Occupational segregation, gender gaps and skill gaps

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Institute for Employment Studies

European Social Fund
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Data relating to numbers of males and females in modern apprenticeship frameworks are not currently routinely published. Therefore these data were requested from the Scottish Executive, Scottish Enterprise, Highlands and Islands Enterprise, ELWa and the LSC on behalf of the EOC. The researchers are extremely grateful to the following individuals for their help in providing these data:

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EXECUTIVE SUMMARY

In June 2003, the EOC launched a General Formal Investigation (GFI) into gender segregation in five occupational areas where there are skill shortages. The GFI is being undertaken with funding from the European Social Fund (ESF). The areas chosen for study in the GFI are amongst the most strongly segregated: construction, engineering, plumbing, and Information and Communication Technology (ICT) (all male-dominated), and childcare (female-dominated). As the first stage of a programme of research to support the GFI, the EOC commissioned the Institute for Employment Studies to conduct a review of research and an analysis of current labour market and training statistics in these five areas.

KEY FINDINGS

Government policies and initiatives
A large number of government initiatives are currently underway in the education and training arena, particularly in vocational education and training. These are to be welcomed, but the lack of explicit recognition of equal opportunity and gender segregation issues is a concern because it is likely to lead to reinforcement of traditional gender divisions in education and training, contrary to the intention to increase opportunities. The concern is greater because of the introduction of vocational GCSEs and the forthcoming changes to work-related learning for young people.

The National Skills Strategy notes that women as a group within the UK still lag behind men in terms of their skills and qualifications. Despite this, there is no explicit strategy to address these identified skill needs of women.

There remains a need to consider the potential differential impact on men and women of national policies. At regional level, there is variation in the extent to which Regional Development Agencies and Local Learning and Skills Councils are taking action to address occupational gender segregation in the context of identified regional skill needs.

Strategies based on policies where the implications for women have not been formally acknowledged within key documentation, are likely to lack the necessary focus and impetus required to have the needed impact.

Some policies also appear to disadvantage young parents within the vocational/work-based learning strand of provision compared with young people pursuing other forms
of learning. This is particularly likely to affect women. Two recent funding initiatives to provide grants to adult learners and to assist young parents in learning with childcare costs exclude those in employment, and so, by implication, the majority of Modern Apprentices. Such allowances could make it more profitable for apprentices in some low-paid areas of employment to give up employed status and return to student status.

Theories of occupational segregation and career choice
Theories that attempt to account for the establishment and maintenance of segregation include those based on individual differences, including human capital theory; those that are based on ideas of discrimination by employers, including labour market discrimination and rational bias theories; and those that take as their central premise, the notion of systemic barriers within organisations, including intergroup and dual labour theories. While no one theory accounts single-handedly for the establishment and continuance of gender segregation, together they help to make sense of these employment phenomena. There has been relatively little empirical research to test these theories at organisational level.

There are, therefore, a number of influences which affect occupational segregation and the research shows that these are mutually reinforcing. Decisions made by individuals certainly contribute to the perpetuation of occupational segregation, but perceived occupational segregation in turn influences individuals’ choices.

Career choice
Occupational segregation remains one of the strongest influences on young people’s choice of career, with individuals typically preferring those occupations in which they see their own gender represented. However, this is not a static process; there is evidence that girls (but to a lesser extent, boys) become willing to consider a wider choice of occupations as they become older. Unsurprisingly, ability, attitudes and interest all influence career choice, but attitudes and interest have a stronger influence on job choice than ability.

Parental attitudes continue to have a significant impact on the career decisions of young people. This is particularly the case amongst some minority ethnic communities. Parents influence decisions both directly, through their views on appropriate jobs, and indirectly, through their influence on the development of young people’s attitudes to school subjects. The teaching style adopted in schools is a further factor which influences the perception of school subjects, particularly the sciences. The advice and guidance offered to young people also affects this process,
but research suggests that careers advisors may not challenge career stereotypes and see this role as outside their area of responsibility.

There have been a raft of initiatives aimed at increasing uptake of the sciences by girls and the need for improved advice and information is identified as a key issue affecting attitudes towards science careers. Image too is an issue affecting recruitment to some sectors - most notably science, engineering, IT, construction and plumbing - that could be addressed by improving the information made available to young people.

The ability of the qualification to help a young person enter their chosen occupation is a key factor influencing initial choice of qualification, while the perceived rewards of different jobs are, perhaps unsurprisingly, an influence on career choice. However, young women and men are attracted by different aspects of various jobs, and pay is not necessarily the strongest influence. Interest is again found to be a key consideration.

**Funding and initiatives to address segregation**
A number of initiatives to address gender segregation have been undertaken with ESF funding, primarily through the EQUAL programme aimed at addressing labour market inequalities. A range of actions to encourage women to enter atypical work have been taken, but in many cases, it remains too early to assess the long-term effectiveness of these initiatives.

**Profile of employment, pay, training and skill gaps in the sectors**
For each of the five sectors, data from the Labour Force Survey (LFS) were analysed to provide a picture of the proportions of women and men in employment in the sector. This analysis confirmed that the five GFI sectors remain strongly sex-segregated, although there were some variations between the sectors; employment in ICT is clearly less gender segregated than in the other four sectors.

For most of the sectors, the numbers of the atypical group were too small to report, given the restrictions that apply in reporting LFS data. Data from the New Earnings Survey were analysed to show the relative pay rates of women and men. Average earnings in the male-dominated GFI sectors are very significantly higher than in the female-dominated childcare sector.

Unlike data for students registered in higher and further education, data for those registered on Modern Apprenticeships (MAs) are not routinely made publicly
available broken down by framework and gender in England, Scotland or Wales. In each case, the statistics had to be specially requested for this report.

MAAs in the GFI sectors remain extremely gender segregated which, in turn, suggests that the main training provision for young people will do little to break down wider segregation in employment in these sectors.

Skill shortages and vacancies exist in all five GFI sectors. This is particularly the case in construction, where skill shortage vacancies as a proportion of total vacancies are almost double the national average. Skill shortage vacancies are also well above average in engineering. Continuing chronic recruitment difficulties are seen in the plumbing and childcare sectors, while in ICT, increasing numbers of employers are reporting the need for higher level skills.

**SUGGESTED WAYS FORWARD**
The EOC is making separate recommendations in its GFI in the light of this report and other evidence. The authors draw attention to the following areas, where they make some initial suggestions for possible ways forward.

**Data collection and publication**
In England, Scotland and Wales, steps should be taken as a matter of some urgency to put data on registrations, and ideally completions, by gender, separately for all MA frameworks in the public domain.

If parity of pay for female and male apprentices is to be monitored, then it is also necessary to gather and monitor pay data. We therefore suggest that SSCs should conduct an initial audit of pay rates for apprentices and that this should be followed by subsequent monitoring. We are mindful of the potential burden this would impose, and in any event, change is likely to be slow. Therefore we would also suggest a three-year interval between subsequent audits. It is also important that the results of such surveys are published.

It is important that more accurate data at an occupational level are collected in key sectors and that the data are gendered. It is therefore suggested that the DfES should fund, through the SSCs, regular surveys of employment patterns, skill and qualification levels and skill gaps. We suggest that such monitoring should occur at intervals of approximately three to five years, unless the SSCs themselves consider that they should be conducted more frequently.
Action to promote atypical work

We consider that a range of actions should be taken to promote atypical employment to young people, including young children before the age at which key educational and career decisions are taken.

We suggest that the government considers making a subsidy available to employers taking on an apprentice (and especially older apprentices) that takes into account the additional costs incurred by employers in the first year, or, as a minimum, six months. A sensible first step might be to focus subsidies in areas of skill shortage. We also suggest that consideration be given to establishing national minimum pay rates for apprentices over and above the £40 per week minimum grant for apprentices that currently applies.

In our opinion, an additional subsidy should be paid to those taking on ‘non-traditional’ apprentices, provided that such action would be covered by the positive action clause of the SDA that allows initiatives to enable women and men to compete on equal terms in sectors where either sex is under-represented.

We suggest that all employment and education/training policies are analysed for their gender impact and that strategies and initiatives based on those policies subsequently take any identified gender impact into account.

We suggest that the Connexions service reviews its policies and staff development provision to enable all workers to address issues of gender segregation as a priority. Training to raise awareness of occupational gender segregation for careers education teachers should also be viewed as a priority.

In arranging visits and work experience, care should be taken that these do not reinforce existing stereotypes and that the opportunities for both females and males in various sectors are stressed. This should be a key aspect of any future government developments in the direction of a work experience entitlement.
1. INTRODUCTION

Despite nearly thirty years of legislation outlawing discrimination on grounds of gender in education, training and employment, and some limited initiatives aimed at encouraging women to consider a broader spectrum of work opportunities, many occupational sectors and jobs in the UK remain strongly gender-segregated. The UK is not alone in this; across Europe there are important similarities in the pattern of occupational segregation between Member States of the European Union (Rubery and Fagan, 1995). Agriculture, industry (manufacturing) and financial services remain dominated by men, while the service sector (including health and social work and education) remains largely the province of women (Thewlis, Miller and Neathey, 2004). IT and the science, engineering and technology (SET) sector remain dominated by men in almost all European states (Thewlis et al., 2004).

Gender segregation in employment is of concern for two reasons quite aside from issues of equality of opportunity: segregation into different areas of work remains a key factor contributing to the gender gap in earnings (Forth, 2002); and gender segregation contributes to continuing skills deficits in the UK, which is recognised by the government in relation to some sectors, e.g. ICT (Hewitt, 2001). Segregation can occur both vertically, concentrating individuals in the lower echelons of an organisation; and horizontally, concentrating individuals in particular occupations. Women suffer from both forms of segregation but this report focuses mainly on horizontal, or occupational, segregation.

1.1 Research background

In June 2003, the Equal Opportunities Commission (EOC) launched a General Formal Investigation (GFI) into gender segregation. The focus of the GFI, which is being funded by the European Social Fund (ESF), is on Modern Apprenticeships (MAs), which are currently the main training routeway into work for young people in Britain. It also concentrates on five occupational sectors where there are skill shortages: construction, plumbing, engineering, Information and Communication Technology (ICT) and childcare.

As Table 1.1 shows, these five 'GFI sectors' remain amongst the most strongly segregated. In the case of construction, plumbing and engineering occupations, in particular, and to a slightly lesser extent in ICT, the vast majority of the workforce is male. In contrast, in childcare, women account for the overwhelming majority of employees. Moreover, average earnings of employees in typical occupations in the four male-dominated sectors are clearly substantially higher than in the female-dominated childcare sector (Table 1.2).
Table 1.1  Employment in GFI sector occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>All construction occupations</td>
<td>1122; 53; 814; 912</td>
<td>16</td>
<td>1,591</td>
</tr>
<tr>
<td>All ICT occupations</td>
<td>1136; 213; 313; 5242; 5245</td>
<td>151</td>
<td>834</td>
</tr>
<tr>
<td>All engineering occupations</td>
<td>212; 311; 5249</td>
<td>64</td>
<td>731</td>
</tr>
<tr>
<td>All plumbing occupations</td>
<td>5216; 5314</td>
<td>*</td>
<td>191</td>
</tr>
<tr>
<td>All childcare occupations</td>
<td>6121; 6122; 6123</td>
<td>297</td>
<td>*</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed.

* Less than 10,000 in cell.


Table 1.2  Average earnings in selected GFI sector occupations, 2003

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<thead>
<tr>
<th></th>
<th>SOC</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Hourly</td>
<td>Weekly</td>
</tr>
<tr>
<td>Managers in construction</td>
<td>1122</td>
<td>15.55</td>
<td>654.4</td>
</tr>
<tr>
<td>Construction trades</td>
<td>531</td>
<td>9.47</td>
<td>413.8</td>
</tr>
<tr>
<td>Construction operatives</td>
<td>814</td>
<td>9.99</td>
<td>472.3</td>
</tr>
<tr>
<td>Elementary construction occupations</td>
<td>912</td>
<td>7.61</td>
<td>364.4</td>
</tr>
<tr>
<td>ICT managers</td>
<td>1136</td>
<td>23.22</td>
<td>872.4</td>
</tr>
<tr>
<td>ICT professionals</td>
<td>213</td>
<td>17.67</td>
<td>675.0</td>
</tr>
<tr>
<td>Engineering professionals</td>
<td>212</td>
<td>15.52</td>
<td>615.2</td>
</tr>
<tr>
<td>Engineering technicians</td>
<td>3113</td>
<td>12.73</td>
<td>525.7</td>
</tr>
<tr>
<td>Plumbers, heaters and ventilating engineers</td>
<td>5314</td>
<td>10.46</td>
<td>445.8</td>
</tr>
<tr>
<td>Childcare and related personal services</td>
<td>612</td>
<td>6.92</td>
<td>250.8</td>
</tr>
</tbody>
</table>

Notes: Data are for full-time employees.

Source: Office for National Statistics, New Earnings Survey, Table A12.

This study, which the Institute for Employment Studies (IES) was commissioned to carry out in August 2003, is the first of a series of research studies which the EOC has set up to support the GFI. It consists of a literature review of factors influencing gender segregation, and a statistical analysis to examine the extent and nature of
occupational segregation, gender gaps and skills gaps in the five GFI sectors. The specific aims of the research are to:

- Derive an in-depth picture of the training and employment of women and men in the five GFI sectors.
- Compare the progression of women and men within these sectors.
- Assess their training and attainment of qualifications.
- Compare the pay levels of women and men in these sectors.

The report also investigates skills deficits in these sectors and the extent to which the sectors had considered recruitment of the under-represented sex as a means to address skills deficits. In particular, patterns of entry to MAs are explored, along with initiatives aimed at recruiting atypical young people via this training route within the five sectors.

1.2 Structure of the report
The following five chapters provide the general background to this study. Chapter 2 describes the recent policy and legislation background. Chapter 3 examines the issues that are driving research into segregation. Chapter 4 summarises the existing theories of occupational stereotyping and occupational segregation. Chapter 5 presents an overview of research into factors affecting the career choices of individuals. Chapter 6 considers European funded initiatives on atypical work.

Chapter 7 focuses on each of the five GFI sectors in turn. It begins with a description of sources of data that are currently available and their limitations. We then review the background to the sector and report the numbers of women and men working and currently in training in that sector. We also, where possible, show data on average rates of pay.

The final chapter outlines the main conclusions of the research.
2. POLICY AND LEGISLATIVE BACKGROUND

2.1 Introduction and legislative context
This chapter briefly outlines the education and employment policies and developments in the UK that formed the backdrop to the review. While most of these are aimed more generally at increasing the flow of (typically young) people into education, or into specific sectors such as science, engineering and technology, in most cases, there are particular gender issues.

The Sex Discrimination Act (SDA) was introduced in 1975 and made it illegal to discriminate on grounds of gender when recruiting staff. The SDA also requires employers to give equality of access to training, development and promotion opportunities. Other legislation, in the form of the Equal Pay Act (1970), required employers to pay equivalent rates of pay for women and men engaged in the same job (and, since 1984, for work of equal value). The SDA therefore requires employers to give equal consideration to equally qualified female and male applicants.

2.2 Qualifications and subject choice
It is only recently that the number of women entering higher education (HE) caught up with, and then overtook, that of men (currently, the proportion of female entrants to HE is around 52 per cent). This means that, for some years, women remained less likely to be able to enter higher level occupations than men. In addition, while lack of qualifications constitutes an overall, non-specific, barrier to employment, lack of appropriate qualifications can be a very specific barrier restricting individuals' opportunities to apply for jobs in certain areas. The making of early educational choices that effectively close off certain career options remains one of the prevailing barriers to the entry of women into areas of non-traditional work.

The early stereotyping of certain subjects as 'male' and 'female' is one factor that influences the subject choices of children and adults (Archer, 1992). In the UK, the choices made at age 16 (and increasingly, now, at age 14) of subjects for further study, to a large extent determine the subsequent options available to an individual for higher education and employment. While women now constitute the majority of entrants to higher education, many areas of study remain heavily gender-segregated.

Similar patterns are seen in the vocational arena. One half (53 per cent) of the National Vocational Qualifications (NVQs) awarded in 2000-01 were awarded to females. Females are also more likely than males to be awarded NVQs at level 3 and above. A third (33 per cent) of women candidates achieved NVQs at level 3 or above in 2000-01, compared with 25 per cent of men (DfES, 2002a). However, women are
largely found in just a few areas. Women constitute the majority of candidates in the three largest NVQ sectors: 'providing business services'; 'providing goods and services'; and 'providing health, social and protective services' (DfES, 2001).

2.3 Vocational education between the ages of 14 and 19

The government announced its intention to increase the options available for young people between the ages of 14 and 19 in the Green Paper 14-19 Extending Opportunities, Raising Standards (DfES, 2002b). The outcomes of the consultation process and its plans were subsequently announced in the White Paper 14-19 opportunity and excellence (DfES, 2003a). This life stage is regarded as an important phase in learning and has become the focus for new initiatives aimed at widening the variety of pathways to learning and thereby increasing individuals' commitment to learning.

While 14-19 opportunity and excellence recognised the need to improve vocational options and raise the status of vocational provision, the document's messages were mixed. It reported that General National Vocational Qualifications (GNVQs) would be replaced by vocational GCSEs (introduced initially in eight vocational subjects: applied art and design, applied business, engineering, health and social care, applied ICT, leisure and tourism, manufacturing, and applied science). However, it also stated that the government's intention was to introduce new 'hybrid' GCSEs that will 'allow students to study on either academic or applied tracks'.

In its response to the Green Paper, the EOC (2002) broadly welcomed the potential changes. However, it expressed concern about the potential impact for gender equality of the proposals for greater and earlier vocationalism within the school curriculum, particularly the risk that such changes could lead to more sex-stereotyped curriculum choices. It also pointed to data showing the correspondence between choices made in GNVQs at age 14 and those made at apprentice level. The, then, Secretary of State responded that:

All new initiatives emanating from the Department aim to mainstream equal opportunities and to challenge stereotyping. The programme of vocational learning ... will significantly expand the opportunities for girls and boys to undertake non-stereotypical vocational courses and work placements. We will be urging participating schools and colleges to promote such courses in a gender-free manner and actively to encourage take-up that is non-traditional. The associated monitoring and evaluation arrangements will provide valuable feedback on the extent to which this has happened and we intend to use the findings to influence future policy development.
Given this response, the EOC found it extremely disappointing that there was no reference in the proposals to mainstreaming equality, to gender issues, or to the need to challenge stereotyping. It observed that there was a risk that these changes could turn the clock back on equality and that it would be necessary to ensure that equality was promoted and not undermined by the proposed changes (EOC, 2002).

Vocational GCSEs
Data regarding the take-up of vocational GCSEs will not be available until Spring 2004 (DfES, 2003b). Until then, the main source of information is the evaluation of the Increased Flexibility for 14-16 year olds programme (Golden, Nelson, O'Donnell and Morris, 2003), which was established by the DfES in 2003. In common with the patterns seen for other qualifications, females were over-represented among students taking qualifications in care and childcare; 28 per cent of females, compared with 1 per cent of males, were taking these qualifications. Similarly, in hair and beauty, some 14 per cent of females, compared with less than 1 per cent of males, were taking these. In contrast, males were over-represented amongst those taking engineering and motor vehicle studies (28 per cent of males, compared with 1 per cent of females) and in construction (12 per cent of males, compared with 1 per cent of females) (DfES, 2003b; Golden et al., 2003).

Work-related learning for young people
At the time that this report was being compiled (in late 2003), the Qualifications and Curriculum Authority (QCA) had just finished conducting its public consultation on proposed changes to the Key Stage 4 curriculum (National Foundation for Educational Research, 2003). The proposed changes included the intention to introduce an entitlement to 'work related learning'. The proposed statutory framework for work-related learning would require schools to make provision for all students that would include:

- Planned activity that uses work as a context for learning.
- Learning through work, about work and for work.
- Using the context of the world of work to develop the knowledge, skills and understanding that will be useful in the world of work.

The consultation document suggested that direct experience of the world of work, through 'a variety of activities' should be at the heart of any work-related provision. While this stops short of making work experience mandatory for 14-16 year olds (since many will go on to do work placement at age 17-18), nonetheless it is likely that many will undertake work placements.
Work placements are of importance, since research by Stoney (1998) and Fitzgibbon (1996) has shown that pupils rate work experience as a very important source of information on careers. But the EOC has expressed concerns that the work placements obtained by pupils at this age will serve to reinforce stereotypes (EOC, 2003a). It has argued that:

*The role of work-related learning in introducing young girls and boys to non-stereotyped work opportunities should be made more explicit. In particular, experience of work, work experience and part-time jobs should provide opportunities for engagement with non-traditional work.*

A new study for the EOC by London Metropolitan University (Francis et al., forthcoming) will examine the gender implications of work experience placements for young people in more detail. This will build on earlier research evidence that, where young people arrange their own placements, these are often in gender-traditional areas of work. Rolfe (1999) considered the role of the, then, Careers Service. One finding was that where schoolchildren were left to arrange their own work placements, most often these were in stereotypical work areas. This was particularly the case where they arranged placements through family contacts.

Work placements can also reinforce stereotypes, even when they are not arranged by young people themselves. An evaluation of pre-16 work experience placements by Hillage, Honey, Kodz and Pike (1996) found that work placements tend to be supply, rather than demand, led, and that students generally tended to take up fairly traditional placements, contrary to the spirit of guidelines set by the, then, DFE (DFE, 1995).

Subsequent work by Hillage, Kodz and Pike (2001) found that schools in more deprived areas reported that they were in less of a position to challenge class, social or gender issues in regard to placements. While there had been a slight narrowing of the gender gap in some sectors, e.g. production, legal and media, nonetheless large differences remained in sectors such as education and health, where placements were predominantly taken by girls (Hillage et al., 2001). Furthermore, some area coordinators for pre-16 work experience placements felt that their ability to challenge stereotypical placements was being reduced by the increase in students finding placements for themselves which was noted above.

Taken together, it can be seen that the government plans a broad raft of changes to 14-19 provision. These changes are intended to improve and raise the status of vocational provision, and give a wider range of options to young people. Yet in the absence of any acknowledgement of equal opportunity issues, there are reasons to
be concerned that issues of gender segregation will be inadequately addressed when these changes are implemented.

2.4 Widening Participation initiative
The *Widening Participation* initiative within the HE sector (HEFCE, 1998) was introduced to encourage wider access to higher education for disadvantaged groups in England, such as those from lower socio-economic groups, deprived geographical regions, ethnic minorities, people with disabilities, and women.

As stated in Chapter 1, more females than males now apply to, and are accepted for, places on university courses. On the basis of these overall figures, the *Widening Participation* programme may therefore be judged to have been a success. However, choice of course remains strongly gender-segregated. Therefore, while females now constitute a majority of entrants to HE, they remain concentrated in gender-traditional areas.

At the same time, a similar movement also took place in the Further Education (FE) sector; indeed, FE has been viewed as the key to widening participation in post-16 learning and to creating a self perpetuating learning society (Kennedy, 1997). There are now more females studying in FE than males, and this gender gap has been widening. At present for every two male students in FE, there are roughly three female students (LSC, 2002a).

Very similar patterns of sex-segregation are found in FE and HE. Additionally, in HE, a majority of the new foundation degrees are in the areas in which men already predominate. The areas in which women have largely registered so far are in those that are historically popular amongst women, such as early years studies (Davies, 2003, citing the DfES). For this reason, concerns have been expressed that the foundation degrees will serve only to reinforce existing patterns and stereotypes (Davies, 2003, citing Alan Smithers). However, at present it is difficult to form any firm conclusion regarding such patterns, as data relating to foundation degrees currently are not reported separately, but instead are reported together with the data for other degree programmes.

2.5 Science, engineering and technology - policy and initiatives
The science and technology sector has paid particular attention to issues of gender in recent years. This has been driven by its awareness that the number of young people (both males and females) entering science examinations and jobs is falling and that this has led to a skills crisis in employment in the sector. The need to persuade more individuals - and particularly females - to enter (and remain in) science, engineering
and technology (SET) has therefore been the focus of several recent government reviews and studies.

The Roberts Review of science, engineering and technology (Roberts, 2002) noted that:

*… the proportion of girls studying mathematics and the physical sciences post-16 is still considerably lower than that of boys, which contributes to the under-representation of women in science and engineering more generally. The review is clear that the under-participation of women in SET is damaging the UK's supply of scientists and engineers.*


The government also commissioned research which sought to understand why greater numbers of qualified women than men leave careers in science each year and to offer solutions on how to support returners to SET (People, Science & Policy Ltd and IER, 2002). Women with SET degrees have lower economic activity rates than both males with SET degrees and women with non-SET degrees. Structural issues to do with the way in which work is organised in SET industries and inflexible work practices make working in this sector difficult for women. Similar issues emerged from the later Greenfield Review (Greenfield, 2003), which was commissioned by Patricia Hewitt to investigate the barriers to retention and career progression for graduate and postgraduate women in science. While the main focus was on professional level occupations, the Greenfield Review also recommended that age limits for MAs be opened up to enable women to start an MA after having children. In its response to this report (DTI, 2003), the government indicated its intention to consider this option. Its decision to start raising the age cap on MAs was later announced as part of the National Skills Strategy (DfES, 2003c), although its potential benefit for women was not acknowledged.

