is worth exploring further.

The large multinationals that took part in this research all had flexible working and work-life balance policies in place. However, these were implemented at the local level through individual arrangements between staff and their line managers and this leaves room for large discrepancies within organisations. The practice was often one of encouraging staff to come forward with their own solutions to their needs. Unions and other staff associations could provide the means to support individuals seeking to develop solutions to their own situations.

Human resources staff were aware that some managers were perceived as resistant to non-standard working arrangements, which may reduce staff's willingness to request more flexible working arrangements. Individual managers appear to have significant power over working arrangements for individuals. Stereotypes need to be challenged by all staff and managers as well as by human resources departments.

In order to overcome this, significant changes in workplace attitudes and culture will be needed but companies could do more to make line managers aware of the business case for flexibility and how they will benefit. One human resources respondent suggested that the company might make formal statements about the structures put in place to encourage flexibility, e.g. flexitime. A change in approach might also lead to some of the restrictions in working practices that are bound by the need to access resources, such as chemicals and equipment, being overcome.

On the other side, women who have been out of the labour market for some years might find SET jobs more flexible than in the past. Employers, perhaps supported by Government, could raise awareness of the changes taking place.

For employers to be able to support those returning from being full-time carers there must be flexibility in the hours they require staff to work and the locations at which work can be conducted. Equally, there will be an expectation that the returners will repay this flexibility with a professional attitude and a commitment to the employer. The companies involved in this study had taken this on board and an output- and target-focused job appraisal process, rather than time-serving was seen as a way to support increased flexibility. Human resources managers reported that generally the response from staff who had been given flexibility was very positive and had improved productivity.

Companies may require help to think more creatively about being flexible to meet the needs of both the business and its staff. It will be important to identify the benefits of flexibility to both employer and employee. In this highly skilled segment of the labour market finding a replacement is not necessarily easy. Using flexibility to recognise the professionalism of employees and the trust that they have earned may be a way of retaining staff and reducing turnover.

There is a large amount of evidence that companies are making increasing efforts to retain their own staff during family formation, through a mix of maternity packages, flexible working practices and other support mechanisms such as crèche facilities. However there is no evidence that companies are actively targeting returners as a potential source of expertise.

**Case Study** **Woman D**

This woman has a degree in materials engineering. On graduating she got a research and development job in the field. She has had a number of secondments across the plant for example managing resources and programmes, but has always returned to research and development.

She was sponsored to complete an MBA and continued working on this during her first spell of maternity leave. She initially returned part-time from this break, but reverted to full-time when she was confident that her child care arrangements were suitable. At the time of the interview she was about to start a second period of maternity leave and will initially restart on a four-day week, which will be reviewed after three months. She has received strong support from both her line managers and her staff during preparation for and returning from maternity leave. She has been grateful for the flexibility offered and has no doubt that she in turn has sought to repay this by doing what was necessary to "get the job done".

# 5. Do Existing Schemes Meet the Needs of Employers and Returners?

## 5.1 Introduction

Before discussing the existing schemes to aid returners, the strengths and weaknesses of such schemes and the possible characteristics of new schemes, it is important to address the questions of whether or not any schemes are required and if so why.

This study has identified four groups of potential recruits to graduate level SET occupations:

- those who gain degrees in a SET subject who enter non-SET occupations on graduating;
- those with SET degrees currently working in non-SET occupations and who may or may not have worked in SET in the past;
- SET graduate men and women who are "inactive – other"; and
- SET graduate women who are "inactive – home".

This study has confirmed that women SET returners are a relatively small group and that they are geographically dispersed and heterogeneous in their characteristics. This deters employers from targeting them as a group.

Many employers are increasingly aware of the value of retaining staff in whom they have invested time and training. The companies interviewed during this study have used maternity leave packages and policies on work-life balance flexibility, to retain existing staff. .

