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Preparing Women for Dead-End Jobs? Vocational Education and Training (VET) for Information and Communication Technology (ICT) Jobs

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ABSTRACT

This paper discusses the role that vocational education and training (VET) in ICT subject areas plays in contributing to the gender and social class structuring of ICT occupations, focusing in particular on education and employment data from the UK. The paper also makes reference to similar data about ICT VET in Germany and Japan to argue that the new areas of 'soft' ICT skills – in education and in occupations – have become feminised, and channel women into low skilled and low paid work. Unlike university level ICT education, which has opened opportunities for women and students coming from families with no experience of higher education, sub-degree level ICT VET seems to be continuing to reproduce gender and socio-economic class within and through ICT occupations. I argue that those concerned with gender equity research and interventions in ICT need to work with an analysis that disaggregates what are now appearing to be quite different skills sets, and different career opportunities often misleadingly conflated under the umbrella term 'ICT'. I also argue for better analytical models for the gendering of ICT than those offered by the 'leaky pipeline' or 'critical mass' models, and for new analyses that would incorporate both a structural analysis and new ways of looking at women's choices, such as Hakim's 'orientation to work'.

KEYWORDS

ICT; vocational education and training; VET; social class; apprenticeships; vocational qualifications; women students.



Preparing Women for Dead-End Jobs? Vocational Education and Training (VET) for Information and Communication Technology (ICT)¹ Jobs

REVIEWING OUR UNDERSTANDING OF THE GENDERING OF INFORMATION TECHNOLOGY OCCUPATIONS

In her 1996 book Webster offered an extensive review of the ways in which women's employment had changed during the 1970s and 1980s, evaluating the impact of the 'new' information and communication technologies within a complex relationship of economic, social, and political change. She predicted the growth of new professional ICT jobs and the likelihood that they would be dominated by men. She also predicted a restructuring of less skilled work, which would create both job losses and job opportunities for women; but at the time the balance of loss and opportunity was unpredictable. In the 1980s the development of new ICT jobs was seen by some as a 'Golden Opportunity' for women (Deakin, 1984), but by the 1990s there was less optimism among those working on gender issues, who saw new occupations settling into old gender patterns. In the twenty years between the research that informed Webster's book and this present paper we now have a more extensive model of a new global 'Network Society' (Castells, 2000), in which information and communication technologies communicate and amplify economic and political, and 'natural' events so that the structuring of ICT work is now a global issue, not just a national one.

In 2008 the 'Women in IT scorecard', published by the British Computer Society (BCS, 2008), had as one of its main driving messages: men outnumber women 4:1 in ICT occupations in the UK. And in 2011 the papers in this special issue of the International Journal of Gender, Science and Technology are all underpinned by a similar empirical 'fact'. The fact of female under-representation in ICT is in danger of becoming an unquestioned 'truism', and in danger no longer being exposed to enough critical analysis to understand the diverse and changing nature of ICT occupations and the role that education and training plays in supporting these.

Education has never been seen as one of the drivers of technological change. Rather educational systems and educators have been seen as struggling to 'keep up' with the new skills demanded by, and predicted for national and global labour markets, and to 'keep up' with the new ICT literacies needed for functional citizenship in the Network Society. In the last ten years a series of reports by the UK Office for Standards in Education Children's Services and Skills (Ofsted), has drawn public attention to the fact that both primary and secondary schools were not engaged as fully with teaching ICT skills to students as the government would wish. The 2009 report noted that in primary schools 'teachers tended to give more attention to those aspects of ICT where they themselves felt confident' (p.4), and in secondary schools:

The Key Stage 4 curriculum (for ages 14 – 16) was inadequate in around one fifth of the schools visited; assessment was unsatisfactory in a similar proportion, and many students were following qualifications of doubtful value. ...Furthermore, teachers gave too much emphasis to teaching students to use particular software applications rather than helping them to acquire genuinely transferable skills. (p.4)

Education was often positioned negatively as contributing to the gendering of occupations through supporting girls to take traditionally female subject choices, which restricted their opportunities to enter higher education or training in ICT and consequently into ICT occupations. Feminist educators hoped that positive interventions would produce a significant challenge to the gendered structure of occupations (Margolis, 2002). Much of this effort has been to encourage young women to enter university to study ICT and enter highly skilled occupations (AAUW, 2000). The statistics on women's employment suggest that the effort to recruit women to the most technical ICT occupations has, at least in Europe, been relatively unsuccessful (Miller et al., 2005). But, there are now large numbers of women – across the world – working at occupations demanding lower levels of ICT skills. They are a significant proportion and in some cases the majority of lower skilled ICT workers. Their educational route has not been that of high academic performance followed by a university degree, it has been schooling and sub-degree level VET. This area of education has received much less scrutiny and intervention from those concerned with gender equity. It might be the case that lower level ICT VET encourages women to enter 'dead-end' jobs where there is little opportunity for promotion or progress, rather than helping them – through a transitional job - onto the first rung of an ICT career. Bihagen and Ols (2007) describe 'dead-end jobs' as those occupations that, over a period of time offer no upward progression, or career development opportunities as measured by salary increases. Their research on the Swedish labour market indicated that 53% of Swedish women in employment in 2003 were in dead-end jobs. Men in these jobs were no more likely to progress than women, but there was a disproportionate number of women in such jobs. A similar analysis needs to be done to identify which ICT occupations are most likely to be dead-end jobs.

Are There Feminized ICT Occupations?

One problem with understanding the nature of ICT occupations, and creating vocational education to prepare people for these occupations, is that 'rapidly changing technologies and economies' (Soe and Yakura, 2008, p.177) make it difficult to define what constitutes an ICT occupational category. This paper has been written from within a UK context, and uses as its baseline categories those created by UK government organisations. Occupational data, at least in Europe, is categorised in very similar ways and is used to produce European Labour Force Data (Eurostat²). Data on educational and

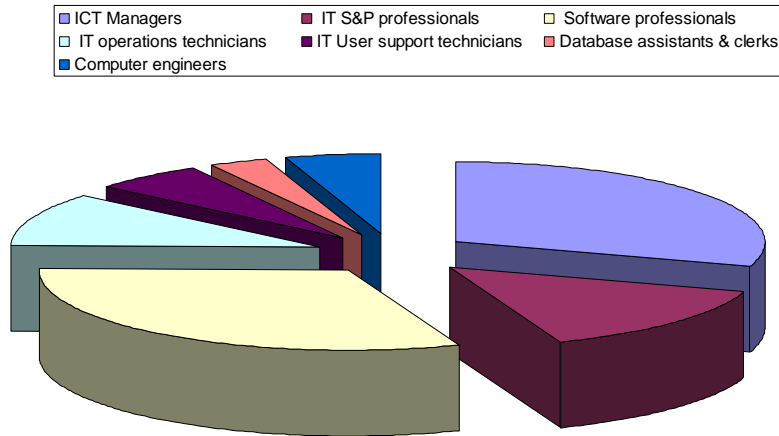
national qualifications is categorised quite differently and reflects the different education system of each country – as will be discussed in later sections. The seven categories used by the UK Office for National Statistics (and Eurostat) to cover all ICT occupations include jobs that are extremely specialized, technical and managerial, as well as some which would appear to contain very few technical skills. The participation of UK women in these different ICT occupations in the UK varies between 2% and 59% (see charts below). This in itself is an indicator that quite different work is being disguised by the ICT category label.