The focus of the Roberts Review - preventing drop-out from science at earlier stages of the education process - has particular, direct, relevance for three of the GFI sectors: engineering, plumbing and construction. Since science qualifications (typically at GCSE) are identified as entry requirements for MAs in these sectors, any difficulties in encouraging girls to take science subjects at school have subsequent implications for future employment in them. Similarly, the difficulties identified for women scientists and technologists, in terms of lack of support and barriers to employment and progression, may be of relevance for women who hope to enter these three sectors at intermediate positions. Given the government's current concerns with intermediate level skills (see section 2.8), it is appropriate next to examine apprenticeships as an intermediate position between school and university.
2.6 Modern Apprenticeships
Modern Apprenticeships (MAs) were introduced in September 1994 (and became fully operational from September 1995), both as a response to concerns about skill needs at intermediate level and to provide a vocational training route that would prove attractive to employers and to young people. The new qualifications initially consisted of an NVQ at level 2 for Foundation Modern Apprenticeships (FMAs) and at level 3 for Advanced Modern Apprenticeships (AMAs), plus some key skill units. They were to be made available to young people aged between 16 and 25. The key skill components varied to reflect the particular needs of different sectors.

The new awards did not prove as successful as hoped and in 2000, the National Skills Task Force reported that the proportion of 25-28 year olds holding vocational qualifications at level 2 or above (i.e. the age group that would have been eligible to take up and complete MAs in the period since their introduction) was one third less than in France and Germany. At level 3 and above, the proportion was even lower, at two-thirds less than that in France and Germany (National Skills Task Force, 2000).

In addition, concerns have been raised for some years regarding the extent of gender segregation in MAs. A report for the Quality and Performance Improvement Division (QPID) of the then DfEE in 1999 noted that, while the overall participation rate of females in MAs had improved, with female participation growing from 30 to 50 per cent between 1994 and 1998, there remained considerable gender segregation across MA frameworks. The report observed (p. 2):

> Despite the introduction of a new initiative, gender segregation is being re-established in a stereotypical fashion with long-term implications for young women and men’s future pay and prospects.

Similar concerns were echoed by a study conducted by The HOST Consultancy for the DfEE and the Local Government National Training Organisation (LGNTO) (DfEE/LGNTO, 1998) and subsequently by the EOC, in its submission to the Cassels Review (see below) (EOC, 2001a). The EOC noted that ten male dominated sectors accounted for 82 per cent of male MA starts, while ten female dominated sectors accounted for some 92 per cent of all female MA starts. It also noted that such 'channelling' of young people into segregated sectors contributed to the continuing pay gap, and that there were stark differences in the pay rates offered to Modern Apprentices in male- and female-dominated sectors (see Table 2.2).

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1 FMAs were formerly known as National Traineeships.
In 2001, the government commissioned a committee headed by Sir John Cassels to review the awards. The recommendations of the Cassels Review (Cassels, 2001) included that:

- Specification of the requirements for entry to an apprenticeship should be the responsibility of National Training Organisations (NTOs).\(^2\)

- For each MA, there should be a clear framework consisting of an NVQ, key skills units and a technical certificate.

- All technical certificates should be 'well-designed' and '[embody] explicit vocational knowledge' and offer the prospect of 'significantly upgrading apprenticeships'.

- There should be a minimum period of duration (one year for Foundation level, two years for Advanced level), although flexible duration should be possible, where appropriate.

The Cassels Review also noted that insufficient information relating to achievement and completion rates for MAs was being kept. The review team was told that few apprentices completed the full apprenticeship programme (i.e. achieved the NVQ and the key skill units which MAs consisted of at that time), but they could not confirm this, since no data were kept on full completions.

Finally, the Cassels Review noted the extremely gender segregated nature of entries for MAs, and recommended that there should be concerted action to address imbalances between the participation of young men and young women in particular sectors. The report stated that:

- NTOs should ensure that, in sectors where there is currently a significant gender imbalance, leaflets and other publications should promote the participation of those who are currently under-represented, whether male or female.

- The LSC and Connexions service, acting jointly and where appropriate with a relevant NTO, should establish projects designed to increase participation by under-represented groups in identified sectors and localities.

\(^2\) NTOs started to be replaced by Sector Skills Councils in 2003.
Following on from the Cassels Review, the National Modern Apprenticeship Taskforce was established in February 2003 and is chaired by Sir Roy Gardner. The Taskforce is charged with expanding MAs, encouraging the engagement of employers and making recommendations for modifications where necessary. The National Skills Strategy, published in July 2003 (see section 2.8) also reported the intention of the UK government and other European states to modernise apprenticeships.

Data on the number of people on AMAs and FMAs are published in Labour Market Trends each quarter. The available data are shown in Table 2.1; unfortunately, the published data are not broken down by gender. It is evident from the data that there has been an overall growth in the number of individuals on MAs since 1999-2000; moreover, whereas in 1999-2000, almost twice as many people were on AMAs than on FMAs, by 2002-03, the majority were on FMAs.

<table>
<thead>
<tr>
<th></th>
<th>AMAs</th>
<th>FMAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>130.0</td>
<td>65.4</td>
</tr>
<tr>
<td>2000-01</td>
<td>125.7</td>
<td>86.6</td>
</tr>
<tr>
<td>2001-02</td>
<td>111.8</td>
<td>101.7</td>
</tr>
<tr>
<td>2002-03</td>
<td>108.2</td>
<td>116.1</td>
</tr>
</tbody>
</table>

Notes: Data are for the annual averages of the number of people in-learning on LSC funded Work-Based Learning for Young People provision.

Source: ONS (2004), Labour Market Trends, January, Table K1.

MAs are available in each of the five GFI sectors. Take-up has been good and the awards appear to be providing a useful route into intermediate level occupations. However, as discussed in Chapter 7, despite the recommendations of the Cassels Review, they remain extremely gender segregated.

Pay of MAs
The available data on pay rates of MAs are very limited. Some information on pay rates in particular sectors (including the GFI sectors) was published in Labour Market Trends in April 2001, but not more recently, and these data were not disaggregated by gender. In 1999, the EOC surveyed the bodies responsible for MAs. At the time, these were Training and Enterprise Councils (TECs), which have since become Local Learning and Skills Councils (LLSCs). The EOC requested information about pay rates for MAs by sector and gender. Some 28 TECs responded (40 per cent of those
contacted), but while several collected data on pay rates and most could supply occupational information by gender, just three were able to supply data on occupation, pay and gender. Data from two of these are shown in Table 2.2.

Table 2.2 Earnings of Modern Apprentices in two TECs, 1999

<table>
<thead>
<tr>
<th>Sector</th>
<th>TEC 1</th>
<th>TEC 2</th>
<th>TEC 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per cent female</td>
<td>Hourly pay (£)</td>
<td>Per cent female</td>
</tr>
<tr>
<td>Heating ventilation</td>
<td>0</td>
<td>3.71</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>2</td>
<td>3.48</td>
<td>2</td>
</tr>
<tr>
<td>Plumbing</td>
<td>2</td>
<td>3.44</td>
<td>2</td>
</tr>
<tr>
<td>Motor vehicle</td>
<td>2</td>
<td>3.07</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>0</td>
<td>2.24</td>
<td>0</td>
</tr>
<tr>
<td>Furniture</td>
<td>2</td>
<td>2.17</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Media arts design</td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Hairdressing</td>
<td>75</td>
<td>1.89</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>81</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Business administration</td>
<td>82</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>88</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Hair/beauty therapy</td>
<td>96</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Childcare</td>
<td>100</td>
<td>1.70</td>
<td></td>
</tr>
</tbody>
</table>


The data indicate that, at that time, pay rates varied considerably between the different occupational sectors. Pay tended generally to be higher in the male-dominated sectors. There were sectoral variations in the existence of agreements relating to pay rates. While there were recommended wage structures set by the industry in construction, plumbing, electrical contracting and the motor vehicle trade, elsewhere there was little regulation other than that any wage should be more than the national insurance threshold. Variations remain between the sectors today (Miller et al., forthcoming), with both plumbing and engineering having specified pay rates for first, second and third year employees (and, for plumbing, for the fourth year, also) within the sector that apply to MAs with employed status (i.e. the majority). In construction, ICT and childcare though, there are no set pay rates.

One emerging policy issue involves the payment of the National Minimum Wage (NMW) to apprentices. Employers are currently required to pay the NMW after the
first year of an MA to apprentices aged over 19. In research undertaken for the Low Pay Commission, Miller, Hurstfield and Stratton (2002) reported that employers felt that, in the early years of training, apprentices were not able fully to contribute to the business. Moreover, employers argued that the lower rate that they were able to pay both to younger apprentices and to those in the first year of training compensated them for the time during which the apprentices were unable to be fully productive. For hairdressing apprentices in particular, employers felt they did not fully ‘pull their weight’ until they had achieved a full level 3 NVQ. Employers were not against paying the NMW to those employees whom they considered were contributing fully to their organisations, but felt the NMW would be an unfair burden if they were made to pay it for apprentices.

Where a mature employee moves into a sector and needs to progress through both a FMA and an AMA, this can mean the employer has to pay the NMW for perhaps two or even three years following the initial apprenticeship year. When this is compared to an employer taking on 16 year olds (who would not be eligible for the NMW until they reached the age of 19, by which time they would ordinarily have completed, or perhaps have a year left to complete), it can be seen that there may be a significant wage penalty attached to taking on a woman apprentice (or indeed any mature apprentice).

The Low Pay Commission (2003) issued a consultation document seeking views about whether the NMW should be extended to 17 and 18 year olds. This would include those on MAs. In its response, the EOC made a strong case for a NMW for apprentices. It pointed out that, currently, young people are likely to take jobs which offer higher immediate rates of pay, but which may well offer no formal training or long term prospects. The exemption of MAs from the minimum wage therefore undermines the aims of the Skills Strategy to increase the skills level of the workforce. In addition to its detrimental impact on take up of vocational training generally, the exemption for apprenticeships from the minimum wage has a major impact on young women who are found in those MA sectors which attract the lowest rates of pay; for example childcare apprentices earn approximately half the MA wage of engineering manufacture apprentices.

However, in recent work for the Low Pay Commission, Neathey (2004) found that, while the majority of employers interviewed were broadly favourable to the concept of a NMW for 16-17 year olds, those with young workers in trainee roles were opposed to a minimum wage for this group. They felt that they would be unable to provide trainee positions if a NMW was introduced.
2.7 Funding for Adult Learners
Since September 2003, there has been little financial support available for people aged over 24 years old who wished to study. This has been identified as a major barrier to adults who want to return to learning (JTL, 2003).

From September 2003, the Adult Learning Grant has been piloted in ten LSC areas. The grant offers an allowance of up to £30 per week to young adults on low incomes who are studying full-time for a first full level 2 or first full level 3 qualification. Subject to means testing, young people who are aged at least 19 and under 31 will be eligible to receive the grant at the time of the pilot. Up to £30 per week will be made available, but only during term-time. However, only those in full-time study will be eligible, which means that those going through the vocational route will generally not receive it.

Entry to Employment (E2E), a work-based learning programme aimed at young people who are not yet ready or able to enter a MA, was rolled out nationally in August 2003. The exact nature of the programme varies according to the young person's needs, but in general it may include some of the following: basic skills, key skills, NVQ level 1 or 2 units, personal development, vocational skills, employability skills, career awareness, work placements or tasters and citizenship. E2E has been designed to allow progression to a FMA, or into employment, or to further vocational learning.

A continuing problem in Britain remains the low levels of qualification within the workforce (DfES, 2003c), particularly amongst older workers. The DfES is currently piloting ways of encouraging employers to provide training and access to qualifications for such individuals. The Employer Training Pilots consist of a range of regional initiatives to provide training to employees aged 19 and over who do not yet hold a qualification at level 2. Components of the pilots can include free or subsidised training; wage compensation; training brokerage; and access to information, advice and guidance. Although the pilots are still ongoing, the indications are that they have been successful in encouraging employers to arrange training for their employees, and around 55 per cent of employees receiving training under this scheme are women. In the most recent budget, it was announced that the pilots would be rolled out to a further six regions in 2004.

2.8 The National Skills Strategy
The White Paper setting out the National Skills Strategy (NSS) was published shortly after this report was commissioned. 21st Century Skills, Realising Our Potential (DfES, 2003c) outlines the government's concerns that the UK is not currently
OCUPATIONAL SEGREGATION, GENDER GAPS AND SKILL GAPS

investing enough in its skills base. It also sets out its plans to manage the supply of training, skills and qualifications to ensure that, in future, employers will have sufficient skilled employees and that individuals will be equipped with the skills the government believes they need to be 'both employable and fulfilled'.

The NSS White Paper raises several issues of relevance to this study:

- **Intermediate level skills deficits.** The White Paper points to particular skills gaps in intermediate skills at apprenticeship, technician, higher craft and associate professional level. These are the levels for which MAs prepare young people.

- **Women's disadvantage linked to lack of skills.** The White Paper states that the government's intention is to increase the skill levels of all under-represented groups in society, particularly women workers who are 'typically locked in a narrow range of low level manual occupations and in part-time work where training opportunities are limited.'

- **Gender gap in qualifications contributes to skills deficit.** The White Paper recognises that the gender gap in qualifications, particularly for older women and those who are employed part-time, contributes to the national skills deficit.

- **MAs seen as important, but also as needing improvement.** Noting that MAs are important routes into employment, the White Paper outlines the government's plans to raise the age, so that more adults can benefit from this training route; this was in line with the recommendations of the Greenfield Review. In addition to broadening the age range for MAs, the government also intends to widen the range of groups of individuals, for instance, benefit claimants, for whom MAs are considered appropriate as routes into employment. However, in keeping with other EU states, the government recognises that current systems of apprenticeship and in-work training need to be modernised to be fully effective.

- **Improving publicity and engaging employers, but no attempt to address gender segregation.** The White Paper states that the government intends to raise the profile of MAs, engage more employers in providing them and ensure that young people have better access to information about MA vacancies. It also comments on the contribution that the gender qualifications gap makes to the national skills deficit, but it makes no explicit reference to addressing gender segregation within MAs as a way of increasing capacity. Nor does it make any link between raising the age cap for MAs and the earlier observation that women over the age of 40 constitute the main group lacking qualifications. It
does, however, acknowledge that the EOC is conducting a General Formal Investigation into occupational segregation.

2.9 The Employment Action Plan

It is a European Union requirement for each Member State to produce annual Employment Action Plans (EAPs) that set out the actions they plan to take to address perceived weaknesses in the labour market. The draft EAP for the UK for 2003 (DfES, 2003d) identifies the gender pay gap and occupational segregation as two issues to be addressed by government policy.

The government recognises that it has an unacceptably high gender pay gap and is committed to addressing this through a variety of measures, including:

- Its equal pay questionnaire.
- The promotion of voluntary equal pay reviews.
- Providing additional government funding to trade unions to train representatives in equal pay issues.
- Requiring the Civil Service to undertake pay reviews.

On gender segregation, the government notes the continuing concentration of women in a small number of occupations. It identifies two main ways of addressing this: the EOC’s GFI and the establishment of a new, dedicated resource centre for women in SET. Set up as a result of the Greenfield Review, the centre will provide advice, support and guidance on women in SET issues. It will also develop and share best practice amongst employers in order to tackle the remaining barriers that impede the recruitment and retention of women in SET occupations.

More broadly, the government continues to pursue a policy of encouraging and supporting female labour market participation through seeking to improve work life balance, the availability of child care, and financial incentives.

The government action plan to address gender segregation appears mostly to be focused on the SET sector, which is largely (although not exclusively), a graduate labour marketplace. Work life balance, child care provision and financial incentives are actions that bring broad benefits to working women (and men), but on their own do little to address gender segregation. In addition, the Greenfield Review pointed to particular difficulties in introducing work life balance measures within the science sector (Greenfield, 2002). In terms of addressing occupational segregation in the
workplace, the government appears to be relying significantly on the outcomes of the EOC’s investigations and actions as a way of achieving its targets.

The absence of any concerted attempt by the government to introduce policies to tackle gender segregation in employment is nothing new. In 2000, Rubery observed that there was limited evidence of policies to tackle gender segregation in the context of the National Action Plan, and within the Connexions service, policy gender issues appear to be of relatively low priority. Rubery and Rake (2000), in their gender impact assessment of UK policies, commented that:

… where studies do reveal important gender differences, these findings, although available to the government, are not integrated into government thinking and policy analysis.
(Rubery and Rake, 2000, p. 19).

2.10 Childcare, Working Tax Credits and the Care to Learn? initiative
In the draft UK EAP, the government indicates its intention to improve the availability of childcare provision. The EAP gives a target for the creation of a further 1.6 million new childcare places by 2004 and a further 250,000 places by 2006. The Spending Review 2002 included a commitment to a further 250,000 new places, so that over two million new childcare places will have been created by 2006.

The childcare element of the Working Tax Credit is intended to help working parents to pay for this provision. For those in education and training, there are three ways in which childcare funding may be funded. For those in HE, the Childcare Grant is available. For parents in FE aged over 19, Learner Support Funds may be accessed to provide for the costs of childcare while the parent is at college. For parents under the age of 19 who wish to continue with, or return to, study after having children, the DfES has recently introduced funding for childcare of up to £5000 per child under the Care to Learn? initiative.

Under the Care to Learn? scheme, childcare funding will be provided for all students aged under 19 with children, irrespective of whether they are in school, college or at a training organisation. However, the childcare provision is not available to learners who are employed. The recent drive to achieve employed status for all apprentices means that the majority are now employees rather than trainees; they are therefore not able to claim childcare funding under the Care to Learn? scheme. Instead, an apprentice who is a young parent will be eligible to claim Working Tax Credit towards the cost of childcare. However, this allows them only to claim 75 per cent of the costs, whereas a young person classified as a student can claim all the costs of
childcare up to £5000 per child. Particularly for young people on low wages, this difference could constitute a significant disincentive to pursuing MAs.

2.11 Regional Development Agencies
Regional Development Agencies (RDAs) are non-department public bodies in England which have 'a primary role as strategic drivers of regional economic development' (DTI, 2003). RDAs aim to co-ordinate regional economic development and regeneration, improve their relative competitiveness and reduce the imbalance that exists within and between regions. Each RDA has five statutory purposes, which are to:

- Further economic development and regeneration.
- Promote business efficiency, investment and competitiveness.
- Promote employment.
- Enhance development and application of skills relevant to employment.
- Contribute to sustainable development.

Part of the remit of RDAs is to draw up regional skills action plans to ensure that skills training matches the needs of the labour market. These action plans include workforce development to address local skill shortages. For many of the regions, local skills deficits are found to be in the GFI sectors. The majority of RDAs identify ITC skills as an issue and several focus on the need to raise the general skills (and qualifications) level of its workforce. It would therefore appear that RDAs would have an interest in addressing occupational segregation as a strategy to address local skill shortages.

Despite this, at the time of the research, only four of the eight RDAs appeared to have specific plans to address skills deficits by targeting women. London and the South West RDAs had both funded development projects aimed at increasing the numbers of women going into construction. The South East England Development Agency (SEEDA) has a specific policy field which identifies the need to improve the participation of women in the labour market. Its priorities include the need to address occupational segregation, reduce gender stereotyping and inequality and overcome barriers to entry and progression for women. SEEDA was also helping to fund the Computer Clubs for Girls initiative (see IT section, Chapter 7). Forward North West (the RDA for the North West region) has been involved in a series of projects organised by the JIVE consortium (details of this initiative are given in Chapter 6).
The remit of RDAs for regional workforce skills development makes them key intermediaries in initiatives aimed at the five GFI sectors. It indicates that they should be playing a key role in helping women to enter construction, ICT, plumbing and engineering. They also have an interest in initiatives to expand childcare provision that in turn would help women enter work. Nonetheless, just three of the RDAs made explicit reference to gender within their action plans.

2.12 Learning and Skills Councils

The Learning and Skills Council (LSC) was established in April 2001 with the intention of bringing together the remits for academic and vocational post-16 study (excluding higher education). The LSC is responsible for planning and funding: work-based learning, workforce development, adult advice and guidance, adult and community learning, and further education. The National LSC took over the roles previously held by the Further Education Funding Council (FEFC) and Local LSCs took over those formerly held by the Training and Enterprise Councils (TECs).

Some LLSCs have started to take action to address gender segregation in employment. For example, Gloucester LSC commissioned a survey of employers and employees within the construction, childcare and engineering sectors in 2002 (BMG, 2002). This study aimed at identifying good practice amongst local employers. While employers were not against the idea of recruiting and employing women or men in jobs usually undertaken by the other sex, none was actively recruiting or providing training aimed at promoting non-stereotypical employment.

Employees reported that, on the whole, employers treated them equitably and that there was equal access to training. They reported that any negative attitudes were more likely to come from colleagues than from employers. This was particularly likely in the childcare sector.

The research revealed that, for women who worked in male-dominated jobs, the salary was the most usual reason for entering the occupation. However, one of the most significant barriers to men moving into childcare was the level of pay offered, and for this reason it was felt unlikely that the proportion of male workers in the childcare sector would increase significantly in the near future.

Employers thought that lack of information about career opportunities in non-traditional jobs was a major reason for individuals not considering these areas of work. They felt that it was the responsibility of schools, careers advisors and
employment services (and employees themselves) to raise awareness of atypical areas of work, rather than their own.

Despite the fact that some LSCs (and their predecessor TECs) are involved in research and actions aimed at challenging stereotyping, there is no current central source of information on the nature and extent of such activities. Work commissioned by the EOC as part of the GFI is intended to provide information on such activities (Miller et al., forthcoming).

2.13 Summary
There have been a raft of policy initiatives over the past few years that have had either direct or indirect implications for women. In a few cases, policy initiatives have been explicitly aimed at encouraging women into segregated areas. However, in many cases, while it is clear that a policy has implications for women, this has not been formally acknowledged within the key documentation. Examples of this include the vocational education agenda, the revisions to 14-19 education and training provision, and the National Skills Strategy.

Unless there is a formal recognition, or explicit identification, of gender segregation, it is likely that strategies based on these policies will have neither the focus, nor the impetus, needed to have a significant impact on the issue.

Having given an overview of developments in policy and initiatives, in the next two chapters we move on to consider research theories that have sought to explain the origins and persistence of gender segregation.
3. ISSUES DRIVING RESEARCH INTO SEGREGATION

3.1 Introduction
This chapter outlines the key issues which drive research into occupational segregation. It focuses on three areas: the employment of women and men in atypical work, pay, and promotion.

3.2 Atypical employment
A general principle that drives much of the work in this area is the desire to open up and maximise all individuals' opportunities to undertake fulfilling and rewarding work, irrespective of gender. Nonetheless, there are different issues that relate specifically to the employment of women and men in atypical areas of work. The perspective underpinning research in these areas therefore differs.

In work focused on increasing female entry to male areas of work, the main priority has tended to be the general desire to widen and improve the range of employment options for women. This is because the areas of work within which women traditionally tend to be concentrated, are generally those with lower average pay and lower status. Gender segregation therefore serves to perpetuate the gender pay gap. For women to obtain better paid (and higher status) work, it is usually necessary for them to consider working in occupations typically perceived as male. The Equal Pay Task Force was set up by the EOC in October 1999 to explore the gender pay gap, gather evidence and make recommendations regarding how to close this gap. The resulting report, *Just Pay*, (Equal Pay Task Force, 2001) indicated that occupational segregation was one of the three main factors contributing to the gender pay gap; the other two factors were discrimination in pay and the unequal impact of women's family responsibilities.

In encouraging men to consider occupations typically viewed as 'women's work', the low status accorded to such work can be a particular barrier. Research has indicated that men are even more reluctant to consider atypical areas of work than are women (Morris, Nelson, Rickinson, Stoney and Benefield, 1999). Encouraging men to enter female areas of work has been primarily viewed as a way to improve the status and pay of those occupations. Lesser weight has been given to other factors, for example the necessity to provide role-models for boys and to increase the validity of adopting caring roles, two factors which have been emphasised recently by the Teacher Training Agency and the DfES through their Men into Teaching and Men into Childcare initiatives (DfEE/DSS/Minister for Women, 1998, paragraph 2.25).
3.3 Pay
The Equal Pay Act (1970) outlawed differential pay rates for men and women. However, surveys and audits of the pay of men and women in the same jobs reveal that women can still earn on average less than men while performing the same jobs. This is often the result of pay structures with long service-related pay scales; unequal recruitment pay decisions or performance-pay arrangements that indirectly discriminate against women (Equal Pay Task Force, 2001; AUT, 2001).

Recent data from Europe indicate that the nature of the pay gap varies in gendered sectors of work. The European Commission has reported that the higher the employment share of women in any sector, the lower the hourly earnings of both men and women within that sector (European Commission, 2003). As indicated above, this has been seen as a barrier which discourages men from entering professions which are currently female-dominated.

The EC review of European labour markets also suggests that, while pay differentials between women and men at the beginning of their careers are non-existent in sectors with a high proportion of male employees, women find themselves at a considerable disadvantage in comparison with male colleagues at career outset in female-dominated sectors.

However, the relative advantage of women at career outset in male-dominated, as compared with female-dominated, occupations declines later in their careers. While the average gap between the hourly earnings of women and men in Britain is now 18 per cent, the gender pay gap for managers and senior officials is much wider at 27 per cent (ONS, 2003). The need, therefore, to address all aspects of the gender pay gap, occupational segregation, caring and pay discrimination is recognised in the EOC's work on gender equality in pay issues.

3.4 Progression
The Sex Discrimination Act prohibits unequal treatment of women and men once in employment, (including access to training and development and eligibility for promotion), as well as when hiring staff. Nonetheless, it can be more difficult for women to gain promotion and enter higher level occupations than men. This is the case for both atypical and typical areas of work.

This phenomenon has been called 'the glass ceiling' and has been described by the Glass Ceiling Commission in the USA as:

... invisible, artificial barriers that prevent qualified individuals from advancing within their organisation and reaching their full potential. The
term originally described the point beyond which women managers and executives, particularly white women, were not promoted. Today it is evident that ceilings and walls exist throughout most workplaces for minorities and women. These barriers result from institutional and psychological practices, and limit the advancement and mobility opportunities of men and women of diverse racial and ethnic backgrounds. (cited in Miller and Neathey, 2004).