For most employers the limited resources that they have for recruitment have to be effectively targeted. The factors that make recruiters focus on new graduates include:

- SET undergraduates are much more likely to take up SET careers than economically inactive female SET graduates;
- the ease of access to undergraduates;
- new graduates will generally be mobile;
- the view that new graduates represent a long term investment;
- the pyramid nature of most organisations that requires large numbers of junior staff; and
- the difficulty of locating inactive female SET graduates who might return.

Taking all of this into account, it becomes easy to see why businesses focus their recruitment efforts on undergraduates. Indeed our research with employers suggested that major companies tend to focus their efforts even more narrowly on specific institutions. It is not therefore surprising that none of the companies we spoke to make specific efforts to recruit returners, although all said that they would be happy to consider returners who applied of their own volition but on their individual merits.

However, this report has found that about 24,000 women SET graduates returned to employment in 2000 and that about a third of them returned to SET occupations.

Targeting the two-thirds who go into other occupations and encouraging more to return to work could help to address the skills shortage in SET occupations.

This report has shown that there are significant issues for women seeking to return to work after extended breaks and that the barriers may be greater for those in SET. It has also revealed that employers are unlikely to make the investment needed because the likelihood of finding and successfully recruiting women returners is very low for any individual company. Taken together these factors suggest that there is a role for Government-sponsored schemes designed to help those women who wish to return to employment in SET.

## 5.2 Schemes Identified

This research has found only four schemes in the UK that are specifically designed to support and encourage women returning to graduate SET careers:

- The Daphne Jackson Trust
- The Wellcome Trust Re-entry scheme
- Engineering and Physical Science Research Council (EPSRC) PhD studentships
- The Laura Ashley Foundation Return to Research Fellowship.

All of these are for people seeking to return to academic science, although the Daphne Jackson Trust is increasingly trying to find placements with industry and many public sector organisations sponsor places. The Wellcome Trust scheme is for those who were fairly senior before taking their break and the Laura Ashley scheme is currently being run as a one-off pilot.

Increasingly, however, grant schemes for academics allow the grant holder to work part-time. From September 2001 EPSRC delegated responsibility for doctoral training to individual universities in order to provide them with greater flexibility over the allocation of awards. The impact that this will have on returners remains to be seen.

Further details of the above schemes are available on the internet at www.set4women.gov.uk/returners. There are also examples of more general activities aimed at supporting returners, albeit mostly targeted at people below graduate level.

## 5.3 Meeting the needs of women

This research has found that women who take career breaks and who therefore need to find a new post, rather than return to their pre-maternity leave job, have often been out of the labour market for over a year, and five to ten years is not exceptional. These women, it was found, need to have their confidence about being back in the labour market restored. A lack of confidence may be manifested in a number of ways:

- a tendency to feel that they may be out of touch with technical issues;
- wariness in dealing with new people and environments; and
- uncertainty about being able to do a specific job.

**Method Box 6**

## Research Method

This chapter is based on the results of a search to identify possible sources of assistance to returners to graduate SET occupations. The search methodology was based around internet searches using the key words: women; returners; science; and schemes.

The search engines used were AltaVista, ExciteUK and Google. The dominant factor in the search results was "women returners". Much of the information and support available is targeted at encouraging women into work or training for work, with little emphasis on returning to any specific occupation, whether SET-based or not. Using "Science" as a key word did not seem to unduly skew the results away from engineering and technology as both IT and engineering-based activities were identified. Following through the links obtained it is possible to classify activities in four ways:

1. Research grants targeted at, or welcoming applications from, returners;
2. Training or retraining projects. These are often targeted at people with lower-level skills;
3. Advice Provision; and
4. Projects to build confidence in returners.

For the second and third of these categories only examples that were felt to be particularly relevant to SET professionals are included. It is worth noting that while there are many alleged sources of advice the references often seem to be circular, leading back to a few national schemes.