Overall the picture of the participation of women in ICT occupations in the UK between 2002 and 2008 (BCS, 2008) shows no move towards gender equity overall. The proportion of ICT jobs occupied by women fell from 24% to 19%. Seybert (2007) also found that the gap between the numbers of men and women in ICT jobs across Europe had increased between 2001 and 2006 rather than decreased. However the gender distribution for 2008 between different kinds of ICT occupations in the UK varied from almost no women computer engineers (2%) to women being the majority (59%) of database assistants and clerks. In other ICT occupations women were 24% of those in user support, 21% of operations technicians, 19% of ICT managers and 14% strategy, planning and software professionals. The fact that the women are a shrinking proportion of those in ICT occupations is not a good thing, but the fact that in the lower paid and less skilled jobs women are the majority suggests that these areas of ICT work are now feminised occupations. The claim that women are not entering ICT occupations is not empirically supported, - it is only more specialised technical occupations that they are not entering.

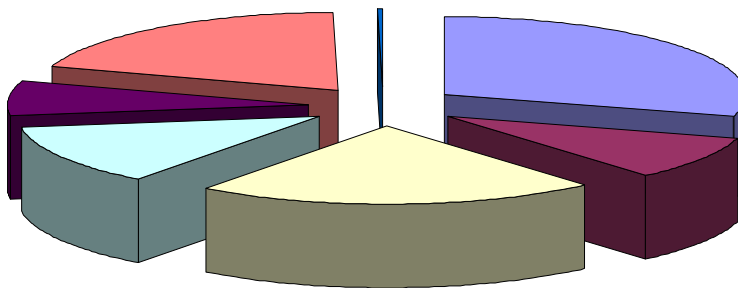
Another way to interrogate this employment data is to map the distribution of all UK men and women in ICT occupations across the different occupations. Figure 1 does this. The two comparable pie charts show that almost equal proportions of men and women in ICT occupations were managers (30.0% and 29.5%). Women were also relatively well represented proportionately as software professionals: 21.5% of women in ICT occupations were software professionals compared with 31.0% of men. The proportions of ICT women who were computer engineers were significantly less than men, as was the case for ICT strategy and planning professionals. And 19.5% of all women in ICT occupations were working as database assistants and clerks but only 3.0% of men. Finally, 5% of men working in ICT occupations were working as computer engineers, but less than 0.5% of ICT women were in this occupation.

Looking at the data in this way gives a different picture. The data show that, as well as smaller numbers of women entering ICT occupations overall, almost no women are computer engineers, and only a very small proportion of men in ICT occupations are computer engineers.

Figure 1: The gender distribution of men and women in ICT occupations, 2008. (Data from UK Office for national Statistics Labour Force Survey 2008)



Above: the distribution of men
Below: the distribution of women



Yet despite the very small proportions, computer engineering is probably the occupation people have in mind when they think about gender and ICT occupations. The distribution of women across all ICT occupations is not a straight forward case of being a minority gender. There are greater numbers of women working as ICT managers and software professionals than as database assistants and clerks. And these differences map onto notions of 'hard' and 'soft' skills in ICT with women being better represented in occupations needing high level soft skills, as well as those with low level hard skills.

Are 'Leaky Pipeline' and 'Critical Mass' Models Helpful?

Interrogating the data in detail, as above, raises a question about the continued usefulness of some of the metaphors that have been used to understand gendered occupations. One explanation for the low proportions of women in occupations labelled as ICT has as its main focus a critique of masculine 'Geek' culture. The solution often proposed relies on increasing the proportions of women in specific occupations/industries until a 'critical mass' of women is reached – after which culture change will occur automatically. The metaphor is that of a chain reaction in nuclear reactor where, once the mass of fissile material (in this case women) is large, a self-sustaining process is triggered (gendered culture change). The problem with critical mass theory is that there seems no agreement about how it operates to produce culture change, or how large a proportion is a 'critical mass'. The concept has come in for criticism by political and social theorists (Childs and Krook, 2006; Dahlerup, 2006), although it remains popular with activists. Kramer et al. (2006), for example, argue that three women on a corporate board of governance is a critical mass, but most activists have adopted 30% as trigger for critical mass. If 30% is the critical mass figure for women in ICT professions then it is close to being reached in user support and operation technician occupations, and there should be evidence of culture change in these occupations.

Another metaphor for the process by which women are unequally represented in ICT, and a model for intervention in ICT education and employment, is that of the 'leaky pipeline'. This metaphor is also now subject to critique. Soe and Yakura (2011) argue that the leaky pipeline metaphor fails because it presumes a normative linear progressive flow, with people moving from basic ICT skills to more advanced ones and from lower ICT jobs to more skilled and senior jobs. It does not provide a model where there is sideways movement into and out of occupations, or a model where people are in dead-end jobs. They cite Leventman's (2007) model of three types of career pathway in ICT work:

- The traditional: those who do follow a traditional linear and progressive route in employment.
- The transitional - those who had a qualification in a non-ICT field and with a non-ICT job experience, who transitioned to ICT occupations.
- The self directed – those who gained ICT in a less structured fashion.

When looking at the data about different ICT occupations it is easy to make the mistake of 'seeing' a leaky pipeline from lower to higher level jobs. Because a number of different occupations are grouped under the category ICT, it is tempting to think they are aspects of vertical segregation. However the different skills and experience needed for the different kinds of ICT occupation would make that kind of vertical movement impossible. What we are seeing is horizontal segregation.

Taking a critical perspective on the usefulness of 'critical mass' or 'leaky pipeline' theory does not imply denying the existence of structural issues in operation in the gendering of work or education and training. In fact this paper argues that ICT VET can be seen as a structural and structuring system in this process. However, detailed analysis of education and employment data suggests that we need something more refined than those two metaphors which have served us well in the past - but are now unable to explain the more complex operation of 21st century employment.

Does ICT VET contribute to social mobility or gender equity in ICT occupations?

In the past what distinguished general and technical VET from 'academic' education was its focus on preparation for specific employment – usually in non-professional jobs (i.e. not graduate-entry jobs such as doctors, lawyers, and engineers). VET has been described as being concerned with procedural knowledge: the skills necessary to carry out a task. These skills may be intellectual as well as manual, however, they are often contrasted with the theoretical and conceptual knowledge that has traditionally been seen as the domain of academic education, which is taught in universities, or in academic 'streams' in secondary education. The two types of education: academic and vocational, are never of equal status and VET is always the lower status partner. Corney and Fletcher (2007) describe this dichotomy as 'education for the best, skills for the rest' (p 5). Universities across the world have increasingly concerned themselves with 'employability' of their graduates (see Crossick 2010 for an example of the kind of report produced by UK university bodies), which has involved developing high level VET courses and incorporating VET skills onto academic degree courses. This paper does not engage with this level of VET, its focus is pre-degree VET delivered via schools and local colleges.

VET is also delivered through employer based schemes such as apprenticeships and work-based training, associated traditionally with skilled male trades (Fuller et al., 2005; TUC and YWCA, 2010). Europe still seems to be suffering from a legacy of an association between VET and working class masculinity (Cockburn, 1985). State schooling, in particular for working class children, has always had a VET function. In most countries vocational education is associated with skilled and craft occupations rather than the professions, but because of this it not a route to social mobility for many students. ICT jobs and ICT skills are recent developments and should perhaps have avoided the historical legacy of gendered apprenticeships and the low status attached to traditional skilled male occupations, but they do not appear to have succeeded in doing so.

The most recent development in VET ICT is the growth of third party commercial training providers (for example Cisco® and Microsoft). These organisations are very successful both in the number of students taking courses and in the value employers give to the qualifications they provide.