In situations in which women constitute a small proportion of the initial recruits to a sector, they may be almost non-existent at higher levels.

For men moving into typically female areas of work, there is no equivalent ‘glass ceiling’ - in fact, the opposite almost seems to apply. Examples from two areas in which women constitute the majority of the workforce (education and health) illustrate this. In secondary schools, women hold the majority of teaching positions in schools, yet men constitute the majority of head teachers (68 per cent). At nursery/primary level, while men constitute just over a third of head teachers, this should be set against the context of the ratio of men to women at teacher grade: men comprise only 16 per cent of staff at teacher grade in primary/nursery schools. Figures for England are shown in Table 3.1.

Table 3.1 Employment of graduate full-time teachers, England, March 2001

<table>
<thead>
<tr>
<th>Grade</th>
<th>Women</th>
<th></th>
<th>Men</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (000)</td>
<td>% of teachers</td>
<td>N (000)</td>
<td>% of teachers</td>
</tr>
<tr>
<td>Nursery and primary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heads</td>
<td>10.6</td>
<td>60.6</td>
<td>6.9</td>
<td>39.4</td>
</tr>
<tr>
<td>Other teachers</td>
<td>142.7</td>
<td>84.1</td>
<td>26.9</td>
<td>15.9</td>
</tr>
<tr>
<td>Secondary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heads</td>
<td>1.2</td>
<td>31.6</td>
<td>2.6</td>
<td>68.4</td>
</tr>
<tr>
<td>Other teachers</td>
<td>98.2</td>
<td>53.7</td>
<td>82.7</td>
<td>45.7</td>
</tr>
<tr>
<td>All teachers</td>
<td>252.7</td>
<td>100.0</td>
<td>119.1</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Notes: Teachers in the maintained schools sector.


Similar figures are seen in Scotland. In primary schools in Scotland, for example, men constitute just 8 per cent of teachers in total, but a quarter of these individuals are in head teacher posts. Women constitute 92 per cent of primary school teachers, but only 8 per cent of these women are in head teacher positions.
Similar disproportionate representation occurs within the National Health Service, where men hold the majority of senior positions, but are a minority of the workforce. It has been noted that men who move into nursing often achieve senior posts more rapidly than women. A 1998 survey of over 13,000 nurses confirmed that men were more likely to be found in the higher nursing grades and twice as likely as women to be in the senior H and I grades (Finlayson and Nazroo, 1998). Earlier findings also revealed that men progressed at greater rates despite their tendency to:

\[ ... \text{enter the occupation later than women, train at less prestigious colleges and not [hold] particularly good qualifications.} \]


The Finlayson and Nazroo study confirmed this trend, reporting that female registered nurses had better post-basic nursing qualifications than equivalent male nurses.

Such findings serve to undermine the idea that women fail to advance because they tend, as a group, to have lower qualifications than men. This forms the basis of 'human capital' theory, which is explored further in Chapter 4. The data also indicate that different issues apply and need to be taken into account when considering women and men entering atypical careers.
4. THEORIES OF STEREOTYPING AND SEGREGATION

4.1 Introduction
Theories accounting for the segregation and/or stereotyping of work broadly fall into two types: those that are largely focused on the decisions taken within organisations and by individuals other than the potential job applicant; and theories that seek to understand the decisions taken by the job applicants themselves. Usually, the former are seen as explaining the processes by which jobs become and remain segregated and/or stereotyped, while the latter describe how such segregation and stereotyping processes impact on individuals’ subsequent decisions relating to employment.

In this chapter, we start by considering the nature of stereotypes and occupational gender segregation. Following that, we give an overview of the main theories that have sought to explain the organisational processes behind segregation. The decisions taken by job applicants are clearly relevant, however, and, importantly, have proved to be far more amenable to investigation than the more organisationally-focused work. Theories and research relating to individual job choice are discussed in Chapter 5.

Occupational segregation as a topic has been taken up within several disciplines: organisational psychology, sociology, economics and business studies to name but four. There are overlaps between the approaches taken within these disciplines, but some differences. In this chapter, we focus on theories drawn from organisational psychology and economics, to give a brief overview of the processes of stereotyping and segregation in the first place, and the way in which this translates into higher and lower status (and reward) occupations.

4.2 The creation of occupational stereotypes
One of the earliest, and probably best-known, definitions of a stereotype was proposed by Ashmore and Del Boca (1979), who defined a stereotype as:

\[
\text{a structured set of inferential relations that link a social category with personal attributes.}
\]

An occupational stereotype is a form of sex-role stereotyping, that is, a set of assumptions about the sorts of activities and interests that are associated with the roles of men and women in society.

Many researchers and writers have argued that gender segregation into various roles leads to the creation of stereotypes. For instance, Eagly (1983) has argued that sex-role stereotypes are the result of the segregation of women and men into different
occupations and social roles. From this perspective, sex-role stereotypes are extreme examples of role bias - the tendency to attribute to particular role-players the characteristics associated with the social role they occupy (Ross, Amabile and Steinmetz, 1977). Hence the characteristics of various roles and jobs are attributed to the group that is more typically found occupying those positions. So, for instance, Silverstone and Towler (1986) observed that because of this 'the supportive nature of the secretarial role makes it a stereotypical female occupation'.

In other words, sex segregation effectively creates a class of jobs which is then subject to societal stereotypes (Gutek, 1988). Segregation occurs first, but then becomes embodied within stereotypes and cultural norms and expectations, which then serve to reinforce the process of segregation. Shinar (1975) commented that:

… sex labelling of occupations seems to be a self-perpetuating system in that the proportion of men and women in occupations parallels traditional beliefs about the sex-related attributes required to perform these jobs.

Individuals appear to decide whether a job is 'masculine' or 'feminine' based on their perceptions of the actual distribution of sexes in the occupation. In other words, individuals perceive an occupation as being performed largely by men or by women, and then believe it must require masculine or feminine attributes in order for an individual to be effective within that role.

Hayes (1986) summarised this by saying that 'the sexually-segregated nature of the job market ... facilitates and perpetuates discrimination against women' but also commented that continuing gender segregation of jobs 'serves to maintain their low occupational status and low wages relative to men'. In other words, jobs that attract women are viewed as being lower status, and therefore attract lower wages, than those that attract men. This is still the case today, as the data from the EC, reported on p. 23 indicate (European Commission, 2003).

To summarise then, theories about stereotypes are theories about the development of beliefs about the characteristics and abilities of individuals. This in turn has implications for the sorts of employment that potentially such individuals are able to undertake.

4.3 Measuring job segregation

In contrast, occupational segregation is concerned with the measurement of the extent to which jobs actually are performed by one particular gender. This may seem straightforward, but has not been without its difficulties. With the increasing attention being paid to occupational segregation in the 1970s and 1980s, Hayes (1986) noted
the lack of any standardisation in the definitions being used in defining gender segregation of occupations and the way(s) in which the gender-concentration of occupations was measured. Hayes identified ten separate terms to measure gender segregation of occupations, most of which remain in use today.\(^3\) The same study noted that a wide range of percentages had been adopted as cut-off points by which to define segregated occupations.

Attempts have also been made to measure the extent of overall occupational segregation in an economy or economies (Blackburn, Siltanen and Jarman, 1995; Rubery and Fagan, 1995) and to measure the extent to which this has declined over time in Britain (Blackburn et al., 1995).

4.4 Theories to explain the persistence of gender segregation

Various theories have been put forward to account for continued gender segregation, restricted career advancement and lower wages for women at work. In general, such theories can be grouped into three different types:

- Those that focus on individual, objective differences between the sexes that account for women's relative lack of success compared with men.
- Explanations based on discrimination by employers.
- Explanations based on the existence of systemic barriers (structural discrimination).

Theories to explain how men and women are placed in different jobs are briefly reviewed in this section, while theories that account for pay differences between jobs performed by men and women are reviewed in section 4.5.

The definitions provided in this section are largely based on those given by Morrison and Von Glinow (1990).

**Individual differences**

The proponents of these theories argue that there are objective differences between the sexes that explain women's lower success at work compared with men. Typically, it is suggested that factors such as women's attitudes, traits and behaviours prevent them from succeeding at the same rate as men. In other words, such theories

---

3 Those identified by Hayes which remain in use are: asexypical, gender-concentrated occupations, gender-dominant professions, gender traditional and non-traditional occupations, sex-congruent and sex-incongruent, sex-segregated occupations, and sex-typed occupations.
propose that women and men do different jobs because women and men themselves are different.

Most studies that have examined characteristics which are relevant to work have in fact found few gender differences. Much of this research has focused on managers. In a study of nearly 2000 matched pairs of male and female managers, Donnell and Hall (1980) concluded that:

... the disproportionately low numbers of women in management can no longer be explained away by the contention that women practice a different kind of management from that practiced by men.

Ten years later, Eagly and Johnson (1990) conducted a meta-analysis of studies of gender differences in management style, which again revealed very few differences between male and female managers. There was only one key exception: when democratic/participative management style was compared with autocratic/directive, women showed more participative behaviour. Eagly and Johnson felt that this finding could in part be explained by women adopting this approach in order to 'win acceptance from others, gain confidence and thereby be effective' when confronted by initially sceptical colleagues. They argued that there is, if anything, less scope for stereotypical behaviours within organisations. There were two reasons for this. Firstly, all managers are usually selected on the same, organisationally-relevant, criteria which decreases the likelihood that women and men in these roles would differ substantially. Secondly, once they are working in a particular job, individuals are constrained by socialisation into the norms and expectations of that job, which substantially reduces the scope for any individual differences.

From the above, it is clear that theories of individual difference provide only a very limited explanation for gender segregation.

Human capital theory
There is a more specific version of the individual difference theory that contends that people are rewarded for their previous investment in their own education and training. It has been suggested in the past that women do not receive the same rewards (in terms of entry to employment, promotion and level of pay received) as do men because they do not have equivalent 'human capital' (Amsden, 1980; Blau and Ferber, 1987).

As indicated above, it is true that, for many years, women did not enter higher education in the same proportions as did men; it is also true that women in the UK remain relatively under-qualified as a group. However, an analysis of those
employment situations in which women do have the same (or better) qualifications as men, reveals that women's entry to, progression in, and pay in, that occupation remains lower than that of men (Anderson, Forth, Metcalf and Kirby, 2001; Thewlis et al., 2004). Data from the education and health sectors reported above indicated that disproportionately more men gain promotion than women, even where the latter are better qualified. Furthermore, analyses which take human capital into account in parallel with a range of other factors (such as length of service, willingness to relocate and employment sector) indicate that human capital is unsatisfactory as an explanation (Stroh, Brett and Reilly, 1992; Forth, McNabb and Whitfield, forthcoming). Some examples are given below:

- **Male nurses** were found to have poorer qualifications at both pre-registration and post-registration levels, yet to advance more quickly into senior posts: the average time for male nurse to reach a senior post was 8.4 years, compared with 14.5 years for a female nurse who took no career breaks (Davies and Rosser, 1986). Similarly, male nurses were twice as likely to be found in higher grade nursing posts, although females had better post-basic qualifications (Finlayson and Nazroo, 1998).

- **An analysis of the UK Labour Force Survey** revealed that while the gender pay gap between male and female full-time employees in the UK as a whole was 41 per cent, human capital accounted for just 4 per cent of this gap (Anderson et al., 2001).

- **Regression analyses of data from male and female managers** in the USA showed that, with all other factors (qualifications, sector, geographical mobility etc.) taken into account, women managers' salaries had increased substantially less rapidly in the past five years than those of equivalent men (Stroh, Brett and Reilly, 1992).

Therefore, while human capital theory may account for a small proportion of the differences between women and men in terms of pay and progression, in general this theory does not receive much empirical support from research. With qualifications and experience held constant, there remains an advantage for men relative to women that cannot be accounted for by differences in human capital. Therefore human capital theory clearly does not fully account for the differences in present-day patterns of employment of women and men.

Given the limitations of theories of individual difference to explain gender segregation, aspects of segregation that are driven by labour demand would appear to derive from a combination of actual discrimination by employers, and a failure to
challenge structural elements in organisations that disadvantage those trying to enter non-traditional areas. These theories are described below.

**Explanations based on discrimination by employers**
This group of theories is based on the principle that occupational segregation derives from the beliefs held by employers that differences exist between the sexes that make one sex less suitable for employment. The suggestion is that because engineers as a group, for example, remain predominantly male and therefore most engineers are male, then employers and other individuals believe that women must therefore be less suited to engineering. The employer may then believe that (despite the existence of any legislative restrictions), it is right to discriminate under these circumstances in order to obtain the ‘most suitable’ employees (Becker, 1957). Progression too may be affected by these beliefs serving to bias performance evaluations.

Where individuals or organisations condone discrimination, there are two theories that explain or predict the hiring of women or other minorities: the labour market discrimination theory (Wells and Jennings, 1983) and the rational bias theory (Larwood, Gutek and Gattiker, 1984; Larwood et al., 1988a, 1988b).

**Labour market discrimination**
This theory proposes that, where employers, customers and/or employees have discriminatory tastes (i.e. they prefer either women or men as employees, providers or colleagues), then employers will only hire a member of the less favoured group if they can do so at a wage discount sufficiently large to compensate for the perceived loss of utility and/or discomfort associated with employing them.

**Rational bias**
This theory suggests that a manager’s decision to discriminate in favour of one gender or the other in hiring or promoting employees is influenced by whether such discrimination would be viewed positively by directors, shareholders, colleagues etc. In other words, if there is a possibility of a manager being viewed positively by directors for choosing to hire a male rather than a female, then this is likely to increase the likelihood of the discriminatory decision being made.

There appear to have been few attempts by researchers to unpick these organisational level decision-making issues, largely because of the difficulties of doing such work. The studies that have come closest to addressing such issues are those in which employers are presented with CVs that are identical in all respects except for gender (or race) to determine the impact of this factor on shortlisting or
salary decisions. Such studies typically showed that females were given lower evaluations even when male and female candidates possessed identical qualifications (Arvey, 1988; Arvey and Campion, 1982; Cohen and Bunker, 1975; Heilman, Martell and Simon, 1988; Zikmund, Hitt and Pickens, 1978). Often these are not conducted in real-life selection settings and commentators such as Herriot (1984), have criticised much of the early work for using students as the 'recruiters' or 'selectors'. Such studies typically indicated an average effect of gender on hiring decisions of around 4 per cent (Olian, Schwab and Haberfield, 1988).

More recent work suggests such biases may be in the process of changing: for example, Snipes, Oswald and Caudil (1998) reported that gender biases in hiring decisions have virtually disappeared. However, once again, the findings of this study are limited by the fact that the work was conducted using students as 'recruiters'.

**Systemic barriers**

Systemic barriers are also referred to as structural discrimination. There are two main theories that fall under this heading: intergroup theory (Alderfer, 1986) and dual labour theory (Thurow, 1969).

**Intergroup theory**

This theory was originally developed to explain the actions and interactions of groups within society, and has been used by organisational psychologists to explain the relationships between groups within organisations. The adapted theory proposes that there are two types of groups within organisations. There are 'organisation' groups, which are based on common work tasks and positions within the organisational hierarchy, and 'identity' groups, which are based on characteristics such as gender, age or race. The theory argues that segregation persists because there is a large overlap between these groups, and therefore the perception grows that the 'organisation' groups can only be satisfactorily comprised of the current 'identity' groups. Perceptions can be further distorted when the patterns of the groups reflect those of society as a whole, for example, if women are concentrated in the low status job groups or the management consists entirely of men.

**Dual labour theory**

Dual labour theory proposes that there are two 'sets' of jobs within the labour market: primary jobs (which have a higher status/reward) and secondary jobs (which have a lower status/reward), and that there is little mobility between them. This has most implications for those individuals in the 'secondary' jobs, who are effectively confined to those with little hope of advancement. Thus, the fact that many women are employed in 'secondary' jobs (for example, jobs such as cleaning and care) means
that in reality they may be confined there, with little chance of progressing into primary jobs. Even within relatively high status positions, there can be sub-divisions into 'primary' and 'secondary' roles.

4.5 Gender segregation and pay
In section 4.4, we described the theories that have been used to describe why women and men largely remain segregated into different jobs. In this section, we move on to consider why such jobs command different levels of reward.

Jobs classified as 'women's work' command lower wages than those classified as 'men's work', even when they require similar qualification levels. Less gendered occupations tend to have higher pay rates than female-dominated ones (EOC, 2003b). As with the attempts to explain the establishment and persistence of gender segregation in employment, a range of theories have sought to explain the origins and persistence of pay differentials between male-dominated and female-dominated jobs and sectors.

The theories seeking to explain differences in pay between the genders have some overlap with those that seek to account for the origin of gender segregation. In this area, however, there has been far more research to test these theories empirically. This is because hard data on employee qualifications, pay, hours of work etc. are much easier to acquire (for example, via national level data sets) than empirical evidence about the beliefs that underlie employers' decisions regarding short-listing and selection.

As would be expected, most of these theories derive from the field of economics. It will be seen that several of these theories overlap with those from the previous section. A brief overview of the main theories that attempt to account for gender wage differentials is given below; the primary source for this is Rubery (1992).

**Human capital theory revisited**
Human capital theory, used first to explain why women fail to enter certain areas of work (because of their lower qualifications or worth as a potential employee), is also used to explain the gender pay gap. Because of their lower 'human capital', women receive lower wages, effectively, lower returns on lower investment in their own human capital. However, we saw in section 4.4 that this theory is not well-supported by research, and that women and men with equal human capital typically do not attract the same level of reward.
**Crowding**

Here, the idea is that women are constrained to work in certain sectors either through custom, or through the prejudice and discrimination of employers. For a large section of the labour market, women are unable to compete with men. As such, the theory has similarities with the labour market discrimination theories that argue that employers hire women only if they can do so at a wage discount. Because of the hostile labour market, women are constrained to 'female jobs' which are largely those that are labour intensive and have low productivity. This is not necessarily because women do not have potential, but because these are the only jobs for which employers see them as being appropriate. Since the jobs are viewed as labour intensive and having low productivity, wages are accordingly low.

**Labour market segmentation theories**

Again, there is similarity between this theoretical approach to differences in pay and the dual labour approach to the perpetuation of occupational segregation. The proponents of these theories argue that low paid jobs arise from the inherent dualism, or segmentation, of the market into a primary sector and a secondary sector. The primary sector consists of jobs characterised by high skill levels and medium-to-high rates of pay, with these higher rates of pay being due in part to the high premium attached to keeping specific skills within organisations. The secondary sector, in contrast, is perceived as requiring lower skill and therefore it attracts lower rates of pay. Labour market discrimination (and crowding) results in women being prevented from entering the primary sector. Because access to the primary jobs is denied, and because they are willing to accept jobs in the secondary sector with low rates, women therefore become concentrated in this sector.

**Empirical testing of theories**

Elements of these theories have recently been tested in research by Forth, McNabb and Whitfield (forthcoming) who have demonstrated that in establishments, occupations and jobs that are female-dominated, the wages of both men and women are lower; however, over and above this general trend, women's wages are still found to be generally lower than those of men. They argue (p. 8) that much of the relationship between occupational segregation and wages:

\[ \ldots \text{can be accounted for by variations in job characteristics and the unobserved skills of workers in male and female jobs.} \]

Forth et al. observe that this is in keeping with the outcomes of previous research. For instance, Baker and Fortin (2000), compared the outcomes of their analysis of Canadian wage and segregation data with that of MacPherson and Hirsch (1995), and observe that, in both studies, the 'wage penalty' for female jobs reduced when
there were controls for detailed job characteristics. In other words, when the characteristics of jobs are analysed in more detail, more skills are identified; the wage differential then decreases as more skills are identified. They suggest on these grounds that lower wages in female jobs derive from '[typically] unobserved job attributes or requirements' (Baker and Fortin, 2000, p. 35).

Forth et al. conclude that a larger proportion of the negative relationship between women's wages and the percentage of female workers in a job, occupation or establishment is accounted for by variations in personal and job characteristics than is the case for men's wages. To summarise, they found that gender segregation alone accounted for just over one half of the average male-female wage differential. Moreover, this was due to two main reasons: women are over-represented in low-paying jobs within establishments (i.e. low paid because they are either lower status, such as clerical assistant posts, or in lower paying functions within the organisation, such as cleaning or catering); and they are found in jobs that are low-paying in general (for example, in jobs in the childcare sector in general).

4.6 Summary
A wide range of theories have been drawn on in attempts to explain gender segregation, and we have given a brief overview of those deriving mainly from the organisational psychology and the economics disciplines. For the theories grounded in economics, more empirical research has been conducted. This has largely shown that attempts to account 'rationally' for differences in the pay of women and men (for example, because women have lower 'human capital' than men) fall down when the evidence is analysed. In almost all calculations, a significant percentage of the gender wage differential remains attributable to gender alone.

In the area of organisational decision-making - in terms of decisions to select and hire etc. - it is harder to find empirical tests of the theories, largely because of the nature of the data that would be required to test such ideas. In addition, for many of the theories in this area, there is a circularity to the arguments that renders them difficult to assess. Thus, arguments about organisation and identity groups, primary and secondary jobs have an intuitive plausibility in appearing to describe many situations, but allow little by way of empirical testing.

Having given a brief overview of organisational level theories of the causes of occupational gender segregation, we turn now to consider the factors that influence individuals' career decisions.
5. FACTORS INFLUENCING JOB CHOICE

The theories outlined in Chapter 4 suggest the main ways by which organisations and occupations become, and remain, gender segregated. As noted earlier, such theories are largely focused on the decisions taken within organisations and by individuals other than the potential job applicant. While theories of individual difference propose that differences in traits or capability may contribute to segregation, this is seen largely from the point of view of an organisation selecting individuals on the basis of those traits.

The other part of this process involves considering the individual who is engaged in seeking and assimilating information about the job market and making career decisions. This chapter therefore considers the impact of such issues as an individual’s perceptions of gender segregation and skill requirements on the job choice process. This is necessarily a brief overview of what is a large (and growing) area of research. We have focused on those issues that broadly have policy implications and relevance, rather than those - such as individual differences in personality or abilities - on which policy and strategy are likely to have little impact.

5.1 Occupational segregation and job choice

Occupational segregation is in fact one of the strongest influences on young people's choice of career. A series of research studies conducted over the past thirty years have demonstrated that individuals soon learn to associate certain jobs with males or females, and that this influences job preferences from an early age.

While both sexes agree on the extent to which jobs are segregated, girls and boys differ about who should perform various jobs. Since the 1970s, researchers have found that girls hold significantly more liberal views than boys on this issue (Shepard and Hess, 1975; Alpert and Breen, 1989; Smithers and Zientek, 1992; Miller and Budd, 1999; EOC, 2001b; Miller and Hayward, forthcoming). Such studies reveal that at very young ages, both girls and boys believe that certain jobs should be performed by a woman and certain jobs by a man, and that these beliefs parallel existing patterns of segregation. If a job is currently largely male-dominated (such as building), then young children (both girls and boys) believe that that job should be performed by a man. As they grow older, these views become more liberal, but this is the case far more for girls than for boys. In some cases, when their view about who might be a doctor or a nurse, for example, is challenged, children will agree that women can be doctors, but they often require prompting, even when it transpires that they have recently been seen by a female doctor (Smithers and Zientek, 1992).
Miller and Budd (1999) asked children aged 8, 12 and 16 'Who should do this job: men, women, or both?' in relation to 21 jobs. Table 4.1 demonstrates that girls develop more liberal beliefs about occupational stereotyping at an earlier age than boys. The table shows the mean (average) number of 'both' responses out of 21; the higher the score, the more liberal the belief regarding female and male employment. The table shows that girls had less stereotypical attitudes at all ages and that the gender gap widened with age.

Table 5.1 Liberality of views on who should perform selected jobs

<table>
<thead>
<tr>
<th></th>
<th>Age 8 years</th>
<th>Age 12 years</th>
<th>Age 16 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>10.8</td>
<td>12.9</td>
<td>11.7</td>
</tr>
<tr>
<td>Girls</td>
<td>12.1</td>
<td>14.1</td>
<td>17.1</td>
</tr>
</tbody>
</table>

Notes: Maximum score would be 21.0.
Source: Based on Miller and Budd (1999).

Miller and Hayward (forthcoming) examine children's perceptions of who should, and who actually does, perform a range of jobs. This analysis gives an insight into perceptions both of occupational gender segregation and occupational sex-role stereotyping. It reveals that, while girls hold more liberal views regarding who should perform various jobs, their perceptions of the extent to which those occupations are segregated do not differ from those of boys. While girls can see that various jobs are segregated, they do not believe this should constitute a barrier to employment within that occupation.

However, while girls believe that women should be able to work in engineering, for example, these beliefs largely fail to translate into individual preferences for employment. Both Miller and Budd (1999) and Miller and Hayward (forthcoming) found that individuals' preferences remained largely restricted to those jobs that were viewed as gender-congruent (i.e. in keeping with stereotypes about the jobs that are appropriate for their own sex). This is in keeping with similar findings from the EOC (2001). In the first study, boys gave significantly higher preference ratings than girls for nine masculine occupations (airplane pilot, air traffic controller, architect, carpenter, firefighter, lorry driver, police officer, scientist and TV repairer). Conversely, girls gave higher preference ratings for seven feminine occupations (dancer, hairdresser, librarian, nursery school teacher, secretary, school teacher and shop assistant).
A similar pattern was seen in the second study. Table 4.2 shows the job titles for which female and male pupils expressed significantly different preferences. It can be seen that, in keeping with Miller and Budd (1999), jobs such as architect and pilot (traditional male jobs) were preferred by boys. So too were jobs in the IT and science sectors: webmaster, computer engineer and molecular geneticist. Girls expressed a preference for female jobs such as nurse, secretary and hairdresser. While the training for physiotherapist and health and fitness instructor is similar, the research demonstrated that the two job titles are differentially attractive to girls and to boys.

