Vocational education and training (VET) for ICT employment: preparing women for work

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Introduction.

This paper attempts to articulate the issues that contribute to women's participation or lack of it in ICT technical and vocational education and training (VET[2]). This is the training and education that prepares women for employment in IT jobs, or helps re-skill or up-skill them once they are employed. The paper has three sections. In the first I try to map out what is encompassed by the category (technical and) vocational education and training (VET), to give some idea of the context and institutions in which the specific activity of ICT VET takes place. The second section reviews data about women's participation in ICT VET from four countries and one large commercial training provider in order to explore whether different educational systems and contexts produce differences in women's participation in ICT VET. The third and final section of the paper explores the possible factors which contribute to differences in women's participation. I also raise questions about whether we are using the right categories to understand the nature of women's engagement in ICTs, or whether it would be useful to reconceptualise the nature of ICT work and skills.

1. What is technical and vocational education and training?

Informal vocational education is part of human culture. At its simplest it is a girl learning to look after her siblings, to cook and make clothing through watching and copying her

[1] Acknowledgements. I would like to thank a number of people for their help in accessing and in some cases translating data: The research team at the UKRC for UK data: Anna Zalevski, Takao Maruyama and Isam Batool. Clem Herman for Open University data. Christine von Prummer for German data, and Takao Maruyama for Japanese data. Any errors that might have crept into the data since they suggested it to me, are absolutely my responsibility.

[2] Both TVET (technical and vocational education and training) and VET (vocational education and training) are used interchangeable in the literature, depending often on a preference in a particular country. The UK usage is more commonly simply VET and this has been adopted for this paper.

mother and elder female relatives. It is a boy learning to tend crops and animals and make weapons through watching and copying his father and elder male relatives. These skills are part of what it is to be a man or a woman. In learning them you learn to perform your gender in societies that have strong gender divisions of labour. They create your gender identity. For many children even in 2010 this is still a good description of their vocational education and training (VET). But for the industrialised and developed regions of the world VET prepares people for specialised paid employment and is carried out by specialized bodies: educational organisations, both private and public in conjunction with employers and professional and skilled trades organisations. It is formalised and accredited. This is especially the case for a new set of skills: learning to design and use information and communication technologies (ICT).

In the past what distinguished general and technical VET from 'academic' education was its focus on preparation for specific work – usually in non-professional jobs (ie 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. But these may be intellectual as well as manual. They are often contrasted with theoretical and conceptual knowledge which has traditionally been seen as the domain of academic education, which is taught in universities, or in academic streams in secondary education. These two types of education are never of equal status and VET is always the lower status partner. Corney (2007) describes this model as 'education for the best skills for the rest' (2007 p 5). He goes on to note that in the UK ' full-time HE student funding accounts for 75% of total adult skills and HE student funding' (Corney 2007 p 7). Jacob and Weiss (2010) classify the different ways in which vocational and academic education relate to each other in different countries. Some educational systems are sequential: students progress from a lower level institution to higher level as in the US system where students move from local (vocationally oriented) colleges to state universities to a research universities. Stopping and re-entering whenever they wish and their qualifications allow. In other educational systems the streams of vocational and academic education are parallel but separate, and an example of this is Germany with its system of universities and Fachhocschule. The curricula of institutions also differ depending on

how much centralised state control is exercised and how much institutions respond to market demand. Dehmel (2005) uses a classification by Green (2000) for three different European models of VET:
The market-led model (e.g. the UK) provision is regulated by supply and demand and the individual is responsible for her own learning.
The state-led model (e.g. France) where the state is the organiser and source of funding for VET
The social-partner-led model (e.g. Germany) – a combination of individual learner responsibility and multiple stakeholders, with strong state regulation.

Germany is an example of the first and the US an example of the second. The UK appears to have moved, in the last 30 years, from a post secondary school VET system which looked more like Germany to one that looks more like the USA. Do women do better in one type of system rather than another?