Large numbers of young people, unemployed people and women returners engage in VET in European countries. By 2005 25% of all 16 and 17 year olds in the UK were engaged in VET, 41% in France and 58% in Germany (Machin and Vignoles, 2006, p 10). However, consistent evidence shows that, in the UK at least, lower level VET qualifications (e.g. NVQ which will be discussed later) can have a negative impact on earnings. Older established qualifications and apprenticeships do have substantial labour market value, and a wage 'premium', but it appears that employers see lower level VET qualifications as an indication of low ability and sometimes prefer people with no qualifications (Hebbar, 2006; Machin and Vignoles, 2006). The most recent UK Government report (The Wolf Report, 2011) on VET concludes that:

Low-level vocational qualifications, notably NVQs, have, on average, absolutely no significant economic value to their holders unless they are gained as part of a completed apprenticeship. This is especially true if they were gained on a government-financed scheme. (p.150)

Spending a year or two taking [a qualification] on a government training scheme is likely to reduce someone's lifetime earnings, not raise them. (p.154)

Cedefop, the European Centre for the development of Vocational Training argues that VET 'is a key element for employment, social inclusion and the competitiveness of the EU'³, yet Bassanini (2004), in a report to the European Union, argued that:

There is still little empirical evidence that can support the policy-maker's emphasis on adult learning. The evidence on the impact of government funded training programmes for the unemployed is mixed (p 104).

These authors are most critical of the ICT offered to adults, which unfortunately includes many of the positive intervention schemes for adult women returners. In some cases the ICT VET offered to unemployed adults was not a match for the skills that employers were looking for. Warhurst et al. (2003) researched the impact of ICT training offered to adults in Glasgow and found that there was strong competition for lower level jobs and the supply of labour outstripped demand, in particular in those lower level jobs that women hoped to enter. The barriers to employment in ICT were higher than the training could overcome.

The low earnings of database assistants and clerks in the UK would seem to support the general finding that the pattern of low level VET has either no impact or a negative effect on earnings. In 2008 the gross weekly wage of women in these jobs was £290, the average wage for women in all ICT occupations in the UK was £570, and the highest earning women were ICT strategy and planning professionals who earned £760: two and half times the pay of database assistants (BCS, 2008)

Because VET is more directly related to the labour market of any country than other kinds of education, is important not to presume that patterns in any one country will reproduced elsewhere. Not only are there cultural issues about the suitability of certain kinds of people for certain kinds of jobs, the economic circumstances of any country will impact on the numbers in VET. For example while the numbers of apprenticeships available tends to drop during a recession, the numbers of people registering for courses of study - both academic and VET - tends to increase because young people in particular opt to stay in education rather than enter a competitive and shrinking labour market. Also, governments often provide additional training programmes for the unemployed during a recession. Whether or not governments continue to do so given the increasing evidence of their lack of success remains to be seen.

WHERE ARE THE WOMEN IN ICT VET?

To explore how far ICT VET is channelling women into low level dead-end ICT jobs, this section considers the representation of women in two different forms of VET (National/Scottish Vocational Qualifications and apprenticeships), and in different subject areas, in the UK. It also discusses the representation of women in VET offered by one of the major private sector providers, Cisco ®, since this is a highly-valued form of accreditation in the ICT industry. Finally in this part of the paper, I briefly review women's participation in VET in two other major industrialised countries – Japan and Germany – in order to explore whether the gendering of VET occurs outside the UK.

Women in ICT VET in the UK

In the UK the main qualification at secondary school is the General Certificate in Secondary Education (GCSE). There are also sub-degree vocational awards given by different vocational award organisations such as the City and Guilds⁴ and Edexcel for both academic and vocational qualifications. Only a small number of these are available to the 14-16 years olds, most are available for age 16+ through school or a local college. Among the variety of vocational qualifications on offer, this section looks at two: National Vocational Qualifications (and Scottish Vocational Qualifications) NVQ/SVQ and Apprenticeships.

In UK secondary school education there is now little gendering of subject choice in national academic examinations at age 16. In 2009 girls were 45% of those entering for a General Certificate in Education (GCSE) exam in ICT⁵. In Advanced (A) level Certificates in Education they were 39% of entrants for ICT and just less than 10% of entrants for Computing (Kirkup et al., 2010). In comparison women were the majority of those obtaining ICT NVQ/SVQs (52.5% see Figure 2)

National/Scottish Vocational Qualification NVQ/SVQs

NVQs and SVQs are national awards (for England and Wales and Scotland) achieved through a combination of assessment and training involving college based study and work experience. They can be studied by students based in a college who have work placements as well as people working full- or part-time, and they are incorporated into apprenticeship schemes,

The statistics below (UKRC, 2010) group the many SET (science, engineering and technology) subjects areas into three NVQ/SVQ groups:

1. Engineering and manufacturing technologies
2. Construction, planning and the built environment
3. Information and communication technologies (ICT)

Three non-SET subject sector areas that had a very high representation of women are used these in charts as a comparison. These three subject groups were:

4. Health, public services and care
5. Retail and commercial enterprise
6. Business, administration and law

Showing SET and non-SET subject areas in this way enables a comparison of ICT VET with other SET fields as well as with other, popular, non-SET areas. In 2007/08, roughly 773,200 NVQ/SVQ awards were given in the UK. More than half were given to women (52.8 %). Figure 2 shows that between 2004/5 and 2007/8 there had been a large increase in the overall numbers of young women getting NVQ/SVQ qualifications in ICT, and in the proportion of awards that were achieved by women – from 32.9% to 52.5% of all awards. These proportions are much larger than the other two SET areas on the chart, but are dwarfed by both the numbers and proportions of women taking NVQ/SVQs in the health, retail, and business subject groups. At this level the percentage of women obtaining ICT qualifications looks proportionately more like the percentages in non-SET subject areas. If we take critical mass theory at face value then women have reached critical mass in this field of study and at this level, culture change should have occurred and at this level ICT VET is gender balanced.

However there is a concern at a national level with the quality and level of these awards. The Ofsted report (2010) quoted earlier says:

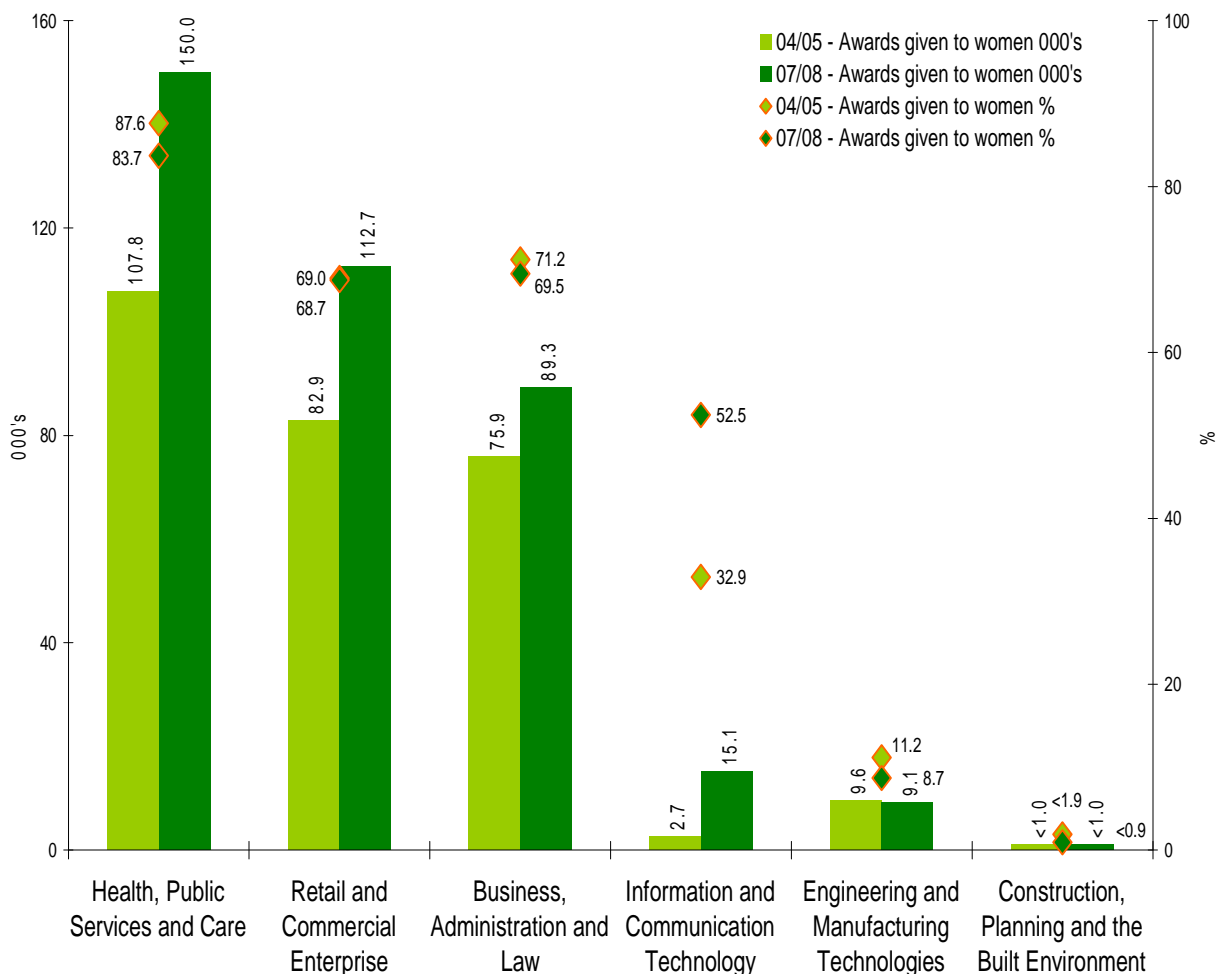
Over the past decade, schools have moved away from GCSE ICT, which is perceived to be more difficult, to take on vocational courses. Increasingly, the schools have turned to qualifications that are seen to be less demanding. A proper evaluation of the challenge

posed by vocational qualifications is necessary if they are to retain credibility with students, parents and employers. (p.32)

And of more concern for women’s education in ICT:

Vocational qualifications have been successful in attracting girls to choose an ICT course at Key Stage 4. The heavy emphasis on tasks based on using ICT for communicating and presenting, aspects which are assessed entirely through coursework, has been an important factor in recruiting them. Perversely, this very emphasis is potentially limiting the achievement of higher-attaining students and has not reversed the decline in the number of girls choosing to pursue ICT in the sixth form. (p.32)

Figure 2: NVQ/SVQ awards achieved by women in three non-SET and three SET subject areas in the UK, 2007/ 08



Secondary analysis by UK Resource Centre

Data source:

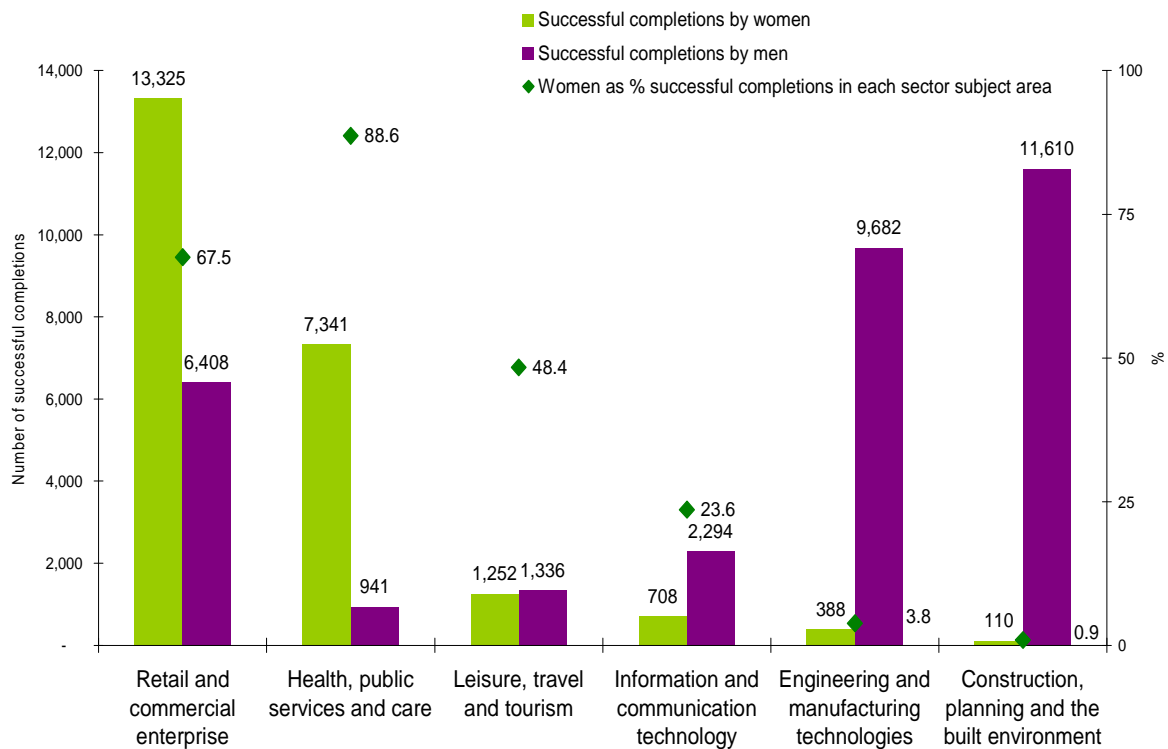
2007/08 - The Data Service (2009) Vocational Qualifications in the UK 2007/08 Supplementary Release. Available from: <http://www.thedataservice.org.uk/statistics/sfrjun09>. Accessed 14 October 2009.