Table 5.2  Job preferences of boys and girls

<table>
<thead>
<tr>
<th>Jobs preferred by boys</th>
<th>Jobs preferred by girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Webmaster</td>
<td>Nurse</td>
</tr>
<tr>
<td>Software engineer</td>
<td>Secretary</td>
</tr>
<tr>
<td>Computer engineer</td>
<td>Occupational therapist</td>
</tr>
<tr>
<td>Systems analyst</td>
<td>Hairdresser</td>
</tr>
<tr>
<td>Civil engineer</td>
<td>Physiotherapist</td>
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<tr>
<td>Airline pilot</td>
<td></td>
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<tr>
<td>Materials scientist</td>
<td></td>
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<tr>
<td>Health and fitness instructor</td>
<td></td>
</tr>
<tr>
<td>Molecular genetician</td>
<td></td>
</tr>
<tr>
<td>Architect</td>
<td></td>
</tr>
<tr>
<td>Medical Laboratory Scientific Officer</td>
<td></td>
</tr>
</tbody>
</table>

Source: Miller and Hayward (forthcoming).

The relationship between liking for a job and the extent of stereotyping or segregation does weaken with age, at least amongst girls. Miller and Hayward (forthcoming) found that, for boys aged between 14 and 18, occupational segregation and occupational sex-role stereotyping are both strongly correlated with occupational preference, and this shows no decline with age. For girls, while the same pattern of preference is in evidence, the correlation of liking with both gender segregation and gender stereotyping decreases with age, becoming non-significant by age 17-18. By such time, however, key educational decisions will already have been made.

One of the key models of occupational choice, the Gottfredson model of circumscription and compromise (Gottfredson, 1981), proposed that the extent to which the job was sex-role stereotyped and congruent with the individual's gender was the most important of three factors that direct young people's choice of career: the other two key influencing factors were the individual's interests and ability and the status of the occupation. The theory proposes that when young people originally seek employment, they seek an occupation that matches their own sex-role (i.e., it is gender appropriate); matches their abilities and interests; and is of a status that they
feel is appropriate to their background (this relates to social class). This drawing of a boundary within which the desired set of jobs falls is termed the process of circumscription.

If a young person fails to obtain a job that matches on all dimensions, Gottfredson proposed that the individual concerned will start to compromise and a less-than-ideal job will be considered. However, the theory proposed a strict sequence via which these dimensions would be jettisoned. Sex-role stereotyping was considered to be such a central aspect of the individual's identity that it would be the last factor to be abandoned when a job was sought.

Hesketh, Durant and Pryor (1990), who tested this theory, found that in contrast to Gottfredson's predictions, sex-congruence was often the first factor to be discarded. Status appears to be of far more central importance, and since far fewer female-dominated than male-dominated occupations have high status, young women who seek high status work have little choice other than to look outside traditional occupations. This development may go some way towards explaining why girls have moved into high level, non-traditional, jobs such as law and medicine, but that there has been no similar change in lower status, skilled occupations which continue to be the job destinations for girls with lower aspirations from traditional backgrounds and lower socio-economic groups. Interestingly, the change in the strength of sex-role stereotyping as a central aspect of an individual's identity, over time, may also be indicative of the impact of expectations of equality and higher expectation of success amongst some high achieving girls.

The work of Hesketh et al. indicates that factors such as status may over-ride initial thoughts about sex-appropriateness of a job, or the extent to which the workplace would be gender-segregated. Potential pay and status may therefore serve to 'pull' the individual towards an occupation that appears to fit with the individual's interests, abilities and desire for a higher-status job, irrespective of perceptions of sex-appropriateness. However, as both research by People, Science & Policy and IER (2000) and the Greenfield Review (Greenfield, 2002) revealed, where individuals subsequently find there is a lack of organisational 'fit', individuals may find this uncomfortable and decide to leave (see also Hesketh and Gardner, 1993).

There is also evidence that it is necessary to achieve a certain 'critical mass' before occupations begin to be seen as non-segregated and potentially welcoming. In the USA, Neumayer et al. (2002) investigated the extent to which the 'visibility' of female surgeons influenced the career choices of female medical students. Although women
comprise nearly half of medical school students in the USA (as they do in the UK),
they constitute only just over 20 per cent of surgery residents.

Neumayer et al. surveyed female students at seven medical schools in which the
proportion of women surgeons employed in the medical faculty varied from 10 per
cent to 40 per cent. They found that the majority of those female students who
intended to choose surgery as a career (21 out of a total of 24) were studying at the
three schools at which the higher proportion (40 per cent) of women surgeons were
employed. The authors concluded that the female students' choice of surgery as a
career was strongly associated with the higher proportions of women employed as
surgeons within the faculty - the implication being that exposure to greater numbers
of examples of women in a specific role encourages women students to consider that
occupation as a career possibility. The fact that exposure to a low percentage (10 per
cent, compared with 40 per cent) of women did not have anything like as much
impact, suggests that there is some 'critical limit' above which numbers have to rise
before women are seen as 'role models' rather than 'exceptions'.

5.2 Ability, attitudes and interest
Ability clearly is an important factor which contributes to development both of interest
in a subject area and in the possibility of employment in that area. While ability may
be thought to be largely innate and therefore outside the scope of this review (and, to
the extent that they are related to ability, attitudes too), nonetheless there is evidence
that experience can help to modify attitudes and the individual's recognition (or
perception) of their own abilities.

One important aspect is how abilities are construed (interpreted by the individual) and
benchmarked (compared against the abilities of others). Recently, researchers have
also focused on self-efficacy, that is, on self-estimates of one's ability to undertake
specific activities, as a predictor of career choice (Lent, Brown and Hackett, 1994;
Tracey and Hopkins, 2001).

While ability itself is a strong determinant of individuals' job choices, the impact of
ability on attitudes can be of more importance. Working with the Third International
showed that while ability (as indicated by tests of achievement) was important in
developing positive views of jobs in science, it had more of an impact indirectly,
(along with teaching approach, and the child's and their friends' views of the
importance of science - see sections 5.3 and 5.4), by contributing to the development
of more favourable attitudes towards science. Those favourable attitudes towards
science in turn then had a stronger impact on the child's perceptions of jobs in science.

A recent review of the impact of a range of 'hands-on' activities in the science, technology, engineering and maths sector confirmed that achievement and interest were linked in this way (SQW, 2002). Girls enjoyed subjects that they were good at and this, rather than thoughts about career opportunities, seemed to be a key factor influencing subject choice for all except those who had already made career decisions.

These findings, that pupil attitude towards, and interest in, specific subjects is more important than ability per se as a factor influencing perceptions of jobs in atypical areas such as science, corroborates broader research on career choice conducted in the USA. Tracey and Hopkins (2001) reported that, while self-estimate of ability is an important consideration, interest is a stronger indicator of occupational choice. While 19 per cent of variance in occupational choice in high school students was accounted for by self-estimates of ability, a much greater amount, 27 per cent, was accounted for by interest (Tracey and Hopkins, 2001).

Although interest is clearly a more potent influence on occupational choice, nonetheless estimates of ability constitute an important factor. One point to consider is that, in the absence of experience, it is difficult to see how individuals can form accurate estimates or judgements of their ability. This emphasises the need for pupils to gain experience in a range of atypical areas of activity while at school. Without this, pupils' views of their abilities and potential are likely to be severely constrained, with obvious implications for career choice. Research into education in IT has noted the tendency for boys to 'monopolise' IT equipment. Girls' access to equipment is therefore restricted and so they gain little 'hands on' experience (e.g. Miller et al., 2000). Research into placement activities (see p. 7) has raised concerns over the restrictive and often stereotypical nature of these experiences. The work by Tracey and Hopkins (2001) indicates that such situations lead not just to restricted experiences, but also serve to limit the basis upon which individuals can make judgements of their own potential abilities.

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4 Self-estimate of ability was (in the Tracey and Hopkins study at least) a measure of how the individual viewed their own ability relative to other people at their own age (i.e. above or below average). Therefore, while it is not quite the same as data from an objective test, nonetheless it is likely to be related to objective ability.
For this reason, initiatives aimed at giving girls experience of atypical areas, such as the new *Computer Clubs for Girls* initiative, described in Chapter 7 (p. 76), are likely to be of some value.

### 5.3 Parental attitudes and support

In the UK, research conducted for the, then, DfEE (now DfES) indicated that parental attitude was one factor which influenced the decisions of young people regarding whether to remain in education or training, or to leave (Payne, 1998). In the USA, Farmer, Wardrop, Anderson and Risinger (1999) and Farmer, Wardrop and Rotella (1999) have identified parental support as a key factor influencing subject choice.

Analysis of the Third International Mathematics and Science Survey (TIMSS) datasets for Australia and England revealed that a mother's attitude towards science is a key factor influencing the development of children's attitudes towards jobs in science. This process occurs via two indirect routes. Firstly, the mother's attitude is a key factor in developing the child's own view of the importance of the subject itself; this then influences the development of favourable attitudes towards the occupational area. Secondly, the child's perception of the extent to which their mother believes in the importance of doing well has a positive influence on the child's belief that their success is dependent upon their own efforts, which in turn impacts on their achievement and thereafter on their attitudes (Miller, Lietz and Kotte, 2002).

Parental aspirations are usually viewed as an important influence on career decisions in general (Erikson and Jonsson, 1996). Schoon and Parsons (2002), also using a path modelling approach, have shown that high parental aspirations are strongly correlated with high aspirations in their children and with good academic achievement.

Schimmel (2000), in the USA, investigated factors that helped encourage ethnic minority students to pursue careers in science. Asian American students (both male and female) reported that they had more restricted career choices due to their parents' expectations. In the UK, a study looking at the work of the Careers Service with Muslim girls and women in Britain has also identified parental perceptions as a factor which needs addressing (Parker-Jenkins, Hartas, Irving and Barker, 1999). In case study research carried out for the EOC and the Women and Equality Unit, employers reported that they needed to talk to parents from ethnic minority communities to convince them that engineering and telecommunications were appropriate areas for their daughters to consider working in (Miller and Neathey, 2004).
Parker-Jenkins et al. (1999) report on projects that have directly sought to engage with, and change the attitudes of, parents within ethnic minority communities. These include:

- 'Head Start' programmes to give young people and their parents the opportunity to experience the available career options and visit a variety of job settings.

- Events for Muslim fathers and male family members which look at career opportunities for girls, and allow male employers to explain how they accommodate different needs.

- Attempts to raise the status of MAs in the eyes of ethnic minority parents and enhance access to work-based routes for young people from ethnic minorities. This initiative was the outcome of a partnership between the Careers Service in Calderdale and Kirklees and the, then, local TEC (now an LLSC). The work included workshops for teachers which focused on the issues surrounding application and participation in MAs by ethnic minority girls.

These initiatives are each, to some extent, based on giving individuals direct experience and knowledge of the jobs and careers on offer. This serves to reinforce the message regarding the potential value of placements in providing individuals with widened career horizons, and emphasises the need to ensure that individuals are offered placement options that can expand the individual's experience.

5.4 Teaching style, out-of-school and hands-on activities

Teaching style

Both the style and mode of teaching can influence attitudes to atypical areas of study. Analysis of the TIMSS dataset (Miller, Lietz and Kotte, 2002) indicated that the teaching approach adopted by science teachers can influence the development of favourable attitudes towards science. The use of real-life problems as examples within lessons, the use of small groups or pairs to encourage active learning, and the use of demonstrations and practical problems in introducing topics, all help to develop favourable attitudes towards science.

Out-of-school and hands-on activities

In 2002, SQW was commissioned by the, then, EMTA (now SEMTA, the Sector Skills Council for Science, Engineering and Manufacturing Technologies) to review girls-only hands-on experience opportunities in science, technology, engineering and mathematics (STEM). The review also sought to evaluate how effective the activities were in developing positive attitudes to jobs in the STEM sector. The review found that many activities were ad hoc, with the majority in fact being for mixed gender
groups and only a minority being planned for, and aimed at, girls only. The aims of the initiatives were found to be general, usually just to increase interest in, and provide experience of, science and technology rather than to link them to the activities involved in jobs in the sector.\(^5\)

SQW (2002) showed that one way in which the impact of such initiatives could be improved was to link participation in the activities to potential career opportunities. One of the biggest gaps identified by the research was the lack of understanding in schools of the potential career opportunities in the ICT sector and of the ICT skills required in other professional capacities. The researchers found far fewer hands-on activities in the ICT sector and concluded that this was because of the relative youth of this sector. It should be noted that the research was conducted at a time when the *Computer Clubs for Girls* initiative was in its infancy and it was not included within the SQW evaluation.

5.5 Advice, guidance and information

In this section, we concentrate on findings that are relevant when considering choice of atypical career or subject, rather than on more broad issues of choice.

*Advice*

Munro and Elsom (2000) looked at the influence that science teachers and careers advisors can have on decisions regarding science subjects and science-based careers. Pupils in Years 9-11 (equivalent to ages 14-16) did not consider science teachers to be a source of information about careers, but they did view them as a source of information about the content of post-16 courses in science, and as people with whom they could discuss how they might cope with more advanced study.

The research also revealed some issues of concern regarding the way in which careers advisors interacted with young people. Rather than seeking to challenge the career stereotypes held by young people, advisors instead appeared to encourage pupils to follow their existing interests. The authors believed that advisors were reluctant to challenge young people’s career stereotypes partly because of the model of guidance they tended to follow (working from the positive and identifying the pupil’s interests and strengths), partly from concern about not alienating the pupil and partly due to pressure of time. In addition, the researchers found that, for many pupils, their interview with the advisor had taken place after they had already made the decision to drop science.

\(^5\) Given the importance of interest, this is likely to have some impact on careers (see section 4.2); however, the impact could still be improved by explicitly linking the activities to information about careers.
FACTORS INFLUENCING JOB CHOICE

This research indicates that some careers advisors view advice aimed at confronting occupational segregation as being outside their responsibility. Working from the positive seems to be interpreted by some as limiting advice only to those areas in which the young person spontaneously expresses enthusiasm. Such an interpretation can only serve to reinforce existing stereotypes.

Information
Young people can obtain information either directly, through leaflets, posters, websites or magazines, or indirectly, through intermediaries. One of the concerns raised by the research of Munro and Elsom (2002) was that there is a lack of systematic updating and training in occupational information for careers advisors. Of perhaps greater concern was the finding that some careers advisors who saw themselves as working in 'guidance', interpreted this as meaning that they did not need to be information experts. Instead, they saw their role as being to encourage young people to do their own research. However, Munro and Elsom pointed to the work of Stoney and Morris and their colleagues that indicated that there is little evidence that young people in fact do carry out career-related research.

Lack of information is an important issue: this factor accounted for the largest amount of variance in ratings of career indecision (Kelly and Lee, 2002). 'Lack of Information' consisted of five subscales: lack of knowledge about the process of career decision making, lack of information about self, lack of information about occupations, lack of information about ways of obtaining additional information, and unreliable information. 'Lack of Information' and 'Need for Information' accounted for 35 per cent of the variance in the factor analysis of items within their Career Decision Difficulties Questionnaire. Kelly and Lee's research revealed that information deficit was the most prominent aspect of career decision problems.

Such findings are in keeping with the outcomes of the survey by BMG (2002) for Gloucester LSC (see section 2.12). This indicated that employers believed that lack of information about career opportunities in non-traditional jobs was a major reason for individuals not considering these areas of work.

Edwards and Stephenson (2002) conducted focus groups which examined knowledge about, and the image of, the ICT, construction and transport sectors, among others (their findings on image are reported in the following section). Focus groups consisted of young people and representatives of employers, NTOs, LSCs and careers advisors. The participants reported that young people were not aware of the wide range of different job roles available within these sectors and that job opportunities needed to be made clear at an early age to help young people choose
the right GCSE options. They also noted that girls were 'turned off' by IT at around the same time that they started formal ICT lessons. This is a similar observation to that of Munro and Elsom (2000), who report that young people make subject choices at a time when their motivation in science subjects is reducing and their perceptions of science careers are very hazy.

Again in keeping with the Munro and Elsom findings, the focus group participants commented that careers advisors were ill informed about, and lacked understanding of, the types of work available in these sectors. The views of the participants were that advisors needed educating about the different job roles available if they were to promote and sell the industries.

The work of Edwards and Stephenson has culminated in an initiative funded under the EQUAL programme which is designed to attract women into atypical areas of work. This is described in section 6.2.

5.6 Image
In the previous sections, the impact of experience and information was noted. Both of these are clearly of importance. They also interact: experience can provide valuable information about a job, while information can lead to a young person seeking experience of the sector. Together, they can help address a central factor influencing uptake of jobs in several of the GFI sectors: image.

In IT, in particular, there is a history of problems with image. It has often been reported that computing is perceived as a 'geek' area, largely involving solo, technical, work (Turkle, 1984). Inaccurate perceptions of the work, and insufficient or inaccurate information about the nature of jobs within the sector, have been identified as issues to be overcome if women are to be encouraged into the sector.

It is not just in this country that such images exist. Australian research suggests that male and female students can apparently reach the stage of being enrolled on computing courses at university and appear still to hold this image. Clarke and Teague (1996) found that schoolgirls typically had not considered a computing career because jobs in this sector were viewed as 'boring', 'menial', 'not sufficiently challenging' and because 'I wouldn't want to be stuck in an office with just a computer'. Most of the girls had learned computing at school, and went on to say that they found it boring, although many were enthusiastic about using computers at home. Such findings are in line with the more recent findings in the UK by Edwards and Stephenson (2002), who assessed how young people perceive jobs in gender-segregated sectors (see above). Focus group participants saw the ICT sector as
being 'boring' 'geekie' and mainly 'dominated by male workers'. The typical image was of the 'techie' guy with no friends. They also perceived construction as a 'dirty' industry.

Problems with the image of IT as a 'geek' sector have been reported for nigh on twenty years, but clearly still remain an issue today. For this reason, e-Skills UK has started to challenge these perceptions both indirectly, by giving girls experience of interesting activities through the Computer Clubs for Girls initiative, and directly, through the ITbeat project aimed at challenging the images of IT held by schoolgirls. Both of these initiatives are described in section 7.3.

5.7 Mode of learning provision
There is some evidence that the mode of learning provision - whether this is work-based or college-based, full-time or part-time - can also impact on young people's willingness to consider training in atypical areas. Data on MAs in Ireland show that, while women had always constituted a very small minority of apprentices, these numbers fell even further after new, 'standards-based', apprenticeships were introduced in 1997. At the end of 1997, women constituted 1.1 per cent of Time Served Apprentices (TSAs) and 0.8 per cent of apprentices registered under the newer Standards-Based Apprenticeship (SBA) system. By 2000, the number of women entering the SBAs had fallen to 0.5 per cent. The numbers of women in apprenticeships in Ireland have continued to fall: just 15 out of 3,943 apprentices (0.4 per cent) in 2003 were female (O'Halloran, 2003).

The training authority for Ireland, FÁS, has expressed concern at this situation and believes that one factor that has exacerbated this situation is that, while the older apprenticeship training scheme made available an initial year of off-the-job training, the newer SBAs do not have this option (FÁS, 1998).

5.8 Exchange utility
Individuals make training/qualification decisions based on the perceived exchange value of the award - what value it will have for the individual in seeking employment. Evidence from the UK and Germany indicates that women tend to make training decisions based on their assessments of likely employment opportunities. Humphries and Rubery (1995) observe that it is a high risk strategy, from the point of view of both trainers and women trainees themselves, to encourage women to train in areas in which they may face discrimination from employers and hence have difficulties in obtaining employment.
A similar idea has been put forward by Loan-Clarke, Boocock, Smith and Whittaker (2000). They suggest that the worth of qualifications can be considered in terms of their 'exchange' value, that is, how they help the holder to gain or progress in a job. Work by Foskett and Hesketh (1996) indicated that career prospects were a key factor in choosing to enter HE, while Miller, Kellie and Acutt (2000) found that the extent to which a qualification was respected was of more concern to women in choosing a qualification than to men. Miller and Petrie (2002) also found that females who had enrolled on computing courses were more likely than males who had done so, to say the fact that employers would view it as the best qualification for a potential employee had influenced their choice of course. They were also less likely to have decided on an employment sector in which to work and to think the course would maximise their chances of gaining a job.

Qualifications in general have acquired more importance to young adults in recent years (Schoon and Parsons, 2002). While their utility in 'buying' a job is important, they are also more broadly seen as important by young people. Qualifications serve to influence their aspirations as teenagers and to predict their occupational choices as adults. Schoon and Parsons carried out a path modelling analysis of data from the National Child Development Study (NCDS) and the 1970 British Cohort Study. The studies provide data on the physical, psychosocial and educational development of the cohort at ages 7, 11, 16, 23 and 33. The analyses indicated that teenage aspirations are the strongest predictor of adult occupational attainment at age 33.

5.9 Rewards
The potential rewards that will be available to the employee also play no little part in determining choice of career. However, the relative extent to which extrinsic rewards (such as salary and status), compared with intrinsic rewards (such as interest and good relations with co-workers), are seen as important, remains a key difference between males and females. In the USA, Morgan, Isaac and Sansone (2001) reported that a desire for interesting work was cited by a majority of both male and female college students as a factor influencing their career choice (79 per cent). However, women were more likely than men to report interpersonal work goals more frequently, and high pay and status less frequently. The extent to which individuals believed the work would provide the interpersonal goals they wanted predicted the extent to which they believed the career would be interesting. It was only in the science and mathematical arena that status and salary predicted the extent to which the job was thought to be interesting, and men rated careers in science and mathematics as more interesting than did women (see also similar work by Gati et al., 1995, in Israel). Overall, though, and in keeping with the work of Tracey and Hopkins (2001), the extent to which a career was seen as interesting predicted likely
career choice. Interest is important to both women and men, but women are less likely than men to cite pay and status as an important influence on choice. Men gave higher ratings of 'interestingness' than did women for science/maths; in addition, science/maths was the only area in which perceived status and salary were actually related to 'interestingness of the job' (i.e. predicted these ratings) and in this area, men gave higher ratings of 'interestingness' than did women.

5.10 Summary
It is clear that occupational segregation remains one of the strongest influences on young people's choice of career. This becomes evident at an early age; both boys and girls tend to express preferences for jobs that are viewed as being appropriate for their own sex. Furthermore, stereotypes about the nature of various types of work (such as IT and science) are formed at an early age.

The research evidence indicates that gender segregation becomes less of an issue for females with age (and, indeed, females tend to hold more liberal views than males at all ages). However, this development occurs at an age after key education and training decisions have often been made.

This relationship between early job preferences and later career decisions can be modified by the type of information that is available to young people and the opportunity that they have to experience activities in atypical areas. Parental attitudes and support, the teaching style adopted in schools and the ability, attitudes and interests of young people can also have an impact. The use of positive images to promote atypical work may also be effective, although this remains an under-researched area.

A particular difficulty lies in persuading males to consider currently female areas of work. For these individuals, salary is an additional factor that compounds gender segregation issues. However, the extent to which different types of rewards - both intrinsic and extrinsic - are perceived by males and females choosing careers in segregated sectors has been shown to vary. In other words, males and females may choose to go into similar careers for different reasons.
6. EUROPEAN FUNDED INITIATIVES ON ATYPICAL WORK

This chapter considers European Social Fund (ESF) initiatives that have been established to provide experience and/or information in atypical sectors under the EQUAL funding stream. The focus is on those initiatives which are directly related to the GFI sectors.

6.1 The EQUAL programme

The ESF initiative, EQUAL, was set up to test and promote new ways of combating discrimination and labour market inequalities. The EQUAL funding programme has funded 77 initiatives across Great Britain, with several of them being aimed at increasing the entry of women into atypical areas of work. Projects funded through the EQUAL programme are aimed both at those in work and at those seeking work, through transnational co-operation. The EQUAL programme also includes action to help the social and vocational integration of asylum seekers. EQUAL operates across identified thematic fields to support the four pillars of the European Employment Strategy and asylum seekers. The programme funds activities implemented by strategic partnerships called Development Partnerships (DPs) that address one identified thematic field.

**JIVE**

In 2002, Bradford College set up a national development partnership, JIVE (Joint Interventions) Partners. This drew on the experience gained in an earlier two-year project led by Bradford College, *Let's Twist*, which focused on providing career guidance to encourage women to train and work in science, engineering, construction and technology.\(^6\) The aim of the JIVE project is to break down gender segregation in the engineering, construction and technology sectors by addressing the barriers that prevent women from pursuing careers in these sectors. It focuses on the following issues:

- Gender stereotyping in careers advice and recruitment.
- Unsupportive environments in education and training institutions.
- The organisational culture and attitudes of businesses.
- The lack of peer-group support.

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\(^6\) The five case studies produced as a result of this project are available from the Bradford College website: [http://letstwist.bradfordcollege.ac.uk/](http://letstwist.bradfordcollege.ac.uk/)
By doing so, the partnership intends to address the skill shortages within these sectors, while at the same time addressing the gender pay gap between women and men.

JIVE operates through one sectoral hub (engineering construction) and four regional hubs (London, the South East, Wales, and Yorkshire and the Humber). The partners involved include: Bradford College (lead partner); Sheffield Hallam University; the Open University; two NTOs, the Engineering Construction Industry Training Board (ECITB), and the Property Services National Training Organisation (PSNTO); The Oxford Women's Training Scheme; Women's Education in Building; the Women's Training Network; and the EOC. The project involves:

- The further development and delivery of *Let's Twist* inclusive learning awareness training to learning providers (500 individuals are to be trained during the lifetime of the project).