VET is delivered within a general secondary education system, as a strand within a high school for example, and this is the area of VET that is of most concern to development organisations such as UNESCO[3]. It is also taught in dedicated institutions- for example Fachhocschule, Institutes of Technology, Technology Academies. Some of these institutions are state funded and quality assured, some are commercial organisations. Vocational training is also delivered through employer based schemes such as apprenticeships and work-based training. In Europe the development of capitalism, skills specialisation and industrialisation produced the first the Guild systems followed by professional and skilled trades associations; all of which controlled access to training and accreditation and excluded women until challenged in the late nineteenth century. In Europe we still seem to be suffering from a legacy of an association between VET level technical skills and working class masculinity (Cockburn, 1985).State schooling, in particular for working class children has always had a VET function, to train children to have the skills considered appropriate to gendered citizens and workers. In most countries vocational education is associated with skilled and craft work rather than professional

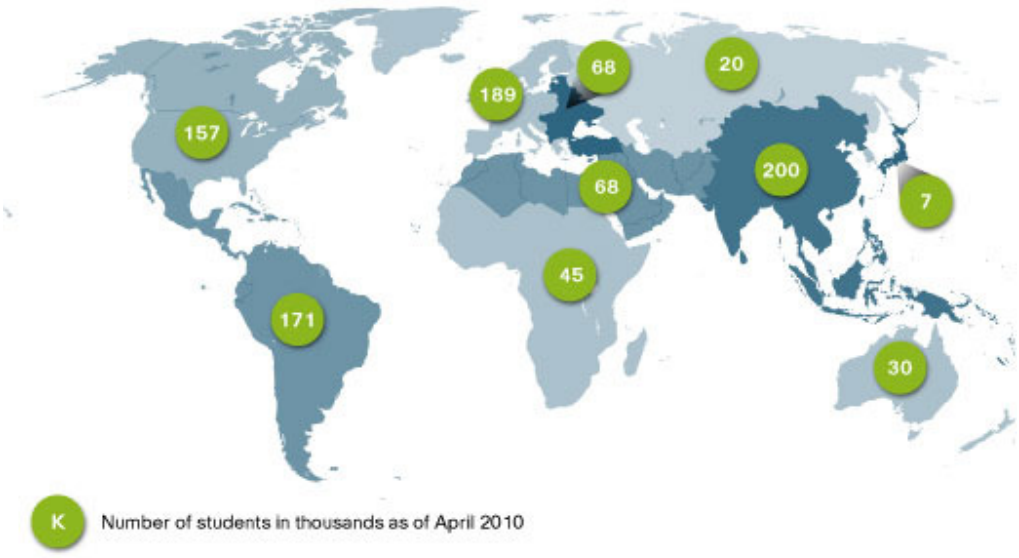
[3] See Unesco website http://www.unesco.org/en/tvet/ accessed 29.10.2010

work, this gives it a stigma as training for membership of the lower social classes. How attractive the job of a skilled crafts person or technician is to a young person depends as much on the status given to that job as it does the work involved in doing it.

ICT jobs, and ICT skills are recent developments and should have avoided the historical legacy of gendered apprenticeships and the low status attached to traditional skilled male occupations. The statistics in the next section will allow us to explore whether this is the case.

A more recent develop of VET especially for ICT is the growth of third party commercial training providers (for example Cisco® and Microsoft). These organisations partner with employers and with non-commercial educational organisations to deliver both training and assessment to employees at all stages of their careers - not simply on entry. The map below –taken from the Cisco® website shows the numbers of students on Cisco® training in April 2010: more than 900, 000 students world wide (Cisco® .com.uk, accessed 20.10.2010).

Figure 1 Cisco® students April 2010



In the industrialised world VET is now also part of university provision. Many areas of employment have become graduate professions quite recently (for example nursing and accountancy) with degree level entry requirements. Most universities have aligned their curricula and assessment with the requirements of professional bodies so that graduates achieve a level professional membership on graduation. Those of us working in universities may still value a conceptual separation between generic academic skills and VET, but is it not clear that our students or their employers understand or value such a separation. In the industrialised regions of the world higher level skills such as problem solving, team work and personal reflection are now also included as necessary parts of vocational training. The barrier between university level education and VET is now highly permeable. Other papers at this conference deal with tertiary level education, so this paper focuses on VET in non-University organisations. However, I cannot avoid including universities later when I discuss Cisco® training.