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Apprenticeships

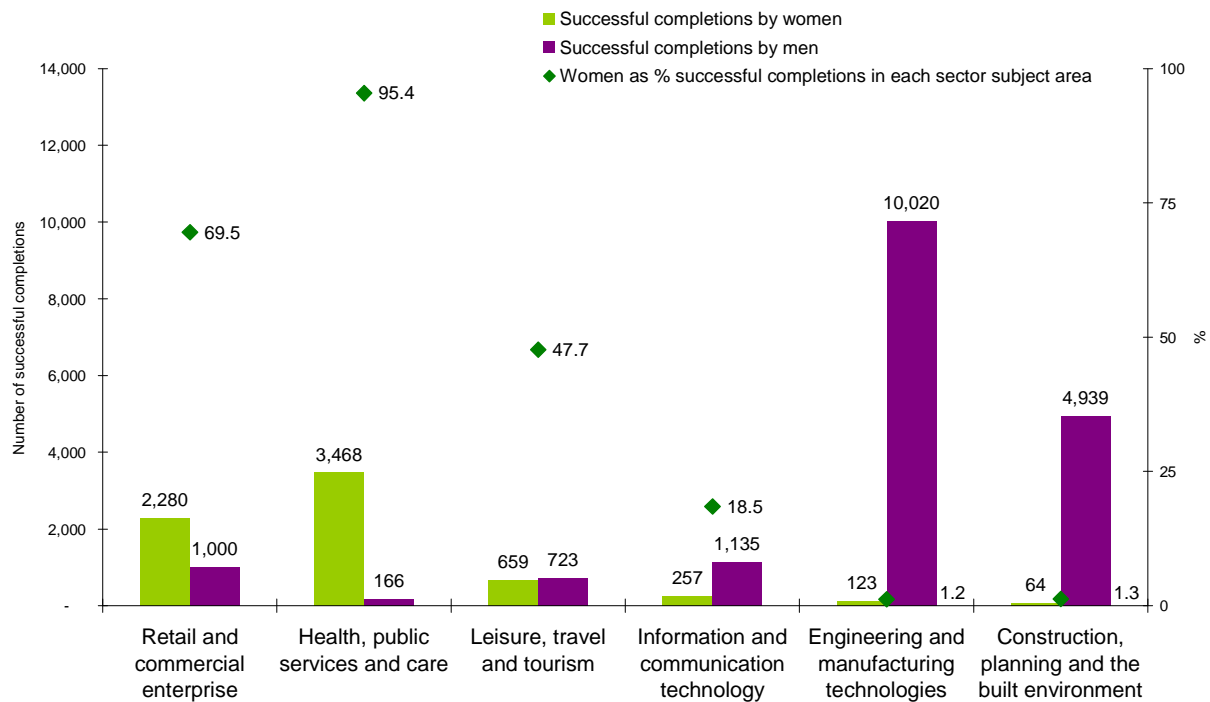
The main difference between NVQ/SVQs and UK apprenticeships is that employers recruit apprentices to specific work-based programmes; they are employees and receive wages as they learn. This is unlike NVQ/SVQs which many students take voluntarily with or without support from their employer – often in evening classes, or in other cases are taken by college based students with a small amount of work experience. Similar subject groupings were selected to analyse apprenticeship data (Figures 3 and 4) as were used for NVQ/SVQ data (Figure 2). Again ICT apprenticeships are a more popular area of study than the other two SET areas, both in the numbers of women successfully completing them and in the percentage of successful completers who were women. The proportion here has not yet achieved the 30% critical mass figure.

Figure 3: Numbers of successful completions of apprenticeships by women and men, and women as a percentage of all successful completions, for three SET and non-SET subject areas, England, 2006/07



Secondary analysis by UK Resource Centre
 Data source
 LSC (2008) Further Education, work-based learning and Train to Gain –LSC-funded learner outcomes in England 2006/07. Available from:
<http://www.lsc.gov.uk/providers/Data/statistics/sfr/>. Accessed 27 November 2009.

Figure 4: Numbers of successful completions of advanced apprenticeships by women and men, and women as a percentage of all successful completions, for three SET and non-SET subject areas, England, 2006/07



Secondary analysis by UK Resource Centre

Data source

LSC (2008) Further Education, work-based learning and Train to Gain –LSC-funded learner outcomes in England 2006/07. Available from: <http://www.lsc.gov.uk/providers/Data/statistics/sfr/>. Accessed 27 November 2009.

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There are two levels of apprenticeship – the higher level is called ‘advanced’ apprenticeship. Figures 3 and 4 above show that women were 23.6% of those successfully completing a basic apprenticeship in ICT, but only 18.5 of those successfully completing an advanced apprenticeship in ICT. Some of this drop out can be explained by women’s relative lack of success at the first level. This appears to be one example of a straight forward leaky educational pipeline. 74% of men successfully completed a first level apprenticeship, but only 64.4 % of women. At the second level the success rates of men and women were the same 51.6% and 51.4%. However, there is no evidence that there is a ladder/pipeline from NVQ to apprenticeship, these two routes seem to be alternatives but not parallel in esteem.

Cisco® training courses.

Gender differences in VET participation are also apparent in industry-based training. In the first section of this paper Cisco® was introduced as a major global provider for ICT VET. Cisco® students are usually in employment and Cisco® accreditation is highly valued by employers as a reliable measure of specific ICT skill. It has been impossible to source gender data for Cisco® qualifications worldwide. However,

many institutions partner with Cisco® to offer accredited training. In the UK the Open University is one of these, offering some Cisco® courses as part of its part-time undergraduate and post-graduate programmes⁶. Data from the Open University give an indication of the gender distribution of students who might be taking these courses elsewhere in the world.

Table 1 shows student data from four Cisco® accredited courses. Cisco® as a company explicitly recognises the need for positive action to address the under-representation of women and has a number of initiatives such as the Women’s Empowerment Programme:

Throughout the world, the Cisco® Networking Academy® program aims to increase the participation of women in the ICT industry through inclusive programs and initiatives. This goal is supported by the Women’s Empowerment Program (WEP), which helps women overcome challenging economic or social circumstances.⁷

Table 1: Students entering and completing a Cisco® qualification on an Open University UK course. 2009/10

	F = % OF ENTRANTS	F % OBTAINING CREDIT	TOTAL ENTRANTS
Cisco® networking (CCNA)	5.5	6.6	524
Advanced routing - CCNP 1	4.7	6.0	85
Wide area networks - CCNP 2	4.4	5.2	69
Multilayer switching - CCNP 3	4.4	In presentation	46

It has funded research into why girls in schools are not attracted to ICT (Gras-Velazquez et al., 2009). However, extrapolating from the OUUK data we could guess that women are a very small proportion of all Cisco® trainees, and the aim Cisco® has to increase the participation on women on its courses is far from being achieved yet. It is worth noting that women are more likely than men to succeed in the OUUK Cisco® courses. In each course in Table 1 women were a larger proportion of course graduates than of entrants, this is an interesting contrast with UK apprenticeship data where women were much less likely to complete basic apprenticeships than men.

How well qualified is the UK labour force in ICT occupations?

On the face of it, VET would seem to be a promising entry route to ICT professions, and women’s relatively strong representation in ICT VET could therefore be positive. In the UK, a large proportion of people working in high level ICT occupations in the UK do not have graduate qualifications of any kind (Table 2) -

roughly 35% of ICT managers and professionals, whereas nearly half of ICT operations technicians do have high level qualifications. In general men and women in each occupation are equally well qualified at graduate level except for software professionals where there is a significant difference between the qualifications of men and women: 28% of male software professionals have no higher level qualifications, compared with 41% of female software professions. Colding (2006), studying ICT workers in Denmark, argues that women prefer the academic rather than the VET route into ICT. However, the UK data do not appear to support this. It appears that in the UK at least significant numbers of the ICT workforce have no high level qualifications, yet as Machin and Vignoles (2006) and Wolf (2011) argue, employers do not value lower level VET level qualifications. Are employers perhaps valuing and rewarding experience above qualification?

Table 2: ICT occupations by qualifications held 2008⁸

Occupation	Gender	% with first degree or equivalent
1136 ICT Managers	Male	65%
	Female	63%
2131 ICT professionals	Male	65%
	Female	67%
2132 Software professionals	Male	72%
	Female	59%
3131 ICT operations technicians	Male	47%
	Female	46%
3132 ICT User support technicians	Male	41%
	Female	39%
4136 Database assistants & clerks	Male	18%
	Female	21%
5245 Computer engineers	Male	40%
	Female	Sample size not large enough to provide robust analysis

Source: ONS LFS Q2.08

The arguments made in this section are based on an analysis of UK data, and research papers which describe a variety of different national contexts. Although education data are particularly hard to use comparatively, because national systems differ significantly, in the following section data is taken from two other countries to give an indication of whether similar issues might be occurring elsewhere.