- The development and piloting of a new equality cultural audit tool with follow up advice and training, covering 250 employers in the engineering, construction, property services and ICT sectors.

- The further development and delivery of *Let's Twist* training in how to overcome gender stereotyping for use with careers advisors (315 careers staff are to be trained).

- The delivery of positive action training to upskill women ICT applications users to work as qualified Microsoft Engineers (60 beneficiaries).

- The co-ordination of *Let's Twist* mentoring schemes (involving 710 girls and women in total) to provide peer-group support.

- Sharing experience and joint working with partners in Germany, Austria, France, Denmark, Finland and Sweden in tackling segregation in highly-segregated sectors.

As part of the programme, a cohort of 15 women have entered the engineering construction industry through the ECITB’s National Apprenticeship Scheme for Engineering Construction (AMA) programme to date. The project will audit the recruitment process, the training environment and the employers who offer

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7 ECITB and PSNTO are in the process of becoming Sector Skills Councils.
placements for these women. The women apprentices will be involved in mentoring, both as mentees and, later, as mentors.8

The GERI partnership
The GERI (Gender Equality and Race Inclusion) consortium consists of research partners in five countries: the UK, Denmark, Austria, Finland and Spain. The UK partners in the project include Careers/Connexions companies, a national Sector Skills Council (e-Skills UK) and organisations from the voluntary and private sectors. Partners work closely with schools, other education and training providers and Learning and Skills Councils. The lead partner is Connexions Lancashire.9

The aims of the project are to:

- Conduct research into the causes of gender and ethnic stereotyping.
- Pool skills to turn research and local case experience into learning resources aimed at the promotion of gender and ethnic equality. These resources will incorporate role models and will be delivered on DVD and online, using interactive video and animation.
- Design and deliver standardised equal opportunities information, training and guidance materials for use by Connexions and careers staff, learning providers, employers and other groups.
- Provide mentoring support, both face to face and through the Internet, together with a range of other enhanced support for clients disadvantaged by stereotyping.
- Participate in transnational co-operation to examine best practice and develop joint solutions with other European countries.
- Facilitate a range of other support and communications activities designed to reduce gender and ethnic stereotyping.

8 Information about the scheme may be obtained from: http://letstwist.bradfordcollege.ac.uk/news/jive.htm or from www.owts.org.uk/jive.htm

9 GERI UK core partners are listed on the GERI website: http://www.geriproject.org/teachers/index.htm.
**Shockwaves**

JTL is the national training organisation for the electrical installation industry. It has set up several projects with EQUAL funding to try to improve diversity in the sector. These include the *Shockwaves* initiative, on which JTL is the lead partner. It designed the promotional materials for recruitment of trainees and developed all the course materials to be used in training (JTL, personal communication).

The background to the initiative was concern at the very low numbers of women coming into the electrical installation sector. JTL data indicated that there were around 7,000 Modern Apprentices in this sector, of whom just nine were female. The *Shockwaves* project was established to address this. Its objectives are to:

- Develop marketing material aimed at attracting women.
- Devise a ‘fast-track’ block-release adult training course for women trainees to enable them to achieve level 3 NVQ in around two years (instead of the more typical four years for those entering by a conventional route).
- Use women coming through the system by this route as case studies and role models for future promotional efforts.

Despite extending promotion of the initiative, JTL encountered some initial problems in gaining employer buy-in to the idea. One reason was that the women recruited to the scheme had no background in the industry and hence would not really become productive for around a year. As noted earlier (p. 14), similar concerns regarding the perceived productivity of apprentices were also raised by employers in recent work for the Low Pay Commission (Miller, Hurstfield and Stratton, 2002).

Twelve women have now been recruited to the *Shockwaves* initiative. A training officer provides mentoring and learning needs support to each of the trainees. At the end of the course, JTL will work to place the women in employment.

In addition, JTL has established a partnership with Women's Education in Building (WEB). It is currently working to develop a stream of female apprentices in the London area to work in the WEB training centre.\(^{10}\)

JTL currently administers two other projects which are concerned with raising the participation rate of ethnic minority apprentices in the Building Engineering Services

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\(^{10}\) Sadly, since the completion of the fieldwork, WEB has gone into liquidation.
industry. At present, only around 2-3 per cent of apprentices come from ethnic minority backgrounds. Therefore, JTL has secured ESF part-funding to recruit two officers to work to increase recruitment of minority groups as part of its *Plugging the Gap* project. The two officers will have the following roles:

- **Youth Officer** - will go into schools with children drawn predominantly from minority ethnic groups and speak to parents to promote the idea that MAs are not inferior to 'A' levels. JTL feels that there is a particular need to give parents information about the options available to their children. There is a strong intention to work more closely with the Connexions network.

- **Employers Officer** - will work to promote the business case for diversity to employers. The Employers Officer will try to persuade companies at least to commit themselves to interviewing applicant apprentices from ethnic minority backgrounds.

The project covers many parts of England, but is concentrated on areas with large ethnic minority populations: London (in particular, East London), Birmingham and West Yorkshire.

A third ESF funded project, *LiveWire*, is focussing on raising the participation rate of ethnic minority young people in the JTL AMA scheme. A similar scheme to *Plugging the Gap, LiveWire* is administered in the Nottinghamshire area in conjunction with the Nottingham LSC. A Youth Officer is working with schools, community groups and the Connexions network to raise the profile of the Building Engineering Services Industry amongst ethnic minority young people. Work experience placements and company visits are planned over the two year period of the project (2002-04).

### 6.2 Summary

It is evident that sector bodies, such as the CITB and JTL, and consortia, such as JIVE or the GERI partnership, have taken a range of actions which have been designed to encourage women to enter atypical work. However, in many cases, it remains too early to assess the long-term effectiveness of these initiatives.
7. SECTORAL ANALYSIS

Chapter 7 examines the extent of gender segregation in employment and training in the five sectors which form the focus for the GFI: construction, ICT, engineering, plumbing, and childcare. For each sector, we begin by providing a profile of the sector, before examining its employment, pay rates and levels of qualifications and training; the focus in the section on training is on provision of MAs. We also discuss the extent of skill shortages and vacancies in the sector and examine sectoral initiatives (in Britain and elsewhere) to increase the employment of the under-represented gender within the sector.

7.1 Data sources

Sectoral profile
This is based on a range of sources, particularly studies commissioned by the sector training organisation(s).

Employment
The Labour Force Survey (LFS), which is a quarterly sample survey of individuals within households, was the main source of data on the numbers of women and men employed within each sector. LFS data are Crown Copyright and are used with the permission of the Controller of HMSO and the Queen's Printer for Scotland. The most recent dataset available at the time of the research (Spring 2003) was used for the analysis.11 For each GFI sector, the analysis is based on all in employment (i.e. employees and self-employed) and considers gender, ethnicity and disability. Ethnicity and disability are self-defined by respondents and we have combined the three different categories for disability that the LFS uses: 'DDA disabled (current disability)' (i.e. those defined as disabled under the Disability Discrimination Act); 'work limiting disabled only' and 'both DDA disabled (current disability) and work limiting disabled'. The extent of part-time work in each sector has also been examined.

LFS data have been used to show total employment in selected occupations in each GFI sector; we have also constructed an 'all occupations' category by combining relevant occupations in the Standard Occupational Classification (SOC) system. In the case of construction, ICT and engineering, an 'all industries' category has been constructed through combining relevant industries in the Standard Industrial

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11 The weights used in the LFS were altered in March 2004. The data presented here are based on the 2003 weights. This change is unlikely to have had a great impact on estimates of the number of people in employment in the GFI sectors.
Classification (SIC) system. However, the data do not allow this to be done for plumbing and childcare.

Any LFS cell sizes below 10,000 are normally assumed to be unreliable (since they are likely to be based on no more than 30 respondents to the survey) and are therefore not shown here. Unfortunately, this is often the case for people working in non-traditional occupations. This has severely limited the gender-related data that can be shown and in some cases has meant that data can only be shown for women and men together. It is also necessary to round all LFS data to the nearest thousand.

The occupations selected for the analysis for each sector were chosen in conjunction with the EOC.

**Pay**
Data on average hourly and weekly pay rates were obtained from the published volumes of the 2003 New Earnings Survey (NES). Small sample sizes mean that the available gender-related data are limited. While the LFS also contains pay data, the NES is the better source for earnings in particular industries and occupations.

**Qualifications and training**
The LFS uses a combination of variables to determine the 'highest qualification obtained' variable for people in employment. For each sector, a table sets out the number of female and male employees holding each level of qualification. Since the numbers of people holding qualifications in the 'atypical' sector are low, we have grouped the data as follows: level 4 and above; level 3; level 2; and below level 2 (this category includes those with trade apprenticeships, other qualifications and no qualifications). Level 2 (equivalent to GCSEs) is achieved by those on Foundation MAs and level 3 (equivalent to A levels) by those on Advanced MAs.

Data on the numbers of males and females starting MAs in England and Wales in 2002-03 and for those in training in Scotland were supplied directly by the following organisations:

- The Learning and Skills Council (LSC) Ad Hoc Statistics unit for data on MAs in England.
- Education and Learning Wales (ELWa) Data and Analytical Services for data on MAs in Wales
- Scottish Executive, Enterprise and Lifelong Learning Department Analytical Services Division for data on MAs in further education.
Scottish Enterprise and Highlands and Islands Enterprise for data on MAs in work based learning.

It should be noted that, at present, data relating to numbers of males and females in MA frameworks are not routinely published. These data were therefore requested on behalf of the EOC and the researchers are grateful to the above institutions for provision of these statistics.

**Scotland**

In Scotland, data are collected separately for modern apprentices going through the FE and Work Based Learning routes. Moreover, data on MAs in FE are grouped by the Scottish Further Education Council with those for students on YT, Skillseekers and the New Deal and so data for MAs in the FE sector on their own (i.e. not grouped with these other trainees) are not available. In addition, in the FE monitoring data, plumbing is not given as a subject heading. Therefore, although plumbing MAs exist in Scotland, data relating to these awards and individuals within the FE sector are not available.

Data for young people registered as modern apprentices within the work-based learning route are shown in statistics provided by Scottish Enterprise and Highland and Islands Enterprise. For the work-based learning sector, data for plumbing MAs are available.

**Skill shortages and vacancies**

Data from the Employers Skills Survey 2002 (ESS) which was conducted for the DfES by the Institute for Employment Studies (Hillage et al., 2002), and from the National Employers Skill Survey 2003 (NESS) (Institute for Employment Research (IER)/IFF Research Ltd, 2004) were used to identify skill gaps. The research team was able to access the ESS dataset, but at the time of compiling the report, only the NESS Research Findings had been published. These sources were supplemented by *Working Futures*, a new national report containing projections of occupational employment by sector and region (Wilson, Homenidou and Dickerson, 2004) and by various sectoral studies.

### 7.2 Construction

**Profile of the sector**

Construction (SIC 45) is one of the largest industry sectors in Britain, accounting for a 6.2 per cent share of total employment. In 2002, nearly two million people were employed in the sector. The majority of these were employees, but as many as 39 per cent were self-employed. The self-employed thus accounted for around three
times the average for the economy as a whole (Wilson et al., 2004, p. 167). Levels of employment (of employees) in the sector do vary seasonally, being higher in the Summer and Autumn quarters than in the Spring and Winter quarters.

The construction sector contains a high proportion of small companies. Interviews with representatives of the CITB for a parallel project for the EOC, *Gender segregation in modern apprenticeships* (Miller et al., forthcoming), revealed that around 60 per cent of companies employ five or fewer employees, with many being sole traders. The sector also makes extensive use of short-term contracts (in Spring 2002, 68,000 employees were employed on temporary contracts) and of sub-contracting. Many small companies find it easier to specialise in one area of work and then to work under sub-contract to large companies. Average weekly hours of those in employment tend to be long, but part-time work is relatively uncommon.

The main occupations within the sector include managers in construction (SOC 1122); skilled construction and building trades (SOC 53); construction operatives (SOC 814), which tend to be semi-skilled occupations; and elementary construction occupations (SOC 912), which tend to be more routine and require less skills. Between them, these occupations employed 1.6 million people in Britain in Spring 2003. Thus it is apparent that the workforce in construction occupations is smaller than the workforce in the construction industry; as discussed below, their gender composition also differs considerably.

The body responsible for training in the industry is the Construction Industry Training Board (CITB). In 2003, the CITB became one of the first Sector Skills Councils (SSCs) to be licensed by the SSDA. In addition to identifying training requirements for the industry and overseeing training provision, the CITB is responsible for development of the MA frameworks for the sector, and a separate section of it operates as an Awarding Body.

**Employment**

Table 7.1, which is based on an analysis of the LFS, shows that in Spring 2003, the construction industry sector employed 185,000 women and 1.89 million men in Britain; thus women comprised 9 per cent of the industry workforce. This is in line with other estimates by Thewlis et al. (2004) and Wilson et al. (2004); both sources found that 10 per cent of the industry's workforce was female. Many of these are likely to be clerical employees. The LFS analysis shows that the great majority (93 per cent) of jobs in the construction industry were filled by full-timers, but whereas 97 per cent of men worked full-time, nearly half (44 per cent) of women worked part-time. (Wilson et al. estimated that 5 per cent of employment was part-time).

58
Table 7.1  Employment in the construction industry, 2003

<table>
<thead>
<tr>
<th>SIC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>185</td>
<td>1,888</td>
</tr>
<tr>
<td>- full-time</td>
<td>104</td>
<td>1,823</td>
</tr>
<tr>
<td>- part-time</td>
<td>80</td>
<td>63</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed. Some respondents did not state their employment status.


The analysis of the Spring 2003 LFS in Table 7.2 shows, however, that far fewer women are employed in construction occupations than in the construction industry; indeed, women made up only 1 per cent of all employment in construction occupations. It is particularly striking to note that not one more narrowly defined construction occupation employed as many as 10,000 women in Spring 2003.

Table 7.2  Employment in selected construction occupations, 2003

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>1122</td>
<td>*</td>
<td>174</td>
</tr>
</tbody>
</table>

Skilled construction and building trades

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>*</td>
<td>1,067</td>
</tr>
<tr>
<td>531</td>
<td>*</td>
<td>835</td>
</tr>
<tr>
<td>5312</td>
<td>*</td>
<td>102</td>
</tr>
<tr>
<td>5313</td>
<td>*</td>
<td>38</td>
</tr>
</tbody>
</table>

Building trades

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>532</td>
<td>*</td>
<td>232</td>
</tr>
<tr>
<td>5321</td>
<td>*</td>
<td>37</td>
</tr>
<tr>
<td>5322</td>
<td>*</td>
<td>51</td>
</tr>
<tr>
<td>5323</td>
<td>*</td>
<td>144</td>
</tr>
</tbody>
</table>

Construction operatives

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>814</td>
<td>*</td>
<td>144</td>
</tr>
</tbody>
</table>

Elementary construction occupations

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>912</td>
<td>*</td>
<td>207</td>
</tr>
<tr>
<td>9129</td>
<td>*</td>
<td>183</td>
</tr>
</tbody>
</table>

All construction occupations

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>**</td>
<td>16</td>
<td>1,591</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed.

* Less than 10,000. ** Combined data for SOC 1122; 53; 814; 912.

Other sources confirm the strong sex-segregation of occupations in the sector. In 2003, an article on the National Association for Women in Construction website\textsuperscript{12} noted that:

\begin{quote}
While women are comparatively well represented in the design disciplines in the UK (19\% of architects are women, for example), there are much larger discrepancies in other areas. A massive 92\% of all professional staff employed by contractors, engineers and quantity surveyors are men. And while male professionals still outnumber females in the industry by about 10 to 1, the ratio of female administration and support staff to men is 3 to 2.
\end{quote}

Table 7.3 shows that members of minority ethnic groups constitute a very small proportion (2 per cent) of the construction workforce. A much higher proportion (12 per cent) are classified as being disabled.

\begin{table}[h]
\centering
\begin{tabular}{llll}
\hline
\textbf{Ethnicity} & & & \\
White & 15 & 1,561 & \\
Minority ethnic groups & * & 30 & \\
\hline
\textbf{Disability} & & & \\
DDA disabled and/or work-limiting disabled & * & 195 & \\
Not disabled & 13 & 1,397 & \\
\hline
\end{tabular}
\caption{Employment in construction occupations by ethnicity and disability, 2003}
\end{table}

\textit{Notes:} Data are for employees and self-employed in all construction occupations as defined in Table 7.2 (SOC 1122; 53; 814; 912).

\textsuperscript{*} Less than 10,000 in cell.


\textbf{Qualifications and training}

The CITB Construction Workforce Development Plan, a consultation document circulated by the CITB in November 2002, suggested that an estimated 150,000 adults employed within the construction sector would need to gain vocational qualifications at level 2. As Table 7.4 shows, some 61 per cent of those working in construction occupations in Britain have a highest qualification below NVQ level 2 and less than a third (29 per cent) have a higher qualification at NVQ level 3 or

\textsuperscript{12} Available at \url{http://www.nawic.co.uk/}
above. Earlier research (Clarke and Wall, 1998) commented on the low proportions of British construction workers who held level 3 NVQ or equivalent, compared with Germany, and the low proportion of trainees in training, compared with Germany and the Netherlands. The data suggest that the lack of qualifications within this sector remains a problem.

Table 7.4 Highest qualification of those employed in construction occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>Level 4 and above</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Below Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>118</td>
<td>290</td>
<td>132</td>
<td>853</td>
</tr>
<tr>
<td>Wales</td>
<td>*</td>
<td>17</td>
<td>*</td>
<td>51</td>
</tr>
<tr>
<td>Scotland</td>
<td>14</td>
<td>34</td>
<td>*</td>
<td>77</td>
</tr>
<tr>
<td>GB</td>
<td>137</td>
<td>342</td>
<td>147</td>
<td>981</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed in all construction occupations as defined in Table 7.2 (SOC 1122; 53; 814; 912).

* Less than 10,000 in cell.


Table 7.4 shows that there are fewer people in total qualified across levels 2, 3 and 4 than below level 2. In order to improve the qualifications of the workforce, the sector has attracted £9 million in funding from the LSC to set up regional networks to deliver on-site training and assessment. This forms part of the Qualifying the Workforce campaign (CITB, 2003). Also, a Rethinking Construction drive is under way. This is aimed at increasing interest in higher education participation amongst 18-30 year olds employed within the industry.

The sector is also facing difficulties drawing in graduates with high quality skills and management capabilities, although these make up a very small proportion of the industry's employees. HESA statistics for the UK reveal that there are around 21,600 students (across all years of study) in the category 'architecture, building and planning', of whom just over 6,000 are female (HESA, 2003). UCAS 2002 entry figures for degree programmes in the building studies category indicated a total intake of 2,466 undergraduates, of whom 309 were female. A recent report (Wilkie and Giddings, 2003) highlights the problem that, with student numbers at their current levels, construction courses in higher education will not meet the needs of the industry in the short or medium term; and that the sector is still failing to attract women into undergraduate programmes:
... despite a number of campaigns to attract more women into the construction industry, there has been no impact on higher education in construction.
(Wilkie and Giddings, 2003, p. 12).

However, this has led employers to look to recruit graduates from other courses in order to resolve this shortage, and this potentially may provide a greater (or at least additional) opportunity for the sector to recruit female graduates.

One of the main difficulties for the construction sector in facilitating training in general, is the very high proportion of small employers in the sector. Such employers also tend to be very mobile, i.e. they do not remain at one site for very long. This can prove problematic for young people who may be reliant on public transport and may also be required to attend training in a college or training company. These factors can restrict their mobility and thus their ability to move sites with their employer.

At the same time, the nature of the sector - with its very great reliance on self-employment or micro-businesses - means that many of the arguments typically used to encourage employers to take on trainees, such as the need to invest in the future business and the promise of more highly-skilled employees bringing improved profits to the employer, simply do not ring true in this sector. Employers fear that today's trainee could easily become tomorrow's competitor.

Similarly, the nature of the work for small companies, which is typified by a series of ad hoc projects, often with quite restricted skill requirements, provides a very limited environment for learning. At the same time, large companies are not in a position to offer training positions, despite holding large budgets and managing large-scale projects, because they sub-contract the bulk of the work to small companies.

Despite these general problems, it appears from interviews conducted with the sector for the parallel project being carried out by IES, *Gender segregation in modern apprenticeships* (Miller et al., forthcoming), that the new MA frameworks are being well-received within the sector and are viewed as the way to develop vocational and craft level skills. Awareness of the programme is high, and the majority of young employees working towards a qualification are taking part in a MA. The training levy that operates within the sector appears to be key, as the vast majority (75 per cent) of those supported by grants from this source were taking MAs (DfEE, 2000a). Moreover, most problems that do arise, stem from the structural difficulties (in terms of the preponderance of small and micro-businesses, etc.) of the sector, rather than from difficulties with the training itself.
Data for MAs in construction in England, Scotland and Wales are shown in Table 7.5.

**Table 7.5 Modern Apprenticeships in construction, 2002-03**

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th>Males</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td><strong>Foundation MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England(^1)</td>
<td>100</td>
<td>1</td>
<td>12,933</td>
<td>99</td>
</tr>
<tr>
<td>Scotland(^2)</td>
<td>---</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Wales(^3)</td>
<td>10</td>
<td>1</td>
<td>861</td>
<td>99</td>
</tr>
<tr>
<td><strong>Advanced MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England(^1)</td>
<td>63</td>
<td>1</td>
<td>5,057</td>
<td>99</td>
</tr>
<tr>
<td>Scotland(^2),(^4),(^5)</td>
<td>***</td>
<td>-</td>
<td>679</td>
<td>-</td>
</tr>
<tr>
<td>(WBL)(^2),(^5)</td>
<td>62</td>
<td>1</td>
<td>5,254</td>
<td>99</td>
</tr>
<tr>
<td>Wales(^3)</td>
<td>10</td>
<td>2</td>
<td>493</td>
<td>98</td>
</tr>
</tbody>
</table>

**Notes:**

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In all cases, numbers less than 5 have not been reported due to the restrictions of the Data Protection Act (1998). The percentages have not been shown in these cases.

- Data are missing or unavailable.

Percentages may not add up to 100 per cent because of rounding.

1 Data for England are for number of starts, period 12, provisional data 2002-03.

2 Data for Scotland are for numbers in training from April - August 2003. In Scotland, the Skill Seekers scheme replaces Foundation level MAs.

3 Data for Wales are for number of starts in 2002-03.

4 Within the FE sector in Scotland, data for Skill Seekers are combined with those for AMAs, YT and New Deal.

5 Data for Work Based Learners in Scotland are for AMAs alone. WBL data for AMAs in Scotland are compiled from data provided by Scottish Enterprise and Highlands and Islands Enterprise.

**Sources:**

England: Learning and Skills Council.

Scotland: Scottish Executive, Scottish Enterprise, Highland and Island Enterprise.

Wales: Education and Learning Wales.
Pay rates
Table 7.6 shows average earnings of full-time employees in selected construction occupations. Unfortunately, because of the low numbers of women in these occupations, it is not possible to show the gender pay gaps in these occupations.

Table 7.6  Average earnings in construction occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>SOC</th>
<th>Female Hourly</th>
<th>Female Weekly</th>
<th>Male Hourly</th>
<th>Male Weekly</th>
<th>Gender pay gaps:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managers in construction</td>
<td>1122</td>
<td>N/a</td>
<td>N/a</td>
<td>15.60</td>
<td>657.8</td>
<td>N/a</td>
</tr>
<tr>
<td>Skilled construction trades</td>
<td>531</td>
<td>N/a</td>
<td>N/a</td>
<td>9.44</td>
<td>413.2</td>
<td>N/a</td>
</tr>
<tr>
<td>Construction operatives</td>
<td>814</td>
<td>N/a</td>
<td>N/a</td>
<td>10.01</td>
<td>474.3</td>
<td>N/a</td>
</tr>
<tr>
<td>Elementary construction occupations</td>
<td>912</td>
<td>N/a</td>
<td>N/a</td>
<td>7.62</td>
<td>347.6</td>
<td>N/a</td>
</tr>
<tr>
<td>All occupations</td>
<td>10.56</td>
<td>396.0</td>
<td></td>
<td>12.88</td>
<td>525.0</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Notes: Data are for full-time employees. Gender pay gaps are calculated by determining women's average pay as a percentage of men's and then subtracting this from 100 per cent.


Skill shortages and vacancies
Fewer individuals than in the past now choose to work in construction. As a result, the sector is experiencing a recruitment problem, particularly with its traditional recruitment pool, young males aged 16-19. This group is reducing in size, as young people are increasingly staying on in academic study. Moreover, the industry is perceived to offer 'poor working conditions, unexciting work, and questionable career prospects' (DfEE, 2000a, p. 51). Thus the sector is facing both a lack of applicants and a lack of interest.

This factor, coupled with the fact that there is an ageing workforce (many employees are approaching retirement), and new working practices that are increasing and changing the skills required in the sector, is creating chronic skill shortages. Clarke and Wall (1998) reported the impending skills shortage as 'like a time-bomb ready to explode with any upturn'. The two recent skills surveys (Hillage et al., 20002; Institute of Employment Research/IFF Research Ltd, 2004) indicate this remains the case.

There are concerns that skill shortages and gaps will result in a sacrificing of quality, reduced customer service, loss of business, delays, and increased operating costs.

As well as facing skill shortages, the sector has experienced increasing recruitment difficulties and has large numbers of unfilled vacancies. In 1999, extreme shortages
were reported for craft and skilled occupations, particularly for bricklayers, plasterers, carpenters and joiners (Construction Confederation Survey reported in DfEE, 2000a).