For the fourth category, many of the schemes are targeted at low-skill groups, although they may be relevant to all potential returners. We have included a reference to the Open University's Associates Lecture programme in the table of schemes. It is not targeted specifically at returners but has features that should make it attractive to potential returners.

Despite the use of "returners" in the search, a good deal of material was found that was focused on attracting girls and young women into science. This is not presented in this note, as it is not relevant to this study. Information on employer-specific schemes is also not presented as we have found that in practice most private sector employers do not have specific "schemes" beyond those for assisting staff through maternity breaks, although these may, increasingly, be supplemented by polices on flexible working and career break initiatives. Beyond this, employers attempt to address each case on its individual needs. The Work-Life balance website (www.dti.gov.uk/work-lifebalance/) has some excellent case study material from employers on these maternity leave schemes.

This is despite their varied experiences during their career break and the fact that some identified that they have developed new skills. Several women in the discussion groups said that while they may seem self-confident they had found re-starting work or retraining *"terrifying"*. We recommend that one of the evaluation criteria for support schemes should be the success of the scheme in assisting returners back into employment.

The graduate returners schemes for SET that were identified tended to rely on the potential returner doing most of the work. For example the applicant must:

- find an employer (usually an academic department for the existing schemes) to take them on;
- find a supervisor; and
- devise a project on which to work.

It was felt by respondents that these requirements put a lot of pressure on the potential returner. It is likely to mean that the existing schemes only help the most confident and possibly the lucky few who still have relevant contacts and were based close to them.

Women returners are frequently constrained in the geographic location in which they can work because of their partner's job, the education of their children or other caring/family responsibilities. The emphasis of existing schemes on returning to academic science may not be relevant for all returners. For many, industry may offer more appropriate and more accessible employment options. This enhanced accessibility is a function of both location and range of opportunities available.

## 5.4 Conclusions

The qualitative research and previous work have shown that returning to work after an extended break is not straightforward. In addition to learning new skills, relearning old ones and forging new networks, women returning from breaks related to childcare generally face ongoing caring commitments that require flexible working practices, with part-time working cited as particularly important.

In SET occupations the predominance of men has meant that flexible working practices and support for those with caring responsibilities has been a lower priority. Thus returning to SET is potentially even more demanding than simply returning to employment after an extended break.

The existing schemes for SET returners are generally targeted at academics and meet the needs of a small and possibly elite set of returners to academia. However, schemes could benefit women and SET more widely by encouraging employers to consider taking returners into their employment. It was not clear to us that these schemes have been designed with employers in mind, particularly non-academic employers. We noted, however that there is an increased drive at the Daphne Jackson Trust to provide industrial placements. We suggest that academia and industry are considered as two separate classes of employer when considering the development of schemes.

### 5.4.1 Academia

A suggestion at the academic women's workshop was for the development of a scheme targeted at university heads of groups/departments that could address the acknowledged need of many groups for a permanent "head of laboratory". A traditional post that respondents suggested had largely disappeared with recent cuts. A Government-backed scheme might provide funds that will enable universities to apply for a grant for such a post. The post, which could be held part-time, might have a fixed term, perhaps for three years. This would provide the university with a much needed member of staff and the returner with a sufficiently secure long-term post to reskill and be better equipped to find long-term employment. The fixed term would mean that the post could play an ongoing role in supporting returners by ensuring turnover.

This study did not include interviews with any university personnel staff. However, they need to proactively provide returners who work part-time with the help and guidance they need. They should also stimulate and facilitate change within academic departments unused to more flexible ways of working.

The workshop of women academics recommended that funders review all schemes to ensure that there was no inadvertent discrimination. Age limits are the most obvious inadvertent discriminator, where grants are designed to help people start their career, age limits work against women who have taken career breaks and late entrants of both sexes.

### 5.4.2 Industry

In industry, a scheme which provides access to technical training and re-skilling during a transition period back into employment, reducing the retraining burden on employers, might make returners more attractive when in competition with others. The geographical dispersion of returners suggests that some form of remote learning and self-teaching would be appropriate.