Delivering VET is problematic for the developing world for. The systems that provide VET in the developed and industrialised regions rely on the engagement of four sets of stakeholders (Gaidzanwa, 2008). The major set of stakeholder are employers who need workers with technical skills to keep businesses competitive, another set are governments who want their national workforces to attract multi nationals employers as well as to provide skilled workers for state enterprises. Other stakeholders are the trainees/students and their families. There have to be jobs on offer for qualified skilled employees so families are assured that the investment in their children's or spouses' education will give an economic return. In many countries these stakeholders are missing. In sub-Saharan Africa for example there is no demand for highly skilled employees- there is an overall shortage of jobs (which is why there is mass emigration). Many national governments express the need for skilled workers for national development, but they do not have the resources to provide the training. VET is more expensive than general education because of the need for investment in equipment, tools and skilled personnel to teach (Gaidzanwa 2008). This explains some of the success of Microsoft and Cisco® training. However, these are commercial enterprises, they charge fees which restricts entry to those who can afford it; often the educated middle classes.

This situation is especially problematic for girls in developing countries. In many regions like Sub-Saharan Africa paid employment for girls outside the family is less immediately lucrative than domestic labour, or it is seen as putting in jeopardy a young woman's marriageable value by allowing her to operate in the public sphere with men who are not part of the family. In the worst cases girl children are most profitable to the poorest families as unregulated domestic workers or sex workers..

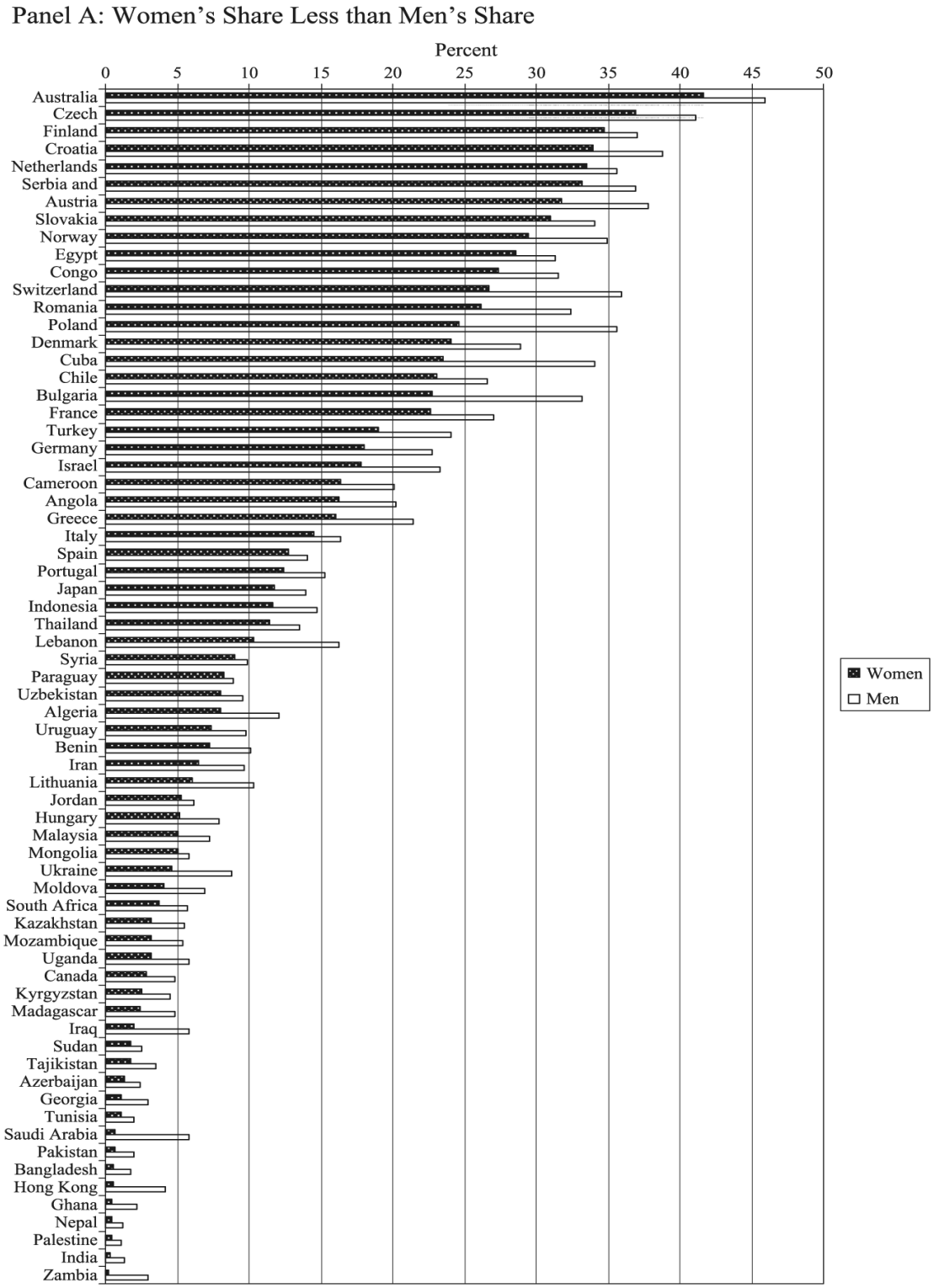
Figure 2. below is taken from Rodgers and Boyer (2006) using UNESCO data which show VET as a percentage of all secondary school enrolment by gender. Panel A shows those countries where girls' engagement in VET is less than boys' and anel B shows those countries where it is more than, or equal to boys' engagement . What is most shocking about this chart is not the gender differences, but the national differences in the overall amount of VET amongst the countries represented. Over half secondary school students in the UK and Belgium are engaged in learning which is classified at VET, but fewer than 5% in some of the most populous countries in the world, for example India, Brazil, Iraq and surprisingly Canada[4] . In countries where less than 10% of the secondary school population are participating in any kind of VET, we would expect to see minimal if any VET in ICT.