More recent data indicate the situation has not improved. The CITB Employers' Skill Needs Survey, Spring 2001 (CITB, 2002a) asked employers about their difficulties in recruiting skilled staff. The survey revealed that 76 per cent of employers had experienced difficulties in recruiting skilled staff in the previous six months. Difficulties were worst for carpentry and joinery and for bricklaying, for which 55 per cent and 45 per cent of respondents reported difficulties respectively. This was followed by professionals (22 per cent), plasterers and plumbers (21 per cent) and managers (19 per cent).

The survey also found that employers were reporting that the numbers of applicants were down and also that those that did apply, lacked the right skills, particularly technical and practical skills, and customer handling skills. While the majority of employers stated that their existing staff were proficient, some reported that there were skill deficiencies within their workforce, largely as a result of the introduction of new working practices. Skills felt to be lacking included: ability to multi-skill, flexibility, problem solving, team working, customer care, and project management.

Data from the ESS 2002 confirmed that employers still saw the sector as facing extreme skill shortages two years later. A quarter (26 per cent) of establishments reported having at least one vacancy at the time of the survey. Nearly a fifth (19 per cent) reported having a hard-to-fill vacancy (based on analyses of data from Hillage et al., 2002). Recruitment difficulties for skilled trades were greater in construction than in any other sector. Over a third of all hard-to-fill skilled trades vacancies reported by employers (i.e. across sectors) were in the construction sector. Of the hard-to-fill vacancies within construction, 60 per cent related to skilled trades. The NESS 2003 findings were similar: 5.2 per cent of all vacancies were found in this sector and 59.2 per cent of these were considered to be hard-to-fill vacancies. Moreover, construction had the second highest proportion of skill shortage vacancies as a proportion of all vacancies; 38.2 per cent, nearly double the national average of 19.9 per cent (IER/IFF, 2004).

Recruitment targets
The impending skills crisis is leading employers to look to recruit beyond its traditional pool, to attract members of ethnic minorities, older people and women. This effort is supported by the CITB, which has been actively involved for some time in initiatives aimed at encouraging non-traditional groups to consider construction; for example, one of the priorities of the CITB Business Plan 2003-07 is to increase 'the
recruitment of females and ethnic minorities into all occupational areas' (CITB, 2002b).

The CITB Construction Workforce Development Plan also set the construction sector a series of targets (CITB, 2002c). These included recruitment targets for new entrants into industry-approved schemes; increased retention of CITB Managing Agency trainees; and recruitment of a target number of female and ethnic minority trainees over each of the five years of the plan. Specific aims included:

- Dedicating resources to recruit 41,000 new entrants into industry-approved training schemes.
- Increasing the retention of New Entrant Training grant-aided trainees to more than 70 per cent over the time taken to achieve an NVQ/SVQ level 2.
- Improving the recruitment of female and ethnic minority trainees by 10 per cent per annum.
- Achieving 800 placements through Local Collaborative Partnerships providing work experience and employment for female, ethnic minority and disabled trainees.

In specific terms, this amounts to a target for 2003 to recruit 103 female trainees and 132 trainees from ethnic minorities. A total target of 8,000 apprentices has been identified for recruitment during 2003 and the intention is to reduce trainee drop-out to 14 per cent. Some of the specific initiatives which are designed to achieve these targets are discussed below.

**Recruitment initiatives**

The CITB has produced a policy document entitled *Creating a Diverse Workforce - the way forward* and its web site contains positive messages and images aimed at attracting women and ethnic minorities. For example, the careers section of the web site listed twenty job titles and gives examples of people holding these; eight of the twenty examples shown were women. These eight held different types of construction jobs, were at different levels of employment, and held a range of qualifications. The CITB in Northern Ireland has also produced a promotional booklet on *Women in Construction* which contains case studies. A 'changing the face of
construction’ web-site\textsuperscript{13} is also currently being run by private consultants to encourage diversity across the construction industry.

The CITB has also been involved in a range of projects that seek not just to bring young people into the sector, but also to identify and facilitate projects that can act as learning vehicles. The \textit{Nashayman}, \textit{Youthbuild} and \textit{Building Work for Women} projects were focused on encouraging young women and young people from ethnic minority backgrounds into construction:

\textit{Nashayman and Youthbuild}

These projects aimed to bring young people of ethnic minority origin into the industry by linking community organisations with Housing Association construction recruitment. Both projects focused on women within the target group.

\textit{Building Work for Women}

In 2000, the CITB joined an established project partnership of Women’s Education in Building (WEB), Women and Manual Trades (WaMT), Change the Face of Construction consultancy and Lambeth Women’s Workshop to provide work experience for tradeswomen to consolidate their NVQ level 2 qualifications, and move from work experience to jobs.\textsuperscript{14}

The work was funded by the London Development Agency, the European Social Fund, London Central LSC, and the Durkan Group, as well as by the CITB itself. Its role is to deliver vocational training as part of the project. The CITB is piloting a Work Experience grant for employers through this and other projects.

WaMT has also run a Women and Manual Trades Conference for several years. This has been sponsored by CITB and DTI.

The \textit{Women Building London} campaign (run by Women's Education in Building, a not-for-profit organisation) aims to help 1,400 women establish careers in construction manual trades. The campaign is backed by the London Development Agency, the Mayor's agency for business and jobs, and the European Social Fund. It aims to raise awareness of the training opportunities available and create new

\textsuperscript{13} Available at: \url{www.change-construction.org}

\textsuperscript{14} Details are available at: \url{www.bww.org.uk/infotext.htm}. As stated on p. 54, WEB has now gone into liquidation.
training opportunities for women, including work based training for those outside MA eligibility (i.e. those aged over 25).\(^{15}\)

**The WITBE initiative**

The Women in the Built Environment (WITBE) project was developed by a consortium including members of Sheffield Hallam University, South Yorkshire LSC, the South Yorkshire Women's Development Trust, the Royal Institute of Chartered Surveyors, and community and training groups. It is financed by European funds distributed by South Yorkshire LSC. The project seeks to encourage women and girls to consider new careers in the built environment sector, or to 'upskill' in their current posts.

The consortium gives structured support to women and girls going into training and jobs, by helping to find suitable jobs and training and arranging mentors. The project includes a Girl's Day during National Construction Week in which girls from sixth forms came to learn about career opportunities in the built environment. The project also delivers accredited courses in construction and the built environment, consisting of taster courses, follow-on short introductory courses to facilitate progression to undergraduate or craft and technician level, and professional development courses to up-skill women currently employed in the sector.

Other groups include the Oxford Women's Training Scheme and the National Association for Women in Construction. The former is a charitable organisation offering free construction skills training with childcare support to improve employment opportunities of women in low paid or casual work, or who are unemployed. The latter was set up in 2002 to raise the profile of professional women in the sector and provide support, and to raise the number of young women entering the industry.

Finally, the London Women and Manual Trades group has come together with partner organisations in Germany, Denmark, the Netherlands and the Czech Republic, to run a pan-European project called *Interventions*. This aims to change gender stereotyping for girls in career choices and to improve their access to non-traditional, future-orientated fields of training and work.

### 7.3 Information, Communication and Technology

**Profile of the sector**

The ICT industry is a diverse sector, in which the principal industry is computer and related activities (SIC 72). There are a number of ICT occupations, which can be

\(^{15}\) Further information is available at: [www.womenbuildinglondon.org](http://www.womenbuildinglondon.org)
found across a range of industries and in companies of very diverse size. The main occupations include: information and communication technology managers (SOC 1136); ICT professionals (SOC 213); and IT service delivery occupations (SOC 313), which is an associate professional and technical occupation. In Spring 2003, almost 900,000 people worked in ICT firms, and there were over one million ICT workers (i.e. working in ICT roles in any sector) (e-Skills, 2003a).

**Employment**

An analysis of the LFS (Table 7.7) shows that in Spring 2003, computer and related activities employed 514,000 people. This latter estimate compares fairly closely with a figure of 548,000 for the same industry (though entitled computer services) in the UK for 2002 in the *Working Futures* report (Wilson et al., 2004, p. 234).

Table 7.7 also shows that women accounted for 22 per cent of employment in computer and related activities in Spring 2003. This is a much lower estimate than that provided by Wilson et al. (2004) of 38 per cent. The estimates of the share of part-time employment in the industry also vary (9 per cent in the LFS, 14 per cent in Wilson et al.), as do the self-employment estimates (15 per cent in the LFS, 8 per cent in Wilson et al.). More than a quarter (27 per cent) of all females in employment in Spring 2003 worked part-time, according to the LFS data.

**Table 7.7 Employment in the ICT industry, 2003**

<table>
<thead>
<tr>
<th>SIC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer and related activities</td>
<td>72</td>
<td>113</td>
</tr>
<tr>
<td>- full-time</td>
<td>82</td>
<td>386</td>
</tr>
<tr>
<td>- part-time</td>
<td>31</td>
<td>15</td>
</tr>
</tbody>
</table>


Table 7.8 shows employment in selected ICT occupations in Spring 2003. The data indicate that this is the least gendered of the GFI sectors; some ICT occupations employ substantial numbers of women, although in all cases, men comprise the majority of employees. Moreover, women are more strongly represented in lower level ICT occupations than in higher status and higher paid ones, reflecting the extent of vertical gender segregation in the sector; for example, they accounted for 30 per cent of IT operations technicians, but only 15 per cent of ICT Managers and 11 per cent of IT strategy and planning professionals.
Table 7.8 Employment in selected ICT occupations, 2003

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT managers</td>
<td>1136</td>
<td>40</td>
</tr>
<tr>
<td>ICT professionals</td>
<td>213</td>
<td>53</td>
</tr>
<tr>
<td>- IT strategy and planning professionals</td>
<td>2131</td>
<td>16</td>
</tr>
<tr>
<td>- Software professionals</td>
<td>2132</td>
<td>38</td>
</tr>
<tr>
<td>IT service delivery occupations</td>
<td>313</td>
<td>54</td>
</tr>
<tr>
<td>- IT operations technicians</td>
<td>3131</td>
<td>36</td>
</tr>
<tr>
<td>- IT user support technicians</td>
<td>3132</td>
<td>18</td>
</tr>
<tr>
<td>Electrical trades</td>
<td>524</td>
<td>*</td>
</tr>
<tr>
<td>- Telecommunications engineers</td>
<td>5242</td>
<td>*</td>
</tr>
<tr>
<td>- Computer engineers, installation and maintenance</td>
<td>5245</td>
<td>*</td>
</tr>
<tr>
<td>All ICT occupations</td>
<td>**</td>
<td>151</td>
</tr>
</tbody>
</table>

Notes:
- Data are for employees and self-employed.
- * Less than 10,000. ** Combined data for SOC 1136; 213; 313; 5242; 5245.


Secondary research (Millar and Jagger, 2001) also demonstrates that women are severely under-represented in ITEC (the Information Technology, Electronics and Communication) sector, particularly in IT services, telecommunication services, and electronics manufacturing. Moreover, their participation in ITEC jobs has been decreasing. They are also concentrated in lower level ITEC jobs such as telephone operators or data processing equipment installers and repairers (also reported in the US by the Underrepresented Groups in the Information Technology Workforce).

Analysis of employment statistics reveals that women remain a minority of employees in the ICT sector, not just in the UK, but in all European states (Thewlis et al., 2004). For example, even in Sweden, women constituted only 20 per cent of the workforce of IT companies in 1998, with just 6 per cent of those holding the higher positions in those companies.

Table 7.9 shows that 10 per cent of both female and male employment in ICT occupations were filled by minority ethnic groups in Spring 2003. Asians or Asian British accounted for over half of all minority ethnic employment in these occupations.
A higher proportion of females (13 per cent) than males (9 per cent) had a current disability.

**Table 7.9 Employment in ICT occupations by ethnicity and disability, 2003**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>134</td>
<td>753</td>
</tr>
<tr>
<td>Minority ethnic groups</td>
<td>15</td>
<td>81</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDA disabled and/or work-limiting disabled</td>
<td>19</td>
<td>75</td>
</tr>
<tr>
<td>Not disabled</td>
<td>131</td>
<td>759</td>
</tr>
</tbody>
</table>

**Notes:** Data are for employees and self-employed in all ICT occupations as defined in Table 7.8 (SOC 1136; 213; 313; 5242; 5245).

* Less than 10,000 in cell.


**Qualifications and training**

It is difficult directly to compare the contributions of Modern Apprenticeships and degree programmes as sources of training for the ICT sector, for several reasons. Firstly, the ICT sector does not limit its recruitment to just those holding cognate degrees. Just 37 per cent of ICT staff hold computing/computer-related degrees (e-Skills UK, 2003b). Secondly, many of those students who graduate with degrees in ICT-related subjects do not enter the ICT sector - around 40 per cent of those who graduated with an IT/computing related degree were not working in an ICT-related occupation (e-Skills UK, 2003b). Thirdly, the types of subject offered by MA programmes and degrees differ. In particular, combined undergraduate programmes offering ICT plus another subject - health, or management, are two prime examples - are widely available.

Nonetheless, a rough picture can be gained by looking at the 'broad-brush' statistics relating to MAs and degree programmes in this sector. An examination of the UCAS statistics for 'accepts' on to degree programmes (both direct application and via clearing) for computer science, information service, information systems and software engineering revealed that 25,867 individuals were accepted for degree programmes in England and Wales in 2002. The 2003 figures for individuals registered for MAs in IT and telecommunications in England, plus number of starts for Wales (data as at 07/08/03, for both Foundation and Advanced levels) indicate in the region of 8,506
apprentices. However, given that only 40 per cent of those with IT-related degrees go on to work in the industry, and assuming some non-completions, the likely figure for supply of graduates to the sector is of the order of 15,000, just over twice the number of apprentices. It should also be noted that a recent initiative in the ICT sector has been to promote the use of MAs as a potential entry route to HE amongst employers; the newer foundation degrees can also be used as an interim qualification (Miller et al., forthcoming). In interviews with sector employers, it emerged that employers preferred graduates. Nevertheless, progress was being made, with the scheme encouraging the use of MAs as a feeder route to degree-level studies.

Table 7.10  Highest qualification of those employed in ICT occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>Level 4 and above</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Below Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>498</td>
<td>162</td>
<td>85</td>
<td>153</td>
</tr>
<tr>
<td>Wales</td>
<td>23</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Scotland</td>
<td>36</td>
<td>10</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>GB</td>
<td>557</td>
<td>175</td>
<td>90</td>
<td>163</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed in all ICT occupations as defined in Table 7.8 (SOC 1136; 213; 313; 524)

* Less than 10,000 in cell.


Table 7.10 shows that of the five GFI sectors, ICT has the best qualified workforce; over half of all in employment (57 per cent) have Level 4 and above qualifications and only 17 per cent have below Level 2 qualifications. For this sector, it is also possible to compare the level of qualifications of women and men. The analysis shows that virtually equal proportions of women (57 per cent) and men (56 per cent) in ICT occupations have Level 4 and above qualifications. Similarly, 18 per cent of women and 16 per cent of men have below Level 2 qualifications.

Table 7.11 presents data on MAs in ICT in England, Scotland and Wales. As noted earlier in this section, this is the least gendered of the GFI sectors. In addition, it should be noted that the data for MAs in the ICT sector in Wales and in Scotland are notably less segregated than in England.
### Table 7.11 Modern Apprenticeships in ICT, 2002-03

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th>Males</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td><strong>Foundation MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT and electronic services</td>
<td>431</td>
<td>15</td>
<td>2,402</td>
<td>85</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>76</td>
<td>31</td>
<td>170</td>
<td>69</td>
</tr>
<tr>
<td><strong>Scotland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td>272</td>
<td>41</td>
<td>399</td>
<td>59</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>144</td>
<td>62</td>
<td>88</td>
<td>38</td>
</tr>
<tr>
<td><strong>Advanced MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT and electronic services</td>
<td>106</td>
<td>13</td>
<td>694</td>
<td>87</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>159</td>
<td>17</td>
<td>795</td>
<td>83</td>
</tr>
<tr>
<td><strong>Scotland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer technology (FE)</td>
<td>73</td>
<td>31</td>
<td>162</td>
<td>69</td>
</tr>
<tr>
<td>Computer use (FE)</td>
<td>156</td>
<td>33</td>
<td>324</td>
<td>68</td>
</tr>
<tr>
<td>Software and operating systems (FE)</td>
<td>85</td>
<td>36</td>
<td>148</td>
<td>64</td>
</tr>
<tr>
<td>IT overall (FE)</td>
<td>314</td>
<td>33</td>
<td>634</td>
<td>67</td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td>127</td>
<td>46</td>
<td>150</td>
<td>54</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>36</td>
<td>65</td>
<td>19</td>
<td>35</td>
</tr>
</tbody>
</table>

**Notes:** See Table 7.5.

**Sources:** See Table 7.5.

One suggestion that has been put forward is that the data conceal differences in the pathways taken by males and females through the frameworks, with girls perhaps tending towards the 'IT user' route, whereas boys steer towards the 'IT support' route (Miller et al., forthcoming). The available data are not detailed enough to enable a definite conclusion to be reached about this. However, some tangential evidence suggests that this may not be the correct interpretation. In Scotland, separate figures are available for apprenticeship training within the WBL and FE routes. The dataset for the FE sector\(^\text{16}\) presents the MA data for IT broken down into three streams:

\(^{16}\) It should be noted that the data cited here, as with previous data for Scotland, are a mixture of Skill Seekers (equivalent to foundation level MA), YT and New Deal.
computer technology, computer use and software and operating systems (shown in Table 7.11). These data show that, contrary to the suggestion that female uptake of these awards arises from registration on the 'user' pathway, little difference is seen in the distribution of males and females across these three sub-disciplines (for those going through the FE route at least). Women constitute around a third of entrants in each case, with the highest proportion of females being seen in the software and operating systems sub-group.

Pay rates
The larger number of women in this sector, compared with the other male dominated areas, means that the sample size in the NES enables a more comprehensive analysis by occupation than we have been able to supply elsewhere in this report. This is shown in Table 7.12.

Table 7.12 Average earnings in ICT occupations, 2003

<table>
<thead>
<tr>
<th>SOC</th>
<th>Female Hourly</th>
<th>Female Weekly</th>
<th>Male Hourly</th>
<th>Male Weekly</th>
<th>Gender pay gaps: Hourly</th>
<th>Gender pay gaps: Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT managers</td>
<td>1136</td>
<td>21.16</td>
<td>784.9</td>
<td>23.69</td>
<td>892.8</td>
<td>10.7</td>
</tr>
<tr>
<td>ICT professionals</td>
<td>213</td>
<td>16.53</td>
<td>619.8</td>
<td>17.87</td>
<td>684.8</td>
<td>7.5</td>
</tr>
<tr>
<td>- IT strategy and planning professionals</td>
<td>2131</td>
<td>N/a</td>
<td>N/a</td>
<td>22.19</td>
<td>848.6</td>
<td>N/a</td>
</tr>
<tr>
<td>- Software professionals</td>
<td>2132</td>
<td>15.20</td>
<td>571.5</td>
<td>16.83</td>
<td>644.5</td>
<td>9.7</td>
</tr>
<tr>
<td>IT service delivery occupations</td>
<td>313</td>
<td>12.46</td>
<td>463.8</td>
<td>14.65</td>
<td>562.2</td>
<td>14.9</td>
</tr>
<tr>
<td>- IT operations technicians</td>
<td>3131</td>
<td>13.14</td>
<td>486.2</td>
<td>15.20</td>
<td>582.8</td>
<td>13.6</td>
</tr>
<tr>
<td>- IT user support technicians</td>
<td>3132</td>
<td>10.97</td>
<td>415.0</td>
<td>13.19</td>
<td>507.2</td>
<td>16.8</td>
</tr>
<tr>
<td>Telecommunications engineers</td>
<td>5242</td>
<td>N/a</td>
<td>N/a</td>
<td>11.89</td>
<td>477.6</td>
<td>N/a</td>
</tr>
<tr>
<td>Computer engineers, installation and maintenance</td>
<td>5245</td>
<td>N/a</td>
<td>N/a</td>
<td>12.16</td>
<td>483.3</td>
<td>N/A</td>
</tr>
</tbody>
</table>

| All occupations | 10.56         | 396.0         | 12.88       | 525.0       | 18.0                    | 24.6                    |

Notes: See Table 7.6.
Source: See Table 7.6.

Table 7.12 indicates that there is a relatively narrow gender pay gap in the ICT sector, when compared with all occupations. The gender pay gap in hourly earnings is particularly narrow for ICT professionals at 7.5 per cent; this is slightly narrower than the equivalent figure for all professional occupations (9.0 per cent).
Skill shortages and vacancies

The ICT sector is currently experiencing difficulties, and the e-Skills bulletin for Quarter 2, 2003, noted that the labour market was flat and that redundancies and unemployment rates were up. Particular difficulties were found in the telecommunications and IT manufacturing sectors. Unlike the other GFI sectors, ICT is not facing a shortage in numbers of workers, and the majority of companies are not expecting any recruitment difficulties. In the same bulletin, e-Skills UK reported the growth forecasts produced by Computer Weekly and by Ovum, both of which predicted low growth in demand for software and services in 2002 (e-Skills UK, 2003a). They commented on the fact that this was a much bleaker picture than that painted by the European Information Technology Observatory which had predicted a rise of 38 per cent between 2000 and 2003 in the demand for ICT specialists (Prospects, 2001). By the third quarter of 2003, however, e-Skills UK felt that the downturn had reached an end, with a stable rather than worsening incidence of company closures and improving stability in the labour market (e-Skills UK, 2003b).

Note, though, that while e-Skills UK reported stability in the labour market in late 2003, it also reported that more than half of employers (57 per cent) believed that their IT staff require more skills (e-Skills UK, 2003c). This was an increase of 10 per cent from the year before. Programming, IT operating system skills, and sales skills were most in demand. The SSC argued that this highlighted the importance of developing existing staff as well as training and recruiting additional individuals.

Analysis of the ESS 2002 (Hillage et al., 2002) revealed that while nearly a quarter of ICT establishments had at least one vacancy at the time of the survey, only 10 per cent reported having hard-to-fill vacancies. At the time of the 2003 NESS, the number of ICT establishments reporting skills gaps had fallen to 13 per cent, but the figure for hard-to-fill vacancies had increased to 26.1 per cent of all vacancies in the sector. Skill shortage vacancies accounted for 18.4 per cent of all vacancies (IER/IFF, 2004).

Recruitment targets

The ICT sector has been very active in recent years in encouraging women to consider employment within the industry. The government has also been vocal in identifying the need to encourage more women to enter this sector as a key strategy to address ICT skills needs (Hewitt, 2001).

A series of conferences has been hosted by the DTI and DfES to explore ways of increasing the numbers of women in the sector. The 2002 conference focused on recruitment into education, training and jobs in ICT, while the 2003 conference
moved on to consider issues around retention. The Computer Clubs for Girls scheme (see below) was announced at the 2002 conference.

Recruitment initiatives
The (former) e-Skills NTO was active in liaising with employers to recruit and retain women. For example, in 1999, it produced a series of cards, leaflets and posters called What's in IT for me?, featuring an ethnically diverse range of young people, of whom half were female.

This work has been continued by e-Skills UK, now the SSC for this sector. In all of its publicity relating to jobs, careers and training in IT, more than 50 per cent of the imagery is female. It has also introduced several initiatives, some of them in partnership with the DfES/DTI. The initiatives have often tried to combine activities that engage the interests of young women and, at the same time, challenge the image of IT as a boring, 'geeky' sector, as this has repeatedly been reported as a barrier to attracting and recruiting girls.

To address this image problem, the Computer Clubs for Girls scheme was introduced in 2002. This initiative aimed to emphasise the 'fun' aspects of computing. The clubs were established with the backing of the DTI and were designed to get girls involved in using packages such as Photoshop to produce mock-ups of magazine cover pages and designs for CD packaging etc. The idea is that, by developing skills in this 'fun' context, girls will start to realise that ICT potentially can lead to interesting jobs in the future. By mid 2003, 1,000 girls had taken part in this initiative and a further 4,000 were about to join the scheme in September 2003. The intention is that in 2004, the programme will be rolled out nationally, making it available for all schools that wish to participate. It is also to be opened to all pupils, not just girls.

The South East England Development Agency (SEEDA) was the pilot region for the Computer Clubs for Girls initiative. A project called ITbeat has also recently begun in this region, again in association with e-Skills UK. This project, which is aimed at an older audience, is taking an 'image consultancy' approach to try and change the image of IT for all young people, especially amongst teenage girls.

There have also been initiatives to attract women into ICT in other European countries. For example, in Denmark, recognition of the need to engage women in ITC skill development led the national broadcasting company to second a group of women to work on the development of an IT training programme for other women within the company (Miller and Neathey, 2004).
7.4 Engineering

Profile of the sector

Engineering forms part of the manufacturing sector. It covers the manufacture of machinery and equipment including: engines for mechanical power; machine tools; general purpose machinery; office machinery and computers; electric domestic appliances; radios, televisions and communication equipment; medical and surgical equipment; watches and clocks; and photographic equipment (SIC 29-33) (Wilson et al., 2004, p. 143).

The main engineering jobs are engineering professionals (SOC 212); science and engineering technicians (SOC 311); and electrical/electronics engineers (SOC 5249). Technical engineering processes have been identified as the core activity for the engineering workforce.

The Sector Skills Council for the engineering sector is the Science, Engineering and Manufacturing Training Association (SEMTA, formerly EMTA, the Engineering and Manufacturing Training Association). In addition, the Engineering and Technology Board (ETB), is a professional partnership for the science, engineering and technology sector that was set up by the Engineering Council and other professional bodies with funding from the DTI. Both SEMTA and the ETB have been increasingly active in campaigning and conducting research to address the need for a more diverse workforce.