A critical factor in supporting and encouraging women with children to return to SET after a career break, is the need for employers to have, and also be able to demonstrate, flexible working policies. Some returners might wish to have flexibility in employment whilst others might have all their caring responsibilities behind them and wish to pick up their career full time. Flexibility should be built into any scheme devised specifically to attract returners to industry. This might allow for each returner and employer to agree an overall time commitment, perhaps with agreed "core" attendance times and a tailored training programme.

To allow employers the opportunity to assess the success of a return, the returner might initially be taken on for a probation period. However, to ensure that returners are not treated as "disposable" short-term employees, the employer should be expected to make some contribution to the training costs, perhaps in knd, as well as paying the returner's salary.

Throughout the qualitative research it was clear that many people attempting to rejoin the labour market rely on local sources of information. This needs to be borne in mind when marketing of schemes is being planned. The issue of local recruitment is possibly of greater relevance to small and medium-sized enterprises than larger companies. In smaller organisations the resources available for recruitment are likely to be even more constrained than the situation described in chapter 5. Partnerships between small and medium-sized enterprises and local Learning and Skills Councils using local media to raise awareness of job opportunities for returners is an option that could be usefully explored further.

# 6. Conclusions and Recommendations

## 6.1 Conclusions

### 6.1.1 The Labour Force

This research has found that the labour force is becoming more highly qualified in that more people now hold degrees than in the past. Both men and women with degrees are significantly more likely to be employed than people without degrees and this difference is greater for women than for men. Importantly for this study, the proportion of women with degrees is rising faster than the proportion of men with degrees.

While the absolute number of SET graduates in the population has risen over the 1990s, the proportion of graduates with SET degrees has fallen. The total number of women SET graduates increased by 26% during the 1990s and they now make up 22% of all SET graduates.

The single most important finding of this analysis of the labour market in terms of addressing potential skills shortages in SET is that only a minority of SET graduates are employed in SET occupations, as defined in this study (40% of men and 25% of women). In the longer term therefore, a critical task is to understand:

- whether graduates are using their subject knowledge in other occupations;
- why some choose not to use their subject, having spent at least three years studying to degree level; and
- how these choices can be influenced.

Male SET graduates are the most economically active category of all graduates, with only 1.7% unemployed. Women with SET degrees on the other hand are economically less active than their male counterparts or female non-SET graduates. Women with SET degrees and children are less likely to be employed than women with children and other degrees. In particular women with SET degrees and older children are less economically active than their non-SET counterparts. This is despite the fact that women SET graduates enter a far wider variety of occupations than male SET graduates.

When we look at the length of time that women with SET degrees, who were not working at the time of the LFS interview, have been out of employment we can see that on average between two thirds and three quarters have been out of employment for at least two years and just under 40% had been out of employment for at least five years in 2000.

Female SET graduates not currently employed provide a pool of approximately 50,000 potential returners, although by no means all of these people will be interested in returning to work, never mind to SET occupations, consequently the pool of likely returners will be far smaller. Some of the concerns of women SET graduates returning to employment after several years as the primary childcarer are common to all women graduates in this situation. Despite examples of good practice based on creative thinking, women returning to SET occupations appear to face additional problems compared to women returning to other graduate occupations. The combination of the belief that their SET-specific skills will be out of date and a degree of

inflexibility from line managers, reflected in the much lower incidence of part-time working for SET graduates in SET occupations, makes returning to SET and managing caring responsibilities difficult.

### 6.1.2 Returning

Despite the existence of some real barriers to returners there has been an increasing number of returnees to SET during the later years of the 1990s. While the numbers are small, with an average of about 5,000 per year, there are increasing numbers returning to computer-based and technology-related jobs. This suggests that to some degree, market forces are having an impact, although the LFS data suggests that this number of returners could be increased.