WOMEN IN ICT VET IN OTHER COUNTRIES

Germany and Japan are two highly industrialized economies with large ICT workforces, but different cultural histories. They both have well developed, but different, vocational education systems. Both have gender inequalities in these systems, and it is worth briefly reviewing women's and men's participation VET in these two countries in order to begin to explore the question of how far VET is gender segregated in different societies.

Germany

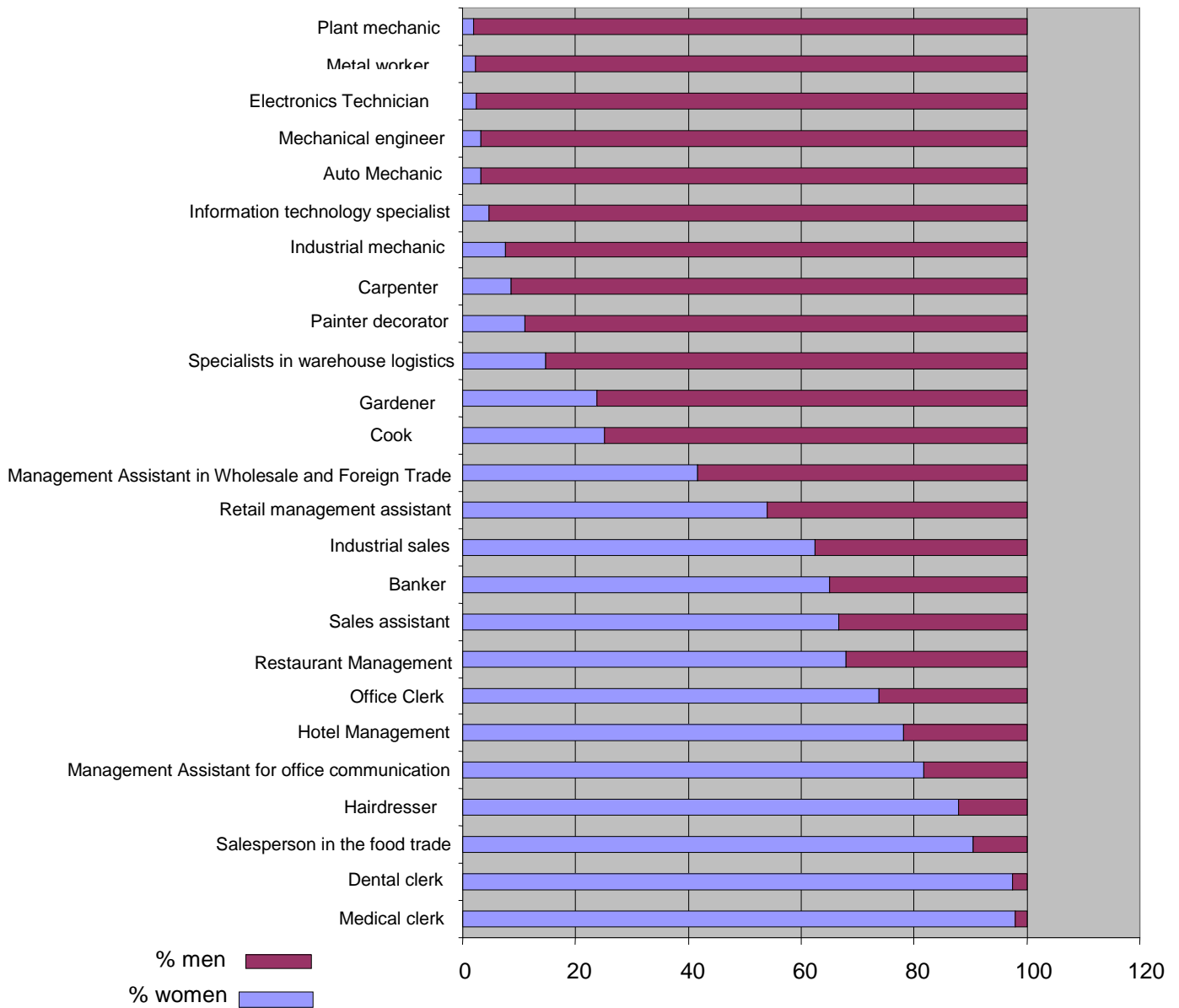
In Germany apprenticeships are the most popular routes for employment for non-graduates. In 2001 approximately 51% of all young people under 22 had completed an apprenticeship. One in three companies offered apprenticeships in 2003; in 2004 all employers except the very small ones agreed to offer apprenticeships.

Figure 5 below shows the participation of women and men in the complete range of apprenticeships available in Germany in 2010. The percentage of female trainee electronic technicians and information technology specialists is tiny: 2.5% and 4.7% respectively. This is much smaller than anything in the UK data. In Germany fewer women are training for these jobs than are training for more traditional SET jobs such as a carpenter or an industrial mechanic: 8.6% and 7.7% respectively.

Management Assistant for Office Communication' –has no direct UK equivalent, but probably corresponds to 'database assistants and clerks'. It is a new category in Germany and reflects the fact that people need training in various technical communications systems to manage information in an organisation. This raises two questions: by focusing on those jobs that make 'hard' ICT technical skills visible are we missing the ICT skills that are now embedded in, if not a key component of, other non-ICT occupations? Should we be looking for the presence of ICT skills in 'feminised' occupations, rather than only looking for the presence of women in 'traditional' ICT occupations? A continued focus on 'ICT occupations' does not allow us to analyse the role of specific ICT skills in gendering areas of employment. It may be that the possession of some ICT skills is now culturally an attribute of femininity and a negative attribute for those wanting access to highly paid technical occupations.

This German data suggests a more highly gender segregated body of students training for non-graduate entry ICT jobs than in the UK (see Figure 3)