The 2003 NESS indicates that, while engineering as a whole accounts for some 3.0 per cent of all employment in England, only 1.3 per cent of all current vacancies are found in the sector. Of these, 40.4 per cent were hard-to-fill vacancies (close to the average across all sectors of 40 per cent), while an above average 30 per cent were skill shortage vacancies (Institute of Employment Research/IFF Research Ltd, 2004). Similarly, Wilson et al. (2004) estimated that engineering accounted for 2.7 per cent of total employment in the UK in 2002.

Employment

Tables 7.13 and 7.14 examine levels of employment in the engineering industry and engineering occupations respectively.
Table 7.13 Employment in the engineering industry, 2003

<table>
<thead>
<tr>
<th></th>
<th>SIC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture of machinery and equipment n.e.c.</td>
<td>29</td>
<td>74</td>
<td>321</td>
</tr>
<tr>
<td>Manufacture of office machinery and computers</td>
<td>30</td>
<td>21</td>
<td>80</td>
</tr>
<tr>
<td>Manufacture of electrical machinery and apparatus n.e.c.</td>
<td>31</td>
<td>50</td>
<td>152</td>
</tr>
<tr>
<td>Manufacture of radio, television and communication equipment and apparatus</td>
<td>32</td>
<td>29</td>
<td>76</td>
</tr>
<tr>
<td>Manufacture of medical, precision and optical instruments, watches and clocks</td>
<td>33</td>
<td>42</td>
<td>103</td>
</tr>
<tr>
<td><strong>All engineering industries</strong></td>
<td>**</td>
<td>215</td>
<td>731</td>
</tr>
<tr>
<td>- full-time</td>
<td></td>
<td>172</td>
<td>711</td>
</tr>
<tr>
<td>- part-time</td>
<td></td>
<td>44</td>
<td>20</td>
</tr>
</tbody>
</table>

Notes: ** Combined data for SIC 29-33.


Table 7.14 Employment in selected engineering occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Engineering professionals</em></td>
<td>212</td>
<td>20</td>
<td>418</td>
</tr>
<tr>
<td>- Mechanical engineers</td>
<td>2122</td>
<td>*</td>
<td>61</td>
</tr>
<tr>
<td>- Electrical engineers</td>
<td>2123</td>
<td>*</td>
<td>38</td>
</tr>
<tr>
<td>- Electronics engineers</td>
<td>2124</td>
<td>*</td>
<td>36</td>
</tr>
<tr>
<td>- Design and development engineers</td>
<td>2126</td>
<td>*</td>
<td>75</td>
</tr>
<tr>
<td>- Production and process engineers</td>
<td>2127</td>
<td>*</td>
<td>37</td>
</tr>
<tr>
<td>- Planning and quality engineers</td>
<td>2128</td>
<td>*</td>
<td>34</td>
</tr>
<tr>
<td><em>Science and engineering technicians</em></td>
<td>311</td>
<td>43</td>
<td>209</td>
</tr>
<tr>
<td>- Electrical and electronic technicians</td>
<td>3112</td>
<td>*</td>
<td>30</td>
</tr>
<tr>
<td>- Engineering technicians</td>
<td>3113</td>
<td>*</td>
<td>73</td>
</tr>
<tr>
<td><em>Electrical trades</em></td>
<td>524</td>
<td>*</td>
<td>467</td>
</tr>
<tr>
<td>- Electrical/electronics engineers n.e.c.</td>
<td>5249</td>
<td>*</td>
<td>104</td>
</tr>
<tr>
<td><strong>All engineering occupations</strong></td>
<td>**</td>
<td>64</td>
<td>731</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed.

* Less than 10,000 in cell. ** Combined data for SOC 212; 311; 5249.

An analysis of the LFS showed that 946,000 people were employed in Britain in Spring 2003 in the engineering industry (Table 7.13). This is a rather higher estimate than that made by Wilson et al. (2004) that employment totalled 800,000 in the UK in 2002. Both sources agree that virtually all employment in these four sectors was full-time (94 per cent in the LFS, 95 per cent in Wilson et al.) and that self-employment is relatively unimportant in the industry (accounting for 4-5 per cent of employment). Similarly, there is also strong agreement about the female share of employment (23 per cent in the LFS, 24 per cent in Wilson et al.).

Table 7.14 shows that engineering occupations are even more strongly gender segregated than the engineering industry; women comprised only 8 per cent of employment in engineering occupations in Spring 2003. Moreover, women are much more strongly represented amongst science and engineering technicians (17 per cent) than amongst engineering professionals (5 per cent).

Table 7.15 shows that members of minority ethnic groups constitute 4 per cent of the engineering workforce. A higher proportion (11 per cent) are classified as disabled.

Table 7.15 Employment in engineering occupations by ethnicity and disability, 2003

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>61</td>
<td>702</td>
</tr>
<tr>
<td>Minority ethnic groups</td>
<td>*</td>
<td>28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDA disabled and/or work-limiting disabled</td>
<td>*</td>
<td>83</td>
</tr>
<tr>
<td>Not disabled</td>
<td>58</td>
<td>648</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed in all engineering occupations as defined in Table 7.14 (SOC 212; 311; 5249).

* Less than 10,000 in cell.


Qualifications and training
The ETB has noted that the advent of NVQs has had a more significant impact on FE than HE, and that in engineering, by 2000-01, 69 per cent of NVQs were awarded at levels 1 and 2 (Engineering Council and ETB, 2002). At the time of the research, the sector skills council for engineering, SEMTA, was engaged both in efforts aimed at increasing the numbers recruited to MAs, and at improving completion rates (see
Miller et al., forthcoming). However, retention difficulties should not be seen as a problem specific to MAs; the ETB has noted that there is a ‘historically higher non-completion rate for engineering courses, compared with other subjects’ (Engineering Council and ETB, 2002, p.13).

Table 7.16 shows that 49 per cent of those in employed in engineering occupations had level 4 or over qualifications in 2003, while 23 per cent had below level 2 qualifications. This means that, amongst the five GFI sectors, overall qualification levels in engineering are second only to ICT occupations. Far fewer women than men are employed in engineering, but qualification levels are slightly higher for those who are; 53 per cent of women, compared with only 49 per cent of men, had level 4 and over qualifications. Similarly, 24 per cent of men, but only 16 per cent of women, had below level 2 qualifications.

Table 7.16 Highest qualification of those employed in engineering occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>Level 4 and above</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Below Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>320</td>
<td>136</td>
<td>53</td>
<td>164</td>
</tr>
<tr>
<td>Wales</td>
<td>20</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Scotland</td>
<td>50</td>
<td>14</td>
<td>*</td>
<td>16</td>
</tr>
<tr>
<td>GB</td>
<td>390</td>
<td>159</td>
<td>60</td>
<td>186</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed in all engineering occupations as defined in Table 7.14 (SOC 212; 311; 5249)

* Less than 10,000 in cell.


The 2002 Labour Market Survey of the engineering industry in Britain reported that 28 per cent of establishments employed apprentices or recognised trainees. In addition, levels of training provision had fallen. In common with earlier findings, larger establishments remain more likely to provide training for apprentices and trainees, with 92 per cent providing either or both on-the-job and off-the-job training, compared with 83 per cent of medium-sized and 69 per cent of smaller establishments.

Table 7.17 confirms that entry to MAs in this sector remain strongly male-dominated. The data for FMA level are encouraging, showing that around 6-7 per cent of registrations at this level in England and Wales are female. If these figures continue and, perhaps more importantly, feed through into advanced level, this suggests that
some overall growth in the numbers of females in this sector may be seen over the next few years.

Table 7.17 Modern Apprenticeships in engineering, 2002-03

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th>Males</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td><strong>Foundation MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering manufacture</td>
<td>342</td>
<td>6</td>
<td>5,417</td>
<td>94</td>
</tr>
<tr>
<td><strong>Scotland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering technology (general) (FE)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering manufacture</td>
<td>24</td>
<td>7</td>
<td>330</td>
<td>93</td>
</tr>
<tr>
<td><strong>Advanced MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering manufacture</td>
<td>150</td>
<td>3</td>
<td>5,322</td>
<td>97</td>
</tr>
<tr>
<td><strong>Scotland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering technology (WBL)</td>
<td>7</td>
<td>2</td>
<td>393</td>
<td>98</td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering manufacture</td>
<td>48</td>
<td>2</td>
<td>2,062</td>
<td>98</td>
</tr>
</tbody>
</table>

**Notes:** See Table 7.5.

**Sources:** See Table 7.5.

SEMTA was able to provide statistics for the proportions of modern apprentices who had a disability (2-3 per cent) and also for those from an ethnic minority (also 2-3 per cent). However, these figures are not further broken down by gender.

SEMTA has recently investigated the growing use of occupational tests as a selection procedure for entry to MAs (SEMTA, 2003). Their survey assessed the extent to which such tests were being used, and by whom. It revealed that while the majority of organisations were adopting good practice in test use, there were some issues that needed to be addressed. There were concerns about the extent of training (and qualification level) of those administering tests. While 41 per cent of organisations reported conducting validation studies on at least one of the tests they used, only 9 per cent had done so separately for gender and ethnic group. By failing to confirm a test's validity for all groups, organisations can run the risk of indirectly discriminating. In addition, of those who monitored their selection rates (52 per cent),
the majority (64 per cent) analysed application and selection rates by gender and ethnicity.

**Pay rates**

Table 7.18 shows average earnings in 2003 in the two engineering occupations which employed sufficient numbers of employees of both sexes for earnings data to be shown in the NES. The table reveals that gender pay gaps in these occupations were narrower than in all occupations. It also shows that the weekly gender pay gap for science and engineering technicians was much wider than the hourly pay gap. This reflects the fact that male technicians worked longer hours than female technicians on average; moreover, average earnings from overtime and other additional payments were much higher for male technicians (£56 per week) than for female technicians (£18 per week).

**Table 7.18 Average earnings in engineering occupations, 2003**

<table>
<thead>
<tr>
<th>SOC</th>
<th>Female Hourly</th>
<th>Female Weekly</th>
<th>Male Hourly</th>
<th>Male Weekly</th>
<th>F as % of M: Hourly</th>
<th>F as % of M: Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering professionals</td>
<td>212</td>
<td>13.55</td>
<td>523.9</td>
<td>15.65</td>
<td>13.4</td>
<td>15.7</td>
</tr>
<tr>
<td>Science and engineering technicians</td>
<td>311</td>
<td>9.75</td>
<td>369.3</td>
<td>11.33</td>
<td>13.9</td>
<td>20.8</td>
</tr>
<tr>
<td>All occupations</td>
<td></td>
<td>10.56</td>
<td>396.0</td>
<td>12.88</td>
<td>18.0</td>
<td>24.6</td>
</tr>
</tbody>
</table>

*Note:* See Table 7.6.

*Source:* See Table 7.6.

**Skill shortages and vacancies**

The increased use of new technology, new materials and new processes has led to changes in the nature of skill needs in the engineering sector (DfEE, 2000b). The report also indicated that, despite the growth in numbers of individuals coming into the sector via FE and HE, there remained a deficit in people with skills at the intermediate level (level 3). The Skills Dialogue (DfEE, 2000b) identified this as one of the issues that needed to be addressed:

*The development of the qualifications framework further, especially at NVQ level 3, to help meet industry’s needs better at the intermediate level.*

The subsequent revision of the MA frameworks was in part a response to this perceived need.
The Employers Skill Survey does not have a separate code for engineering. The proxy category 'manufacturing' was therefore interrogated. This indicated that over a quarter of establishments had vacancies at the time of the survey (29 per cent) and 18 per cent reported hard-to-fill vacancies. Engineering was separately identified in the 2003 NESS. Engineering accounted for 1.3 per cent of all vacancies, with 40.4 per cent of these being considered hard-to-fill vacancies; skill shortage vacancies accounted for an above average 30.0 per cent of all vacancies (IER/IFF, 2004).

The 2002 Labour Market Survey of the engineering industry in Britain revealed that 16 per cent of establishments reported a gap between the skills of their existing workforce and those needed to meet current objectives (EMTA, 2002). This was the case irrespective of size of establishment. There were slight differences between establishments in Wales, Scotland and England, with the reported frequency of skill gap reporting being 9, 14 and 17 per cent in the three countries, respectively. The survey reported the north east of England to be experiencing the greatest difficulties, with 28 per cent of establishments reporting skills gaps. However, Wales was the region in which the highest proportion of employers mentioned technical engineering (as noted above, the core activity for the engineering workforce) as a specific problem area, with 99 per cent of employers who reported a skills gap identifying a gap of this type.

The survey also revealed that technician engineers and engineer technicians were job groups for which skills gaps were having significant impact on businesses. Across the sector, around 15 per cent of establishments reported skills gaps in these jobs, with this figure reaching 34 per cent in Wales. Technician posts are jobs that a person with a level 3 NVQ would typically occupy. This serves to emphasise the sector's needs in terms of people coming through vocational training routes, such as the MA, at the intermediate level.

Recruitment initiatives
The ETB has been active in attempting to increase the number of women entering this sector. In order to inform its future actions, it commissioned a review of the factors which influence whether women choose careers in science, engineering and technology (Pollard et al., 2003). The ETB has set up a career strategy group that is charged with promoting careers in the sector and with investigating ways of encouraging entry into the sector. As part of this, it has recently gained ESF funding to support a programme of research looking at the design and impact of careers information.
The Women into Science and Engineering (WISE) campaign was set up to help attract more girls and women into SET, both directly and by supporting other organisations, parents, teachers, careers advisors, employers, politicians and the media to encourage girls and women to consider careers in the SET sector. A range of initiatives have been supported under the campaign. These include the science and engineering ambassadors scheme for schools; helping to set up Young Engineers clubs; running the *Outlook* programme that provides three day 'hands-on' engineering programmes in colleges for girls; provision of information and advice on science and engineering careers, developing CVs and interview techniques; and a range of publicity initiatives, including the use of female role models in engineering and science and publishing the *Sparks* newsletter.

### 7.5 Plumbing

*Profile of the sector*

Plumbing is a relatively small, but diverse, industry, which forms a sub-section of the building installation component (SIC 45.3) of the larger construction sector. Data on employment of women and men in this part of the construction sector are not routinely published.

There are two main occupations in the sector: plumbers, heating and ventilating engineers (SOC 5314), and pipe fitters (SOC 5216). Both occupations are skilled trade occupations; the former is a construction trade and the latter is a metal forming, welding and related trade.

Responsibility for training in the sector formerly rested with its NTO, the British Plumbing Employers' Council (Training) Ltd (BPEC). However, in 2003, a new organisation, SummitSkills, replaced BPEC and two other former NTOs; at the time the research was conducted, it was in the process of applying for its license to become the Sector Skills Council for the electrotechnical, heating, ventilation, air conditioning, refrigeration and plumbing industries. There is also a professional body to represent those working in the sector. The Institute of Plumbing (IP) has a membership of around 11,000 people, of whom fewer than 50 are female.

Most employment in this sector is in small firms. A telephone survey by Questions Answered (2002) for BPEC found that 90 per cent of employers in the sector had ten or fewer employees, with over two-thirds employing four or fewer employees; there is also extensive self employment.
**Employment**

Table 7.19 presents LFS data for Spring 2003 on the two SOC plumbing occupations. It shows that the sector is extremely male-dominated with less than 10,000 women being employed in plumbing occupations. Table 6.18 also shows that the great majority of those employed in the sector are white and are not disabled.

### Table 7.19 Employment in selected plumbing occupations, 2003

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled metal and electrical trades</td>
<td>52</td>
<td>14</td>
</tr>
<tr>
<td>Metal forming, welding and related trades</td>
<td>521</td>
<td>*</td>
</tr>
<tr>
<td>- Pipe fitters</td>
<td>5216</td>
<td>*</td>
</tr>
</tbody>
</table>

| Skilled construction and building trades | 53      | *      | 1,067  |
| Construction trades            | 531     | *      | 835    |
| - Plumbers, heating and ventilating engineers | 5314    | *      | 177    |
| All plumbing occupations       | **      | *      | 191    |

**Notes:** Data are for employees and self-employed.

* Less than 10,000. ** Combined data for SOC 5216; 5314.


### Table 7.20 Employment in plumbing occupations by ethnicity and disability, 2003

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>*</td>
<td>189</td>
</tr>
<tr>
<td>Minority ethnic groups</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disability</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDA disabled and/or work-limiting disabled</td>
<td>*</td>
<td>22</td>
</tr>
<tr>
<td>Not disabled</td>
<td>*</td>
<td>169</td>
</tr>
</tbody>
</table>

**Notes:** Data are for employees and self-employed in all engineering occupations as defined in Table 7.19 (SOC 5216; 5314).

* Less than 10,000 in cell.

These findings are confirmed by other, smaller-scale, sectoral studies. As shown in Table 7.21, the survey by Questions Answered (2002) found that the sector was heavily male-dominated with significant under-representation of female, ethnic minority and disabled people. Similarly, the Sector Workforce Development Plan for the Plumbing industry (BPEC, 2001) acknowledged that:

… the industry has a poor record in providing jobs and retaining women and people from ethnic minorities ... and industry employers recognise the need to address the imbalance.

In common with findings from other sectors, this is largely seen to be a consequence of the image of plumbing.

The figures shown in Table 7.21 are based on research undertaken by the plumbing sector itself, and therefore are not identical to the findings of the LFS. However, they provide a useful picture of the distribution of numbers at craft, technician/supervisory and management grades.

**Table 7.21 Distribution of staff in the plumbing sector by occupational level, 2002**

<table>
<thead>
<tr>
<th>Level</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Disabled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>1,017</td>
<td>1,012</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Supervisors/technicians</td>
<td>431</td>
<td>431</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Plumbers</td>
<td>4,025</td>
<td>4,013</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,529</td>
<td>5,518</td>
<td>17</td>
<td>13</td>
</tr>
</tbody>
</table>

*Source:* BPEC (2001), Table 2.1.1.

There is also evidence that plumbing has an ageing workforce and that the majority of plumbers are aged 35 or over (DfEE, 2000a).

**Qualifications and training**

Table 7.22 shows the numbers of workers within the plumbing sector who hold qualifications at levels 2, 3 and 4, and below level 2. Because the sector is small compared with the others considered in this report, it is not possible to report the numbers of plumbers holding qualifications within Scotland or Wales, nor at level 4. This does not mean that individuals do not exist at these levels of qualification, only that the sampling methodology used in the LFS makes it unsafe to report figures below 10,000. The data shown in Table 7.22 nonetheless do indicate that the majority of workers in this sector currently are qualified at level 2 or below.
Until recently, NVQs were the preferred option for training individuals within the sector. But according to the Construction Skills Dialogue (DfEE, 2000a, p. 43):

... apprenticeships are now a major channel of investment in the skills of new entrants and in 2000 a sizeable proportion (two fifths) of plumbers reported employing trainees or apprentices.

Nevertheless, the sector currently suffers from a lack of employers willing to take on apprentices or students for work-based experience. This is largely due to the nature of employment within the sector since, as noted above, the large majority of plumbing companies employ fewer than five individuals. There is also currently a shortage of college places for plumbing. Plumbing (and its apparent potential for high earnings) has received a great deal of media coverage over the past year and perhaps partly because of this, plumbing courses are now oversubscribed, training centres are full to capacity, and course registrations are up (see The Guardian, 17 December 2002; see also the SummitSkills website: www.summitskills.org.uk).

Table 7.23 shows that the distribution of MA's in this sector is extremely gendered and that there are virtually no women who are taking plumbing MA's in Britain.
Table 7.23 Modern Apprenticeships in plumbing, 2002-03

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th>Males</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td><strong>Foundation MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plumbing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England¹</td>
<td>16</td>
<td>1</td>
<td>2,057</td>
<td>99</td>
</tr>
<tr>
<td>Scotland²</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wales³</td>
<td>***</td>
<td>-</td>
<td>135</td>
<td>-</td>
</tr>
<tr>
<td><strong>Advanced MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plumbing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>6</td>
<td>1</td>
<td>1,050</td>
<td>99</td>
</tr>
<tr>
<td>Scotland (WBL)⁵</td>
<td>***</td>
<td>-</td>
<td>939</td>
<td>-</td>
</tr>
<tr>
<td>Wales³</td>
<td>0</td>
<td>0</td>
<td>68</td>
<td>100</td>
</tr>
</tbody>
</table>

Notes: See Table 7.5.
Sources: See Table 7.5.

Pay rates in plumbing
Table 7.24 shows the available data on earnings in plumbing; there were too few women in the sample to allow data for female employees to be shown.

Table 7.24 Average earnings in plumbing occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th></th>
<th>Male</th>
<th></th>
<th>Gender pay gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOC</td>
<td>Hourly</td>
<td>Weekly</td>
<td>Hourly</td>
<td>Weekly</td>
</tr>
<tr>
<td>Plumbers, heaters and</td>
<td>5314</td>
<td>N/a</td>
<td>N/a</td>
<td>10.44</td>
<td>445.6</td>
</tr>
<tr>
<td>ventilating engineers</td>
<td></td>
<td>N/a</td>
<td>N/a</td>
<td></td>
<td>N/a</td>
</tr>
<tr>
<td>All occupations</td>
<td>10.56</td>
<td>396.0</td>
<td>12.88</td>
<td>525.0</td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24.6</td>
</tr>
</tbody>
</table>

Note: See Table 7.6.
Source: See Table 7.6.

Data on the earnings of self-employed plumbers are not available, but are rumoured to be substantially higher at least in some areas (e.g. London).

Skill shortages and vacancies
The LMI and Skills Foresight survey undertaken by Questions Answered (2002) found that the industry had grown from 18,000 firms in the mid 1990s to around 21,500 in 2001. Further expansion is probable; the demand for plumbers is great,
both to replace those leaving the industry and to respond to the 'mini boom' created by the recent strong economy and investment in housing. It is estimated that around 5,700 new plumbers are needed each year, amounting to approximately 29,000 by the year 2007 (CITB forecasts quoted in the Construction Skills Dialogue, and at the Institute of Plumbing website: www.plumbers.org.uk). Consequently, as discussed below, the sector is currently experiencing an extreme skills shortage.

There are continuing reports of skill shortages in this sector. The skills foresight research conducted on behalf of BPEC in 2002 reported considerable 'churn' - staff taken on or lost - in the year prior to the survey. Two thirds of those surveyed reported that they had increasing skills needs. The reasons given by respondents were: changes to regulations, and changes to plumbing and heating technologies and work practices. One in five (22 per cent) of the plumbing and heating firms surveyed reported a significant gap between those skills held currently by their employees and the skills they believed were needed (Questions Answered, 2002). Three main areas of skills gap were identified as needing improvement: gas skills, basic/general skills and new plumbing and heating technologies.

The report by Questions Answered also found that 60 per cent of companies stated that they intended to train staff to tackle these skills problems. Just under 10 per cent reported that they would address the problem through recruitment of individuals with specialist skills or else sub-contract. Around 15 per cent said they would deal with the problem in 'other' ways, but it does not appear to be the case that any were intending to recruit apprentices in order to develop their future skills base. A further question on recruitment policies indicated that employers, in general, preferred to recruit fully-qualified or relatively-well-qualified recruits. Almost a quarter had taken on individuals aged between 19-25 who were qualified to NVQ level 3 or equivalent. One half had taken on young people aged 16-18 who held a level 2 NVQ or equivalent. Few reported recruiting women seeking a career change or people with disabilities.

The report concluded that the findings indicated that there were imbalances between the demand for, and supply of, plumbing and heating engineers, and suitable candidates for plumbing and heating apprenticeships. To some extent, the difficulties that beset the plumbing sector are similar to those described for construction: a large majority of the sector comprises sole traders, small and micro-businesses, a highly mobile workforce, but one which works in a restricted range of activities. This can make it difficult in general to take on apprentices.

The Employers Skills Survey 2002 does not have a separate code for plumbing. However, the categories of 'electrical/gas/water supply/distribution' were used as a
proxy to allow this dataset to be mined for contributory information. The proxy analysis in fact revealed a similar - if anything, worse - situation to that reported in the Skills Foresight report: 82 per cent of employers reported having a vacancy at the time of the survey and 18 per cent had hard-to-fill vacancies (analyses based on data from Hillage et al., 2002). Plumbing is not analysed separately in the NESS 2004 or Working Futures reports.

Recruitment targets
Compared with the other heavily male-dominated sectors experiencing skills gaps, there have been relatively few initiatives aimed at encouraging women to come into plumbing. However, it should be noted that this report was prepared at a time at which the sector was working towards approval of SummitSkills as its SSC, and this had necessarily drawn attention and resources away from other initiatives. Nonetheless, SummitSkills has recognised that more needs to be done to encourage recruitment from less traditional sources (including women). It has set a target of doubling the number of women plumbing apprentices in the next three years and to increase the number of individuals coming into the sector through non-traditional entry routes. These are in addition to its plans to achieve year-on-year increases in the numbers of apprentices recruited, and in those achieving completion (which currently stands at 47 per cent) (SummitSkills, 2003).

Recruitment initiatives
The predecessor of SummitSkills, BPEC Ltd, had been involved in April 2003 in a conference hosted by JTL on Meeting the Skills Shortage with Diversity. An action plan was identified as an outcome of the conference, which resolved that SummitSkills would take responsibility for developing a framework and strategy for driving the diversity agenda forward, with sector trade bodies taking responsibility for driving the partnership. The need to raise awareness through press advertisements, television soaps, ethnic minority press, union magazines and women’s magazines was recognised. The action plan also noted the necessity actively to market the equal pay and career opportunities for all apprentices in the sector, and the need for further research into the shortage of applicants, barriers during training and employers’ fears. The plan also stated that more positive action initiatives along the lines of Plugging the Gap, LiveWire and Shockwaves were required (JTL, 2003).