The qualitative research and previous work have shown that returning to work after an extended break is not straightforward. In addition to learning new skills, relearning old ones and forging new networks, women returning from breaks related to childcare generally face ongoing caring commitments that require flexible working practices, with part-time working cited as particularly important.

For anyone considering returning to SET there is a perception that the longer they have been away the more new knowledge there is to catch up on. It seems that women face additional barriers in returning to work in SET compared to men who return. Men are less likely to have been out of employment altogether or for an extended period. They therefore have fewer concerns about updating basic work skills or re-entering the labour force, they mainly have to deal with up-dating their specialist skills.

The LFS data shows that returners may well return part-time. Once over the initial learning curve, women may need flexibility to deal with their childcare responsibilities that men do not. These findings, alongside the qualitative research, lead to the conclusion that a key issue is the extent to which SET employers can change their working practices to accommodate work-life balance practices for the five to ten years when employees' children are young in such a way that will yield benefits to the whole population.

Throughout the qualitative research it was clear that many people attempting to rejoin the labour market rely on local sources of information. This needs to be borne in mind when the marketing and delivery of schemes is planned.

### 6.1.3 Industry practice

This study focused on large employers where there was some evidence of good practice in place so that this could be identified and promulgated. Many small and medium-sized enterprises also provide working opportunities for SET graduates and investigating the practices and attitudes within smaller SET-based companies merits further work.

The large multinationals that took part in this research all had flexible working and work-life balance policies in place. However, these were implemented at the local level through individual arrangements between staff and their line managers and this leaves room for large discrepancies within organisations. Human resources staff were aware that some managers were perceived as resistant to non-standard working arrangements, which may reduce staff's willingness to request more flexible working arrangements. Individual managers appear to have significant power over working arrangements for individuals.

The existing schemes for SET graduates meet the needs of a small and possibly elite set of returners to academia. However schemes could benefit women and SET more widely by helping employers to access and (re)train returners.

### 6.1.4 Academia

Women in academia appear to have some specific problems. Just at the time that researchers must be most productive if they are to move into permanent posts women are beginning family formation. If they are on contracts with no maternity leave rights, getting back into employment of any kind can be difficult. The age-based career structure works against them being appointed as postdocs in their early and mid-thirties. Additionally, anyone whose publication record is considered 'short' for their age by recruiters is likely to be held back in a market sector that is highly competitive.

## 6.2 Recommendations

## Recommendation 1:

### For Government

We have seen that the overall pool of potential returners is not the largest group of SET graduates not employed in SET but is significant compared to the short-term skills shortages projected by some sectors. Chapter 5 highlights that there is a market failure in terms of encouraging economically inactive female SET graduates to return to employment.

***To address the market failure we suggest that it is appropriate for Government to intervene and provide assistance to both returners and employers.***

(i) ***We recommend that academia and industry be considered as two separate classes of employer.*** Before developing new schemes it will be appropriate to consider whether business support schemes already exist that have some, most or all of these characteristics. Even if they have been developed for different purposes it may be more cost-effective to adapt an existing programme than develop something entirely new. We recommend that schemes should have the following components.

(ii) ***In industry, a scheme should provide access to technical training and reskilling during a transition period back into employment.*** This will reduce the retraining burden on employers, making returners more attractive when in competition with other potential recruits. Linking retraining to knowledge transfer activities could have the added benefit of building extra links between industry and academia. TCS might provide a useful model in this respect. An industry-based scheme might offer the following options:

- Taster sessions offering short periods of employment on a 3-6 month scale for short project-based work;
- 1-2 year schemes that are employment-led with elements of training and mentoring;
- Training-based schemes with employment experience.

*(iii) For academia, the role for Government appears to be twofold,* albeit probably working through the research funding bodies (both the Research Councils and the Higher Education Funding Councils).