However, high participation figures in VET are not always due to positive factors. Some countries have a high emphasis on vocational schooling because the majority of jobs do not require graduates. Training schemes have also been used by governments in Europe and (Rodgers and Boyer, 2006) to reduce, albeit temporarily, the numbers of young people appearing on the unemployment statistics. VET does not guarantee a job, it may be simply a break from a period of unemployment. High numbers on VET can also be the result of a very selective or expensive university system which working class or poor children are unable to access, and choose VET as the alternative.

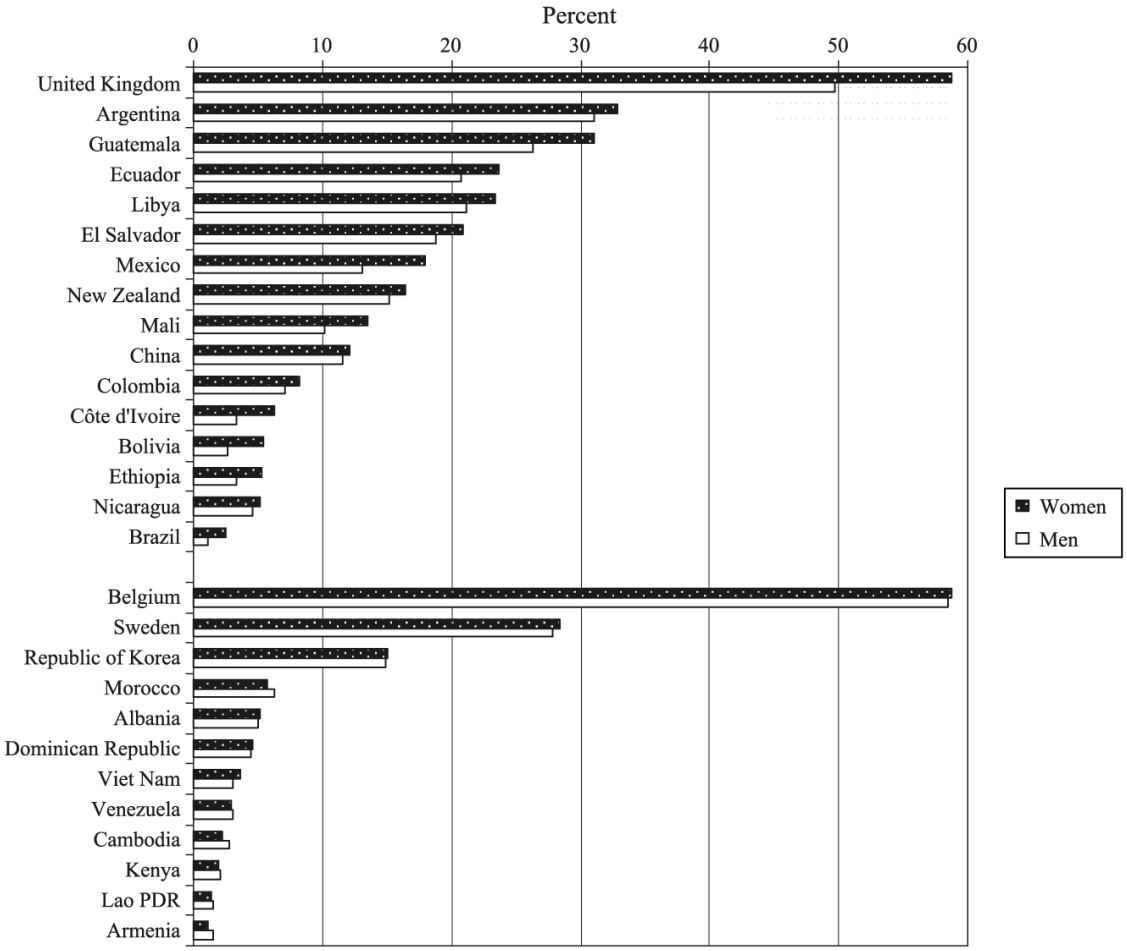
[4] the position of Canada in this table suggests some affect of data classification that is misplacing this county