Figure 5: Gender of trainees on VET programmes in Germany (2010) ⁹



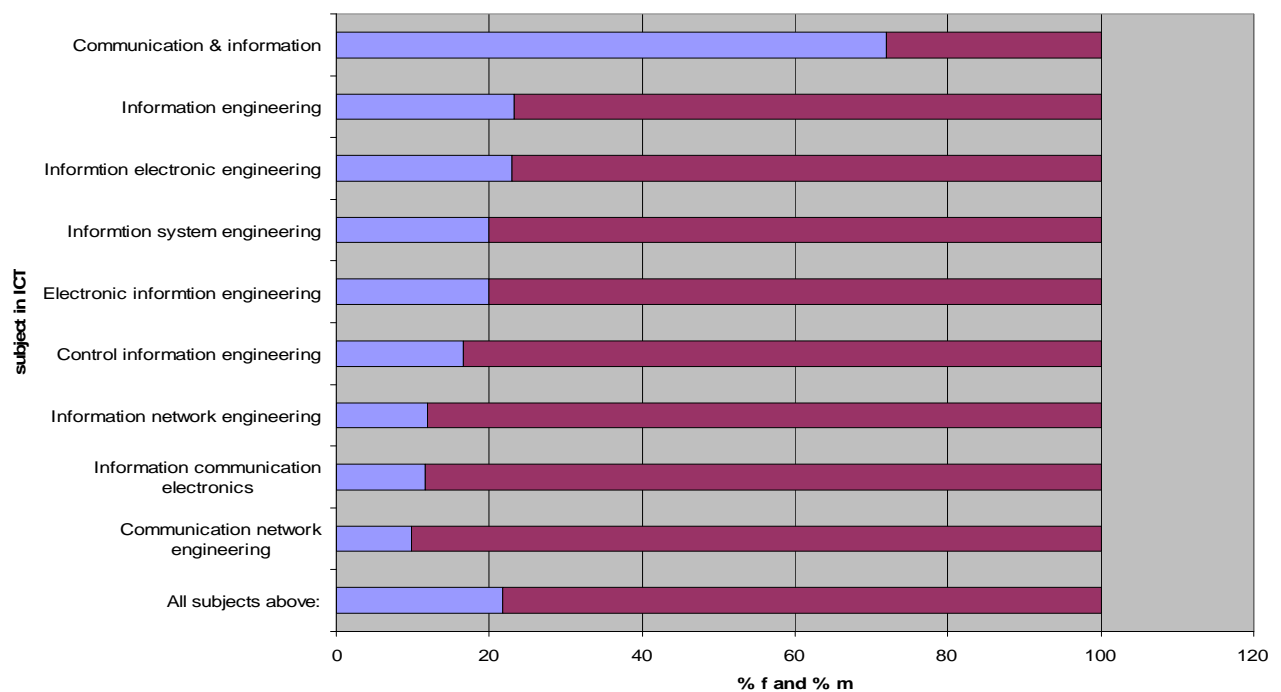
Japan

Unlike Germany Japan relies on specialised colleges for vocational education - Senmon Gakko: Colleges of Technology - for most of its ICT VET. They have historically been responsible for the training of skilled technicians, contributing to Japan’s industrialization in the twentieth century. A number of these colleges are highly specialised in specific subjects. They provide programs and curriculum for specific professional membership, certification, and vocational training. Colleges of technology have very low female enrolments (18 percent); and the number of women enrolling has been decreasing.

Figure 6 is taken from the most recent Japanese statistics on trainees in Senmon Gakko colleges and shows all those specialisms that constitute ICT VET. The proportions of women look more like those in the UK data than in the German data. Women are over 20% of trainees in information, electronic, and system engineering. They are a much smaller proportion of network engineers. They are the large majority (72%) of communication and information students; a subject that is classified as VET in this system.

This snapshot- an opportunity sample- of data on ICT VET from Germany and Japan suggests gender patterns for VET similar to that of the UK: extremely low numbers and very small proportions of women participating in 'hard' skills ICT VET and much larger numbers, and the majority gender on 'soft' ICT VET courses. Although a controlled data comparison would be necessary to do more than suggest similarities, it is not unreasonable from this data to suggest that gender patterns are being reproduced across the world in this newest area of education.

Figure 6: Gender of trainees on VET programmes in Japan (2010)¹⁰



HOW FAR IS ICT VET OFFERING WOMEN OPPORTUNITIES OR PERPETUATING GENDER AND SOCIAL CLASS INEQUITY IN ICT OCCUPATIONS?

This paper has argued that VET is a problematic area of education for feminist and other equity interventions. The increase in the participation of girls and women in SET education in academic fields in school and in higher education has been paralleled in 'soft' ICT VET courses, but not in the most respected traditional VET systems such as apprenticeships. It is within these more technical areas and

traditional qualifications that VET creates a wage and career premium. In the data presented in this paper women, however, are more likely to engage in ICT VET that is likely to lead to lower level, feminised, and 'dead-end' occupations with little wage premium for their qualification, and in the worst cases may even have received a penalty from it.

Traditionally VET has prepared people for skilled working-class jobs, for example hairdressers and childcare workers for young women, and technicians and skilled SET craftsmen (what in, the UK, is sometimes jokingly referred to as 'white van man') for young men. These are careers in which women and men recruit family members and friends; often to small family run businesses. Rodgers and Boyer (2006) refer to this preference for employing family members for SET jobs as the 'lads of Dads' syndrome, and it extends to large employers who also like recruiting from within families of employees. This worked very strongly in the apprenticeship system. However, since ICT jobs are new kinds of jobs, with new kinds of skills, in most places 'Dads' would not have done the jobs that 'lads' are now training for. The 'lads of Dads' system seems to be operating symbolically at the level of gender and social class rather than literally at the level of family relationship. Low level ICT jobs are likely to be in large organisations in both the public and private sectors, and it appears that 'girls of Mums' (who were pre-ICT secretarial and clerical workers) are now being recruited in a similar way, but to low level ICT jobs in data, administration, and communication occupations. Structural issues are usually identified as channelling women into these jobs, but more recently Hakim (2006) has proposed a different occupational 'choice' theory.

Hakim's position on women and work is controversial. She argues that structural issues such as social class are no longer strong determining factors of occupational choice, instead lifestyle and ideological choices made by individuals produce three types of orientation to employment among women in rich economies:

- Home-centred women who don't want/need to work and who engage in education as cultural capital
- Work-centred women who are committed to a career and make a large investment in their education/training and are ambitious and well qualified
- Adaptive women – who are the majority – who want to work as long as their family activities don't suffer too much, but are not interested in a career - who focus on vocational qualifications.

Some of these look similar to Leventman's career pathways discussed earlier: 'traditional' career path = 'work-centred', 'transitional' career path = adaptive. These orientations to employment, argues Hakim, determine what kinds of jobs and career structures women choose, and other interventions will have only limited success in changing women's behaviour. Hakim's work has received criticism from other researchers. James (2008) interviewed a variety of women in a range of jobs in the UK and found that socio-economic class made a difference to women's orientation to employment, and also that orientation shifted over time, rather than remaining constant. Kvasny et al. (2009) found gender, race, and class all contributing significantly to a choice of ICT education and career.

Research on VET indicates that the choices people make about post school education and occupation reflect their social class background, which will include daughters adopting the values of their mothers. Miliranta et al. (2008) tracked Finnish students after a period of basic VET education, and found a strong relationship between the education of parents and the training and employment decisions of students. Children with parents with low educational achievement were more likely not to choose further training and to be less successful in their search for employment. There was a stronger relationship between social class, experience of schooling and later choices among girls than boys. Boys were most influenced by local conditions and the opportunities they provided. A similar study in the Netherlands (Tieben and Wolbers, 2010) found similar relationships. They also found that working class children opted for less risky, lower level educational routes; lower than their qualifications would give them access to. Whether this is explained as structural barriers or individual orientation, the end result is a system where young women are entering new fields of skill and employment, but reproducing gender and social class parental attitudes towards them.

To conclude: using the umbrella term 'ICT' to describe a range of occupations disguises the fact that the phrase 'ICT' now covers quite different sets of occupational skills. 'Hard' skills, such as those that deal with electronics have continued their association with 'masculine' occupations, and often have the word 'engineer' attached to them. This is clearly seen in the data from Germany and Japan. 'Soft' ICT skills such as expert user skills are being defined as an attribute of being female and are being incorporated into traditionally female occupations with a changed title: but their gender composition, status, and earnings level shows that they have been feminised. There are also contradictory analyses regarding how much these skills are in demand from employers. Researchers like Santiago et al. (2008) and Tessaring and Wannan (2004) argue that basic ICT VET is key to skilling workers for a knowledge economy, but researchers like Warhurst et al. (2003), Bassanini (2004) and Wolf (2011) question the value of low level ICT VET, and present evidence that employers do not value it and that it contributes little or nothing to an employee's salary or career prospects.

ENDNOTES

¹ I debated whether to use the category ICT or just IT (information technology).IT seems to be the term favoured in recent literature, however, because I want this paper wants to bring attention to the 'soft skills' that are used in lower level ICT jobs- done in large part by women- I have used ICT throughout the paper.