- ***First, providing the backing for people to return to specific posts rather than having to design their own research projects.***
- ***Secondly, ensuring a level playing field for older returners who may be disadvantaged by their age or gaps in their research CV.***

***Any Government-backed scheme will need to have the following elements in place:***

- Effective partnerships with SET employers, particularly smaller businesses;
- Appropriate training elements to support the updating of both general business and specialist skills;
- Access to appropriate training providers;
- Remote and self-teaching structures;
- Built-in flexibility with regard to terms and conditions;
- The capacity to identify and spread best practice;
- A marketing strategy that will ensure that potential returners are made aware of the opportunities open to them; and
- Monitoring and evaluation systems embedded in the scheme.

*(iv) Government should also publicise case studies, from both classes of employer, designed to promote creative solutions to individual problems.*

## Recommendation 2:

### For Industry

The qualitative research has shown that many who have left SET retain negative images of the sector. While these may to some degree still be reflected in working practices, there is a good deal of evidence to suggest the sector is increasingly embracing work-life balance practices and could do more to promote this.

*(i) Individual employers or perhaps industry associations should work with the relevant parts of Government to ensure that the current nature of SET employment is adequately communicated.* This may be relevant to the majority of SET graduates who do not actually enter SET occupations as well as to returners.

(ii) Increasing competition for skilled people will mean that significant changes in workplace attitudes and culture will be needed to attract and retain the best people. However, ***companies could do more internally to make line managers aware of the business case for flexibility and how they will benefit.*** One human resources respondent suggested that the company might make formal statements about the structures put in place to encourage flexibility and we endorse this suggestion.

(iii) Stereotypes need to be challenged by all staff and managers as well as by human resources departments. We see a role for human resources departments in providing support for individuals seeking to develop solutions.

***(iv) As beneficiaries of any Government-backed scheme to aid returners, employers should be expected to make some contribution to the training costs as well as paying the returner's salary.***

## Recommendation 3:

### Schemes for Returners

Existing schemes are meeting some needs; however, the experiences of users spoken to within this study suggests that existing schemes can be improved. In particular, the following issues might be addressed in order to reduce the burden on potential applicants:

***(i) The scheme managers take a proactive role in matchmaking between prospective returners and employers;***
***(ii) Scheme managers should build up portfolios of likely employers/hosts for returners.***

## Recommendation 4:

### For the Higher Education Sector

***(i) This study did not investigate the role of the higher education sector as an employer. We recommend that this should be explored in the content of implementing work-life balance policies***. We did explore employees' perspectives of returning to academia at a workshop. A suggestion at the workshop was for the development of a scheme targeted at university heads of groups/departments that could address the acknowledged need of many groups for a permanent "head of laboratory". This was a traditional post that respondents suggested had largely disappeared with recent cuts.

***(ii) A Government-backed scheme might provide funds that will enable universities to apply for a grant for such a "head of laboratory" post.*** The post, which could be held part-time, might have a fixed term, perhaps for three years. This would provide the university with a much needed member of staff and the returner with a sufficiently secure long-term post to reskill and be better equipped to find long-term employment. The fixed term would mean that the post could play an ongoing role in supporting a continual flow of returners.

***(iii) The workshop of women academics recommended that funders review all schemes to ensure that there was no inadvertent discrimination.*** Age limits are the most obvious inadvertent discriminator, where grants are designed to help people start their career, age limits work against women who have taken career breaks and late entrants of both sexes.

## Recommendation 5:

### Other Organisations

*(i)* Increasingly in larger businesses, management practice is to encourage staff to come forward with their own solutions to their needs. This may not be the ideal approach if a sector is not embracing modern work-life balance practices as quickly as others. ***We therefore see a role for unions, other staff associations and professional institutions in providing support for individuals seeking to develop solutions.***

***(ii) Business support intermediaries could play an important role in supporting SMEs by assessing local skills requirements and promoting opportunities for returners through local media.***

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# Notes

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