This discussion illustrates the fact that it is impossible to make sense of national the differences in overall VET provision globally without a more detailed understanding of the regional/country context. The next section of this paper looks at some data from four countries and one commercial provider on the participation of women in ICT VET and discusses this in the context of each country's VET provision.

Figure 2. The proportion of secondary schooling allocated to VET by gender (2005)



Panel B: Women's Share Greater than or Similar to Men's Share



Note: For each gender, shares are calculated as the enrollment in technical/vocational programs in secondary schools relative to the enrollment in total secondary schools (public and private)

Source: UNESCO (2005)

2. Where are the women in ICT VET?

This section examines data from four countries, and one global training provider Cisco®. The choice of countries was opportunistic, however, they represent a selection of developed countries from different regions in the world. Given the problems of VET in the developing world, I have not included data from any developing country. I begin with data from the UK where I am located, I then discuss Germany - an example of a European country with a different educational system. This is followed by a discussion of Japan as an example of a highly industrialise Asian county, and finally Australia, still a part of the British Commonwealth of Nations, and with an education system similar to the UK, but with quite a different economy.

Because so much ICT VET is provided by commercial organisations if would be a serious omission not to include data about one. However, is very difficult to get figures about the gender of trainees with Cisco® or Microsoft. Fortunately the Open University is a partner with Cisco® and incorporates Cisco® training and accreditation on some of its undergraduate and postgraduate IT courses. A small case study of Cisco® in the Open University is the final part of this section.

2.1. Women in ICT VET in the UK

I will begin by examining available UK statistics. These are taken primarily from the UK Resources Centre 2010 Guide to Statistics (Kirkup et al 2010), which re-analysed UK government statistics.

The UK Government has revised the vocational qualifications that young people can study in schools many times over the last 20 years. The UK secondary education system remains a binary one, even though most secondary education is not selective on entry, children will join academic or non-academic streams. Vocational education is not high status, and the UK government's emphasis over the last few years on increasing the participation rate for university entry has had a negative impact on the status of

vocational education. Employers are much less willing than in Germany to offer apprenticeships and the further education sector where much of the teaching is done for post-secondary VET is much less well funded than the university sector.

The main qualification at secondary school is the General Certificate in Secondary Education (GCSE). There are also vocational awards given by different vocational award organisations such as the City and Guilds[5] and Edexcel for both academic and vocational qualifications. Only a small number are available to the 14-16 years olds, most are available to 16+ at school or through a 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 ICT. 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). Women are a larger proportion of those obtaining ICT NVQ/SVQs.