² See Eurostat website for most recent data analysis:

<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

³ <http://www.cedefop.europa.eu/EN/about-cedefop/mission.aspx> accessed 20.05.2011

⁴ City and Guilds is an old organization, established in 1978 to provide a national system for vocational training. See <http://www.cityandguilds.com/uk-home.html>

⁵ The figures in this sub-section come primarily from the UK Resources Centre 2010 Guide to Statistics (Kirkup et al., 2010), which re-analysed UK government statistics.

⁶ This is an example of VET being incorporated into academic learning and qualifications.

⁷ From: 'Women's Empowerment Program Boosts Career Prospects' a case study at

http://www.cisco.com/web/learning/netacad/success_stories/digitalDivide/docs/WEP.pdf Accessed 1.11.2010

⁸ This table was sent in a private communication by Mark Underwood in response to a query about data contained in The IT Scorecard 2008.

⁹ This table is a translation of Figure 23, from Sehrbrock (2010) Ausbildungsreport 2010

¹⁰ Data source: NSATAC (2010) *Koutou Senmon Gakko*. Available from:

http://www.e-stat.go.jp/SG1/estat/GL08020103.do?_toGL08020103_&tclassID=000001027488&cycleCode=0&requestSender=dsearch . Accessed on 1 November 2010

REFERENCES

American Association Of University Women (AAUW) (2000) Tech-savvy: Education Girls in the new computer age. Washington DC, AAUW.

Bassanini, A. (2004) *Improving skills for more and better jobs? The quest for efficient policies to promote adult education and training. European Economy. Special Report Number 3. Quality and efficiency in education.* Office des publications officielles des Communautés européennes.

BCS, UK, E.-S., INTELLECT & BERR (2008) *Women in IT Scorecard*. London, Dept for Business Enterprise and Regulatory Reform.

Bihagen, E. & Ohls, M. (2007) Are women over-represented in dead-end jobs? A Swedish study using empirically derived measures of dead-end jobs. *Social Indicators Research*, 84, 159-177.

Castells, M. (2000) *The rise of the network society*, Oxford, Blackwell.

Childs, S. & Krook, M. L. (2006) Should Feminists Give Up on Critical Mass? A Contingent Yes. *Politics & Gender*, 2, 522- 530.

Cockburn, C. (1985) *Machinery of dominance : women men and technical know how*, London, Pluto Press.

Colding, B. (2006) Ethnicity, gender and vocational education in Denmark. *International Journal of Manpower*, 27, 342-357.

Corney, M. & Fletcher, M. (2007) *Adult skills and higher education: separation or union*. Reading UK, CfBT Education Trust.

Crossick, G. (2010) *The future is more than just tomorrow: Higher education, the economy and the longer term. Recession to Recovery.* . London, Universities UK.

Dahlerup, D. (2006) The Story of the Theory of Critical Mass. *Politics & Gender*, 2, 511- 522.

Deakin, R. (1984) *Women and computing: the golden opportunity*, London, Macmillan.

Fuller, A., Beck, V. & Unwin, L. (2005) The gendered nature of apprenticeship: Employers' and young people's perspectives. *Education + Training*, 47, 298-311.

Gras-Velazquez, A., Joyce, A., Gras-Velazquez, M. D. & Debry, A. J. M. (2009) *White paper. Women and ICT. Why are girls still not attracted to ICT studies and careers?* Brussels. European Schoolnet with CISCO

Hakim, C. (2006) Women, careers, and work-life preferences. *British Journal of Guidance & Counselling*, 34, 279-294.

Hebbar, L. (2006) Vocational training for the unemployed: its impact on uncommonly served groups. *International Journal of Manpower*, 27, 377-395.

James, L. (2008) United by Gender or Divided by Class? Women's Work Orientations and Labour Market Behaviour. *Gender, Work & Organization*, 15, 394-412.

Kirkup, G., Zalevski, A., Maruyama, T. & Batool, I. (2010) *Women and men in science, engineering and technology: the UK statistics guide 2010*, Bradford UK Resources Centre for Women in Science Engineering and Technology.

Kramer, V. W., Konrad, A. M. & Erkut, S. (2006) *Critical Mass on Corporate Boards: Why Three or More Women Enhance Governance*. Wellesley, Mass, Wellesley Centers for Women's Publications Office

Kvasny, L., Trauth, E. M. & Morgan, A. J. (2008) Power relations in IT education and work: the intersectionality of gender, race, and class. *Journal of Information, Communication and Ethics in Society*, 7, 96-118.

Leventman, P. (2007) Multiple Pathways Toward Gender Equity in the United States Information Technology Workforce. in Burger, C. J., Creamer, E. G. & Meszaros, P. S. (Eds.) *Reconfiguring the Firewall: Recruiting women to information technology across cultures and continents*. Wellesley, Mass, AK Peters Ltd.

Machin, S. & Vignoles, A. (2006) *Education Policy in the UK*. London, London School of Economics.

Maliranta, M., Nurmi, S. & Virtanen, H. (2008) *It takes three to tango in employment: Matching vocational education organisations, students and companies*

in labour market. Working paper No. 22., Universität Zürich, Universität Bern, The Swiss Leading House on Economics of Education.

Margolis, J. & Fisher, A. (2002) *Unlocking the Clubhouse. Women in Computing*, Cambridge Mass, MIT Press.

Miller, L., Pollard, E., Neathey, F., Hill, D. & Ritchie, H. (2005) Gender Segregation in Apprenticeships. Working Paper 25. London, Equal Opportunities Commission.

OFSTED (2009) *The importance of ICT. Information and communication technology in primary and secondary schools, 2005/2008*. London, Ofsted.

Rodgers, Y. V. D. M. & Boyer, T. (2006) Gender and racial differences in vocational education: an international perspective. *International Journal of Manpower*, 27, 308-320.

Santiago, P., Tremblay, K., Basri, E. & Arnal, E. (2008) *Tertiary Education for the Knowledge Society. OECD Thematic Review of Tertiary Education: Synthesis Report*. Paris, OECD.

Sehrbrock, I. (2010) *Ausbildungsreport 2010*. Berlin, DGB - Confederation of German Trade Union.

Seybert, H. (2007) *Statistics in focus: Population and Social Conditions: 119/2007. Gender differences in the use of computers and the Internet*. Brussels, Eurostat.

Soe, L. & Yakura, E. K. (2008) What's Wrong with the Pipeline? Assumptions about Gender and Culture in IT Work. *Women's Studies: An inter-disciplinary journal*, 37, 176 - 201.

Tessaring, M. & Wannan, J. (2004) Vocational Education and Training -key to the future. Lisbon Copenhagen Maastricht Mobilising for 2010. Luxembourg, Office for Official Communications of the European Union.

Tieben, N. & Wolbers, M. H. J. (2010) Transitions to post-secondary and tertiary education in the Netherlands: a trend analysis of unconditional and conditional socio-economic background effects. *Higher Education*, 60, 85-100.

TUC & YWCA (2010) *Apprenticeships and gender*. TUC, YWCA.

Warhurst, C., Lockyer, C. & Dutton, E. (2006) IT jobs: opportunities for all? *New Technology, Work & Employment*, 21, 75-88.

Webster, J. (1996) *Shaping Women's Work. Gender Employment and Information Technology*, London, Longman.

Wolf, A. (2011) A Review of Vocational Education. The Wolf Report. IN EDUCATION, D. F. (Ed.). London, Department for Education.