The Institute of Plumbing has a Women in Plumbing group. Set up in 2002, the group meets bimonthly, and has been involved in promoting plumbing as a career for women. There is an unofficial mentoring network around the country. The Women in Plumbing group also has its own section on the SummitSkills website.
Finally, some initiatives are being taken by individual companies, sometimes with external financial support. In late 2003, one company in Wales was about to start trying to recruit 50 women as plumbing trainees. It had secured ESF funding to do this.

7.6 Childcare

Profile of the sector

The childcare industry sector forms part of the social work activities without accommodation industry sectors (SIC 85.3). This is a large, diverse, sector, which employed over three million people in employment in Spring 2003, but it is not possible to state how many of these jobs were directly related to childcare.

The main occupation for the sector is childcare and related personal services (SOC 612), which is part of the broad caring personal service occupations (SOC 61). There are four occupations within childcare and related personal services: nursery nurses (SOC 6121); childminders and related occupations (SOC 6122); playgroup leaders/assistants, who include those who work in out-of-school clubs (SOC 6123); and educational assistants (SOC 6124). Note that educational assistants are not covered in the analyses below.

Childminders, who must be registered by a local authority, are usually self-employed, while nursery nurses and play group leaders/assistants are normally employees, either within local authorities or in private companies. Private sector businesses in childcare are typically small enterprises. A high proportion of those employed in these occupations work part-time.

At the time of the research, responsibility for overseeing training in the sector rested with the Early Years NTO (EYNT0). Responsibility was shortly to shift to a Sector Skills Council, but when the research was conducted, there remained some debate regarding which of the SSCs the EYNT0 would join. As with the sector skills body for the plumbing sector (SummitSkills), the hiatus while SSC status was resolved had severely curtailed the ability of EYNT0 to take positive action to promote the MAs.

Some people who train under the EYNT0 qualification structure subsequently find work within the sport, recreation and allied occupations, the sector for which SPRITO was the NTO. However, the remit for SPRITO also covered the playwork sub-sector, which comprised adventure playgrounds, out of school clubs, play centres, holiday play schemes, mobile play projects, and specialist projects. Therefore, there

17 SkillsActive has now been established as the SSC for Active leisure and learning.
was some cross-over of qualifications, personnel and interests between these two NTOs.

**Employment**

Table 7.25 shows the number of women and men who work in childcare occupations. It indicates that the degree of gender segregation in the sector is pronounced; fewer than 10,000 men worked in childcare occupations as defined below, with the majority of men in childcare and related personal services being employed as educational assistants. Table 7.26 reveals that most employees in the sector are white (ethnic minorities comprise 4 per cent of employment in childcare occupations); those with disabilities account for 12 per cent of employment in these occupations.

**Table 7.25 Employment in selected childcare occupations, 2003**

<table>
<thead>
<tr>
<th>SOC</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Childcare and related personal services</strong></td>
<td>612</td>
<td>591</td>
</tr>
<tr>
<td>- Nursery nurses</td>
<td>6121</td>
<td>132</td>
</tr>
<tr>
<td>- Childminders and related occupations</td>
<td>6122</td>
<td>112</td>
</tr>
<tr>
<td>- Playgroup leaders/assistants</td>
<td>6123</td>
<td>53</td>
</tr>
<tr>
<td><strong>All childcare occupations</strong></td>
<td><strong>297</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Data are for employees and self-employed.

* Less than 10,000. ** Combined data for SOC 6121, 6122 and 6123.


**Table 7.26 Employment in childcare occupations by ethnicity and disability, 2003**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>285</td>
<td>*</td>
</tr>
<tr>
<td>Minority ethnic groups</td>
<td>12</td>
<td>*</td>
</tr>
</tbody>
</table>

**Disability**

<table>
<thead>
<tr>
<th>Disability</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDA disabled and work-limiting disabled</td>
<td>36</td>
<td>*</td>
</tr>
<tr>
<td>Not disabled</td>
<td>261</td>
<td>*</td>
</tr>
</tbody>
</table>

**Notes:** Data are for employees and self-employed in all childcare occupations as defined in Table 7.25 (SOC 6121; 6122; 6123).

* Less than 10,000 in cell.

Secondary evidence supports the LFS findings that childcare remains an almost entirely female occupation. Penn and McQuail (1997) suggested that just 1 per cent of those working in the childcare field were men. More recent figures indicate that there has been little change in the profile of the childcare workforce (EYNTO, 2001). Workforce surveys undertaken in 2001 indicated that the majority of employees were women, with men constituting a significant proportion of employees (12.5 per cent) only in out-of-school clubs. These often provide childcare for older children: for example, Scott, Brown and Campbell (2000) found that out of school care projects in Scotland were recruiting men who had previous voluntary experience in youth or community work. An analysis of the 2001-02 LFS (EYNTO, 2001) revealed that elsewhere, few men were employed; they accounted for 6 per cent of playgroup leaders or assistants; 2 per cent of childminders; and just 1 per cent of nursery nurses.

Researchers have suggested that the under-representation of men in childcare can in part be attributed to the poor pay and conditions in the sector, along with its low status, poor career progression prospects and its reliance (in the UK) on part-time employment contracts (Scott, Brown and Campbell, 2000; EYNTO, 2001; BMG, 2002; Rolfe et al., 2003). However, Moss (2000) and Bertram and Pascal (2000) have commented that, even in those Nordic countries in which employment in the childcare sector is both better paid and more likely to offer full-time contracts, men remain a minority of the childcare workforce.

Penn and McQuail (1997) found that, perhaps unsurprisingly, childcare was regarded by those within the sector as a 'natural' area of work. The more natural the job was seen as being for women, however, the more unnatural it was seen as being for men. They also reported that men wishing to work with young children can find themselves subject to suspicions of perversion and child abuse. Similarly, Cameron, Moss and Owen (1999) considered the experiences of male childcare workers. They found that men choosing to enter the sector were unlikely to receive unconditional support from their families, friends or partners, unlike women who chose to do so. Male respondents reported that the most likely reaction to greet their career decision was one of 'surprise, confusion and ridicule'. Sometimes reactions could be stronger: research commissioned by Gloucestershire LSC reported that open antagonism from his colleagues was experienced by one male childcare worker (BMG, 2002).

Qualifications and training

Table 7.27 shows highest level of qualifications of those employed within childcare occupations. It reveals that 63 per cent of the workforce has a qualification at level 2 or above.
Table 7.27 Highest qualification of those employed in childcare occupations, 2003

<table>
<thead>
<tr>
<th></th>
<th>Level 4 and above</th>
<th>Level 3</th>
<th>Level 2</th>
<th>Below Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>53</td>
<td>52</td>
<td>60</td>
<td>101</td>
</tr>
<tr>
<td>Scotland</td>
<td>11</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>GB</td>
<td>67</td>
<td>57</td>
<td>68</td>
<td>112</td>
</tr>
</tbody>
</table>

Notes: Data are for employees and self-employed in all childcare occupations as defined in Table 7.25 (SOC 6121; 6122; 6123). No data can be shown for Wales because of small sample sizes.

* Less than 10,000 in cell.


While a range of nationally recognised qualifications is available in early years education, childcare or playwork, including FMA and AMA programmes in early years care and education, it should be noted that, according to the EYNTO, just 2-3 per cent of employees enter through the MA route. When MAs were first introduced, the heavy subsidies made these a popular training route with employers. However, once trained and qualified, apprentices could find themselves unemployed, with the employer then recruiting more trainees to take advantage of the subsidy. While the benefit of this was that a high number of individuals went through the apprenticeship schemes, one unfortunate side-effect of the subsidies was the subsequent unemployment of some apprentices.

The new arrangements for MAs are proving less popular in this sector, largely because of the technical certificate requirements. An off-the-job training requirement can lead to a temporary reduction in staff numbers down to below that required by legislation. Therefore, MAs are not being taken up in the numbers they once were.

Table 7.28 reveals that virtually all those on early years care and education MAs in England, Scotland and Wales are female.
### Table 7.28 Modern Apprenticeships in childcare, 2002-03

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th>Males</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td><strong>Foundation MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early years care and education</td>
<td>5,151</td>
<td>97</td>
<td>170</td>
<td>3</td>
</tr>
<tr>
<td><strong>Scotland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Advanced MAs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early years care and education</td>
<td>3,975</td>
<td>98</td>
<td>98</td>
<td>2</td>
</tr>
<tr>
<td><strong>Scotland</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child care services (FE)</td>
<td>236</td>
<td>97</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Early years care and education (WBL)</td>
<td>915</td>
<td>98</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Notes:</strong></td>
<td>See Table 7.5.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sources:</strong></td>
<td>See Table 7.5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that male students registered on courses as a result of the Men In Childcare (MIC) project in Scotland are largely not included within these data as they are either registered for the SVQ only, rather than the MA, or are registered on National Certificates or Higher National Certificates.

The MIC project reports that the proportion of males in students on childcare courses at Scottish colleges in 2002-03 was 1.5 per cent (equivalent to 37 students). The MIC students added a further 41 students.

**Pay rates**

Table 7.29 shows average earnings of full-time employees in childcare occupations. Earnings are well below the average for both women and men (although only weekly data are available for men). The gender pay gap in childcare and related personal services is much narrower than average.
Table 7.29 Average earnings in childcare occupations, 2003

<table>
<thead>
<tr>
<th>SOC</th>
<th>Female Hourly</th>
<th>Female Weekly</th>
<th>Male Hourly</th>
<th>Male Weekly</th>
<th>Gender pay gaps: Hourly</th>
<th>Gender pay gaps: Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>612</td>
<td>6.88</td>
<td>248.4</td>
<td>281.2</td>
<td>N/a</td>
<td>11.7</td>
</tr>
<tr>
<td>Nursery nurses</td>
<td>6121</td>
<td>6.90</td>
<td>249.7</td>
<td>N/a</td>
<td>N/a</td>
<td>N/a</td>
</tr>
<tr>
<td>Childminders and related occupations</td>
<td>6122</td>
<td>6.22</td>
<td>260.1</td>
<td>N/a</td>
<td>N/a</td>
<td>N/a</td>
</tr>
<tr>
<td>All occupations</td>
<td></td>
<td>10.56</td>
<td>396.0</td>
<td>12.88</td>
<td>525.0</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Notes: See Table 7.6.

Source: See Table 7.6.

Skill shortages and vacancies
As indicated above, recent initiatives to increase the provision of childcare in the UK, in conjunction with funding initiatives such as Care to Learn?, have led to an increase in demand for childcare. The Sector Workforce Plan for the Early Years Care and Education sector (EYNTO, 2001) reported that there had been no on-going collection of data in the sector. The only national Skills Foresight survey had been undertaken two years previously. However, the consultation carried out as part of the sector workforce plan identified numerous local skill shortages and gaps as well as national concerns.

One reason for the lack of information is that it is difficult to acquire clear data on the childcare sector, in part because, as noted above, the sector’s workforce is divided between two separate training bodies (EYNTO and SPRITO). The playwork sub-sector workforce development plan produced by SPRITO identified the following skills issues, gaps and shortages:

- A recognised national skills shortage of workers in early years, play and childcare.
- Skills gaps in training and assessing playworkers.
- A need for the IT skills of the workforce to be improved.
- Skills gaps in business, finance and administration.
- Skills gaps in the provision of inclusive play for children with special needs.
Within the Employers Skills Survey, childcare falls within the overall grouping of 'education, health and social care'. Therefore any analysis based on this dataset will be of only limited utility. This sector as a whole had the second-highest level of reported vacancies of the five sectors (after plumbing). Some 35 per cent of employers reported having vacancies at the time of the survey, with a fifth (20 per cent) reporting hard-to-fill vacancies. Similarly, childcare is not analysed separately in the NESS 2004 or Working Futures reports.

Recruitment targets
There have been various targets for the male proportion of the childcare workforce to be increased in recent years. For example, the DfES has set a strategic target for EYDCPs for 2001-04 that 6 per cent of childcare workers in England and Wales should be men by 2004. Although there is no target as yet in Scotland, the Scottish Executive has stated its commitment to provide funding to increase the number of men working in childcare.

The Sector Workforce Development Plan, while observing that the sector has 'been bedevilled by a stereotypical view that it is 'women's work that anybody can do' (EYNTO, 2001, p. 27) stopped sort of making explicit recommendations to counteract stereotyping or, indeed recommending actions to attract men into the sector.

Recruitment initiatives
The Making Choices promotional material (produced by EYNTO and SPRITO), which is designed to help people decide whether they want to work in the sector, makes early reference to equal opportunities:

We want to particularly encourage more men, people from ethnic minorities and people with disabilities into child care as the percentages are still quite low in these areas. We want to see more children benefit from quality care and education that is delivered by men, older people, people from a different ethnic background to their own, and people with disabilities.

The Men in Childcare (MIC) project in Edinburgh has been part-financed with ESF funding and since January 2001 has been responsible for childcare training for over 130 men. Key features of the project have been advertising directed explicitly at men, and by then providing information and support at all stages of the training. Support included mentors, face-to-face and telephone based support, financial support for full-time students and for all course fees.

In 2002, this was followed by the announcement from the Education Minister for Scotland that an additional £2.4 million will be made available to local authorities from
2004 onwards. While local authorities will have flexibility in deciding how best to use the additional funding, the Scottish Executive intends to give examples of areas the funding could be used for. One of these is improving the diversity of the workforce.

At Lakes College in West Cumbria, there was a concerted attempt to recruit males to childcare courses which resulted in a higher level of male students around 1999-2000. It is unclear whether this initiative is continuing, although the initiative was held up as a good practice exemplar within the LSC report on diversity (LSC, 2002b).

Scandinavian countries appear to have been particularly successful in encouraging men to consider childcare as a career option. For example, in Denmark, the number of men has increased in recent years by 25 per cent in after-school care and by 5 per cent in the care of young children (cited in Peeters, 2003). Amongst the relevant factors accounting for this rise have been a recent publicity drive to increase the recruitment of men and an increase in the proportion of men being trained in childcare (for example, in one Danish childcare college, almost 50 per cent of the students are male).

In Holland, there had been a recent poster campaign to encourage men to enter childcare. In Belgium, where the number of men in childcare remains negligible, the Minister of Welfare and Equal Opportunity, whose remit includes childcare, has increased the salaries in day-care centres by approximately 30 per cent. It is hoped that this salary increase, along with a new Men and Childcare campaign, should result in an increase in the male proportion of employment. The publicity campaign promotes an image that is different from the typically feminine image of childcare. The posters and leaflets were widely distributed amongst job seekers at job centres (Peeters, 2003).

7.7 Conclusions
All sectors were aware of the need to take action to address gender segregation. However, they had made different rates of progress, with the ICT sector seeing most movement overall. Contrary to what might be expected, progress in challenging occupational gender segregation appears not to be much influenced by skill shortages within sectors, although sector efforts clearly were. Engineering, construction, plumbing and childcare are all reported to have significant skill demands and hence potentially result in career opportunities, yet it is still difficult to persuade the under-represented gender to enter these sectors; on the other hand,

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18 For details of reports (in English) on childcare in Flanders, see http://www.kindengezin.be/English_pages/default.jsp
ICT has been beset by reports of redundancies and firm closures, yet is making better progress towards a balanced workforce.

It is clear from the statistics provided by the LSC, Scottish Enterprise, Highlands and Islands Enterprise and ELWa that there are some significant differences in patterns of entry to MAs in these sectors across the three countries. It is also clear that it would be of great value to be able to monitor progress within these frameworks by gender. However, at present, such data have to be specifically requested.

It is possible to examine the numbers of men and women in various occupations using data from the Labour Force Survey. However, since the numbers of women in plumbing, construction and engineering and the number of men in childcare are so few, in practice it is not possible to report in detail the outcomes of such investigations. This is because the numbers typically fall below the confidence criterion cut-off for the LFS. The cut-off (of 10,000) is needed because the sampling and weighting procedures used in compiling the LFS data and weighting to reflect the relative proportions of men and women and people from different ethnic backgrounds means that below this number, the number of individuals actually sampled is too small to give a reliable figure. However, this leads to a situation in which it is impossible to follow the progress of the very groups who are of most interest, primarily because they are small groups.

Therefore, while a wealth of data is potentially available, in practice the figures remain tantalisingly elusive. To monitor progress - and to gauge what works, as the outcomes of initiatives begin to emerge - more detailed (and accurate) data will almost certainly be needed.
8. CONCLUSIONS

This study has looked at theories of gender segregation, occupational stereotyping and occupational choice. It has reviewed the background features of employment in the five sectors of interest (construction, plumbing, engineering, childcare and ICT) and reported on initiatives taken in these sectors. Lastly, we have analysed current data on employment, pay, skill shortages and training in the five target sectors.

8.1 Key research findings

Policy initiatives
The research showed that there have been a raft of government policy initiatives over the past few years that have had either direct or indirect implications for women. However, in many cases, for example, the vocational education agenda, the revisions to 14-19 education and training provision and the National Skills Strategy, this has not been formally acknowledged within the key documentation. As a result, it is likely that strategies based on these policies will lack the necessary focus and impetus to have a significant impact on the issue.

Theories of segregation and stereotyping
Our analysis of theories accounting for the segregation and stereotyping of work revealed that no one theory by itself accounts for the establishment and continuance of gender segregation, but that all have made some contribution to our attempts to make sense of these employment phenomena. There has been relatively little empirical research to test these theories in some areas, for example with regard to organisational recruitment decisions. An exception concerns analyses of the gender pay gap which have revealed that, in almost all calculations, a significant percentage of the gender wage differential remains attributable to gender alone.

Factors influencing job choice
The study revealed that occupational segregation remains one of the strongest influences on young people’s choice of career. This becomes evident at an early age; both boys and girls tend to express preferences for jobs that are viewed as being appropriate for their own sex. However, this is not a static process; there is evidence that girls (but to a lesser extent, boys) become willing to consider a wider choice of occupations as they become older. Moreover, the relationship between job preference and gender can be modified by external factors, such as parental attitudes and support, the teaching style adopted in schools and the advice and guidance offered to young people; the ability, attitudes and interests of young people also affect this.
Employment and pay in the GFI sectors

The statistical analysis clearly demonstrated the extent of gender segregation in employment within the five GFI sectors, although there were some variations between the sectors; employment in ICT is clearly more gender balanced than in the other four sectors.

In some cases, it is not possible to give precise figures for the number of individuals from the atypical gender who are employed in a particular GFI sector. This is because the Labour Force Survey, the main source of data, has a minimum threshold for reporting. Thus it is only possible from the LFS to state that fewer that 10,000 women are employed in plumbing occupations and not provide a more detailed estimate.

Skill gaps in the GFI sectors

Skill shortages and vacancies exist in all five GFI sectors. This is particularly the case in construction, where skill shortage vacancies as a proportion of total vacancies are almost double the national average. Skill shortage vacancies are also well above average in engineering. Continuing chronic recruitment difficulties are seen in the plumbing and childcare sectors, while in ICT, increasing numbers of employers are reporting the need for higher level skills.

Modern Apprenticeships in the GFI sectors

Our analysis revealed that MAs in the GFI sectors remain extremely gender segregated which, in turn, suggests that the main training provision for young people will do little to break down wider segregation in employment in these sectors.

The study also demonstrated that there are severe limitations in the collection and publication of data on MAs. The only way in which the extent of gender segregation in MA training can be monitored is through the analysis of the numbers of males and females who are registered on MAs in specific sectors. Yet it emerged that, at the time of the research, there was no body in England, Wales or Scotland which routinely published the statistics for the MA frameworks by gender. In each case, the statistics had to be specially requested.

It appeared to be a fairly straightforward task to obtain these data for Wales and Scotland. In England, the situation was more complicated because responsibility for these data had passed from the DfES to the LSC, which was still in the process of determining its system requirements at the time of the research. The situation was exacerbated by local LSCs having different software for collecting the relevant data, making central collation of the data difficult. Nonetheless, the Ad Hoc Statistics unit
eventually was able to provide the data requested, but it is our understanding that as yet no decision has been reached regarding whether such data will be made routinely available in future. We understand that an Equal Opportunities Working Group is to be set up in the near future and the nature of the statistics to be collected and published is one of the issues that it will be discussing.

It was also not possible to obtain data on the pay for most MAs, with the exception of plumbing and engineering. For these sectors, there exist specified pay rates for employees in the first few years of employment, and these apply to those apprentices who have employed status.

*Employment of apprentices*

The research showed that employers are concerned that, in the short term, apprentices require investment and are not seen as making a positive contribution to the business. For older apprentices, there is the requirement to pay the minimum wage after one year of apprenticeship.

The study also revealed that the childcare allowance could make it more profitable for apprentices in some low-paid areas to give up employed status and return to student status. Amongst the sectors we have considered, this particularly might be an issue within childcare, which is one of the lower paying employment sectors.

### 8.2 Suggested ways forward

The EOC is making separate recommendations in its GFI in the light of this report and other evidence. The authors draw attention to the following areas, where they make some initial suggestions for possible ways forward. These can be grouped together under two broad headings: data collection and publication; and action to promote atypical work.

**Data collection and publication**

*Data on MAs*

As indicated above, it was not without some effort that the full data on MAs were assembled. In the absence of detailed data for MAs, reported separately by gender for the various frameworks, it is simply not possible to monitor progress in challenging gender segregation.

It is difficult to understand why the situation with regard to data reporting in the vocational arena is so very different from that in HE and FE. The DfES *Statistics on Education and Training* routinely provide statistics for areas of study broken down by
gender. It is surely an essential first step in achieving parity between academic and work-based learning routes that we have access to the same data for each.

We therefore suggest that in England, Scotland and Wales, steps should be taken as a matter of some urgency to put data on registrations, and ideally completions, by gender, separately for all MA frameworks in the public domain.

**Pay of apprentices**

As noted above, it was not possible to obtain data on the pay of Modern Apprentices (except for plumbing and engineering). If parity of pay for female and male apprentices is to be monitored, then it is also necessary to gather pay data. We therefore suggest that SSCs should conduct an initial audit of pay rates for apprentices and that should be followed by subsequent monitoring. We are mindful of the potential burden this would impose, and in any event, change is likely to be slow. Therefore we would also suggest a three-year interval between subsequent audits. It is also important that the results of such surveys are published.

**Employer survey data**

The publication of the new National Employers Skills Survey is very welcome. We feel it is important that more accurate data at an occupational level are collected in key sectors and that the data are gendered. It is therefore suggested that the DfES should fund, through the SSCs, regular surveys of employment patterns, skill and qualification levels and skill gaps. We suggest that this monitoring should occur at intervals of approximately three to five years, unless the SSCs themselves consider that they should be conducted more frequently. We feel that such surveys would be of use to the SSCs both in terms of the general monitoring of developments in skills and labour supply, but also to assist them in monitoring progress towards a more diverse workforce.

**Action to promote atypical work**

We consider that a range of actions should be taken to promote atypical employment to young people, including young children before the age at which key educational and career decisions are taken.

**The cost of apprentices**

We have seen that apprentices require investment and that there is an additional problem for older apprentices of the requirement to pay the NMW after one year of apprenticeship. These issues are especially likely to affect smaller employers. Therefore in our opinion, an additional subsidy should be paid to employers taking on an apprentice (and especially older apprentices) that takes into account the additional
costs incurred by employers in the first year, or, as a minimum, six months). A sensible first step might be to focus subsidies in areas of skill shortage.

We also suggest that an additional subsidy should be paid to those taking on 'non-traditional' apprentices. Legal advice would need to be sought to determine whether this would be covered by the positive action clause of the SDA that allows initiatives to enable women and men to compete on equal terms in sectors where either sex is under-represented, but it would appear on the surface to be likely.

There is a precedent for subsidies to encourage employers to hire specific groups of individuals. In the past, in attempts to encourage employers to hire unemployed people, subsidies or tax breaks have been made available to those that do so. The most recent of these is the New Deal initiative.

*Treatment of apprentices*

Although the government has encouraged the move to employed status for the majority of apprentices, no minimum wage has been set. We have noted that some employers (particular small employers) struggle to cover the cost of an apprentice. Nonetheless, we have also noted that recent initiatives with student grants and allowances have led some intermediaries to question whether some apprentices would be financially better off as students. Were some form of subsidy for those employing apprentices to be considered, consideration might then also be given to establishing national minimum pay rates for apprentices over and above the £40 per week minimum grant that currently applies.

*Gender impact of new initiatives*

It was noted earlier that no actions specifically focused on improving the skills of women were suggested in the National Skills Strategy. This could have been avoided if the government was systematically to assess the differential gender impact of new initiatives. At present, even where there is a significant benefit to disadvantaged groups arising from government policy - as there is for women with the intended lifting of the age cap on MAs - this is often not explicitly recognised.

Therefore we suggest that, in addition to ensuring more equity of treatment between work-based learning and other learners, that all education/training and employment policies are analysed for their gender impact. Moreover, strategies and initiatives arising from policies should be designed to take into account any identified differential gender impact.
Careers advice
Some personal advisors, particularly those who do not come from a careers advice or guidance background, appear not to be challenging the existing ideas of young people about careers and experience. We therefore consider that the Connexions service should review its policies and staff development provision to enable all workers to address issues of gender segregation as a priority. Training to raise awareness of occupational gender segregation for careers education teachers should also be viewed as a priority.

Work experience placements
The government is keen to introduce more work-relevant learning in schools. Whether this includes work-place visits or indeed work experience is at present for schools to decide. However, where visits and work experience are arranged, care should be taken that these go beyond the reinforcement of existing stereotypes and that the opportunities for females and males are stressed. This should be a key aspect of any future government developments in the direction of a work experience entitlement.
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