2.1.1. National/Scottish Vocational Qualification NVQ/SVQs:

NVQs and SVQs are national awards 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, For the UKRC statistics we grouped 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,

[5] 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

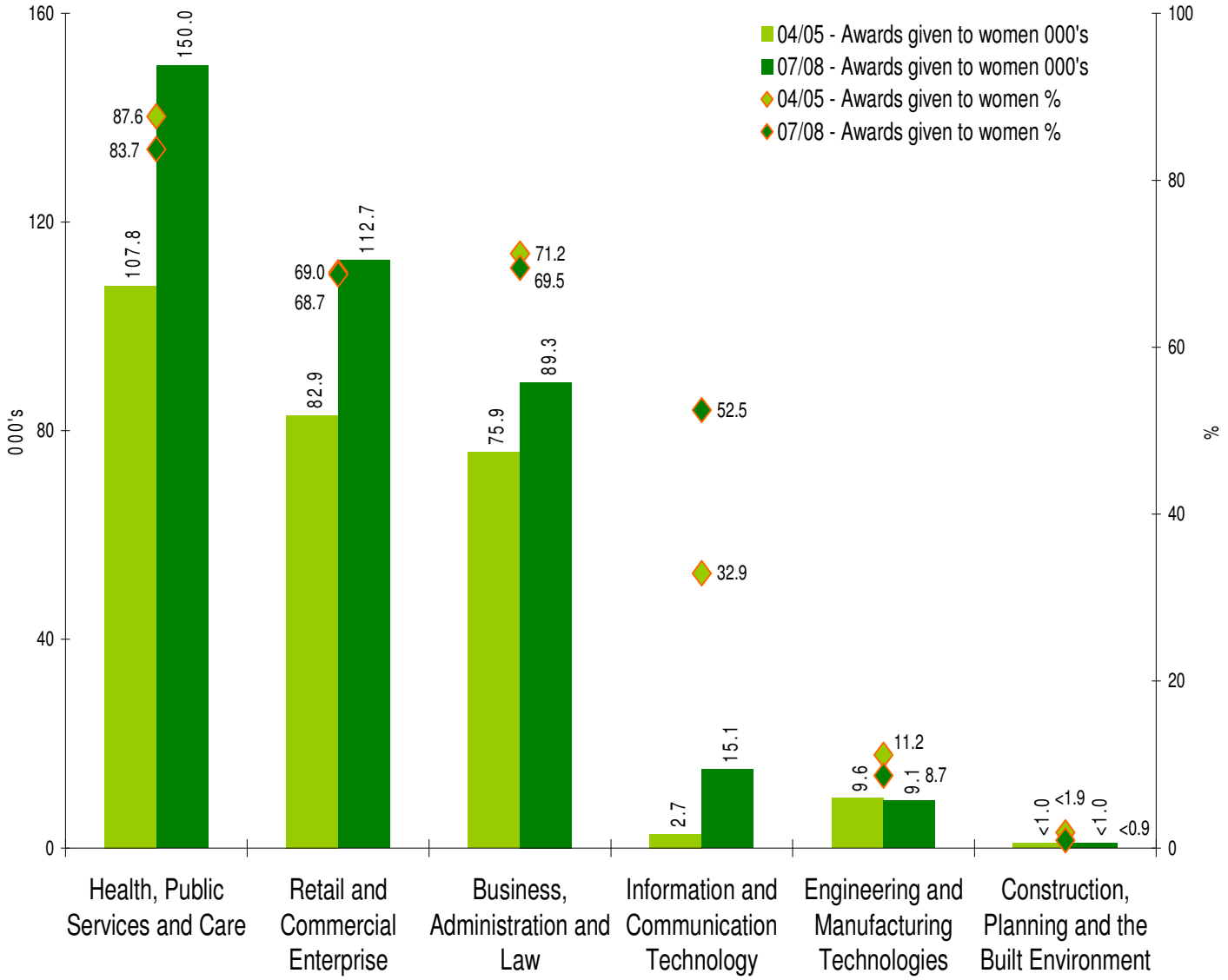
3. information and communication technologies (ICT)

We then selected three non-SET subject sector areas which had a very high representation of women, and 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

In 2007/08, roughly 773,200 NVQ/SVQ awards were given in the UK More than half were given to women (52.8 %). Fig 3 shows that between 2004/5 and 2007/8 there had been a large increase in the overall numbers and proportions of young women getting NVQ/SVQ qualifications in ICT – from 32.9% to 52.5%. 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 participation of women looks proportionately more like the percentages in non-SET subject areas, although the numbers are much smaller.

Figure 3 : 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.

2.1.2. Apprenticeships.

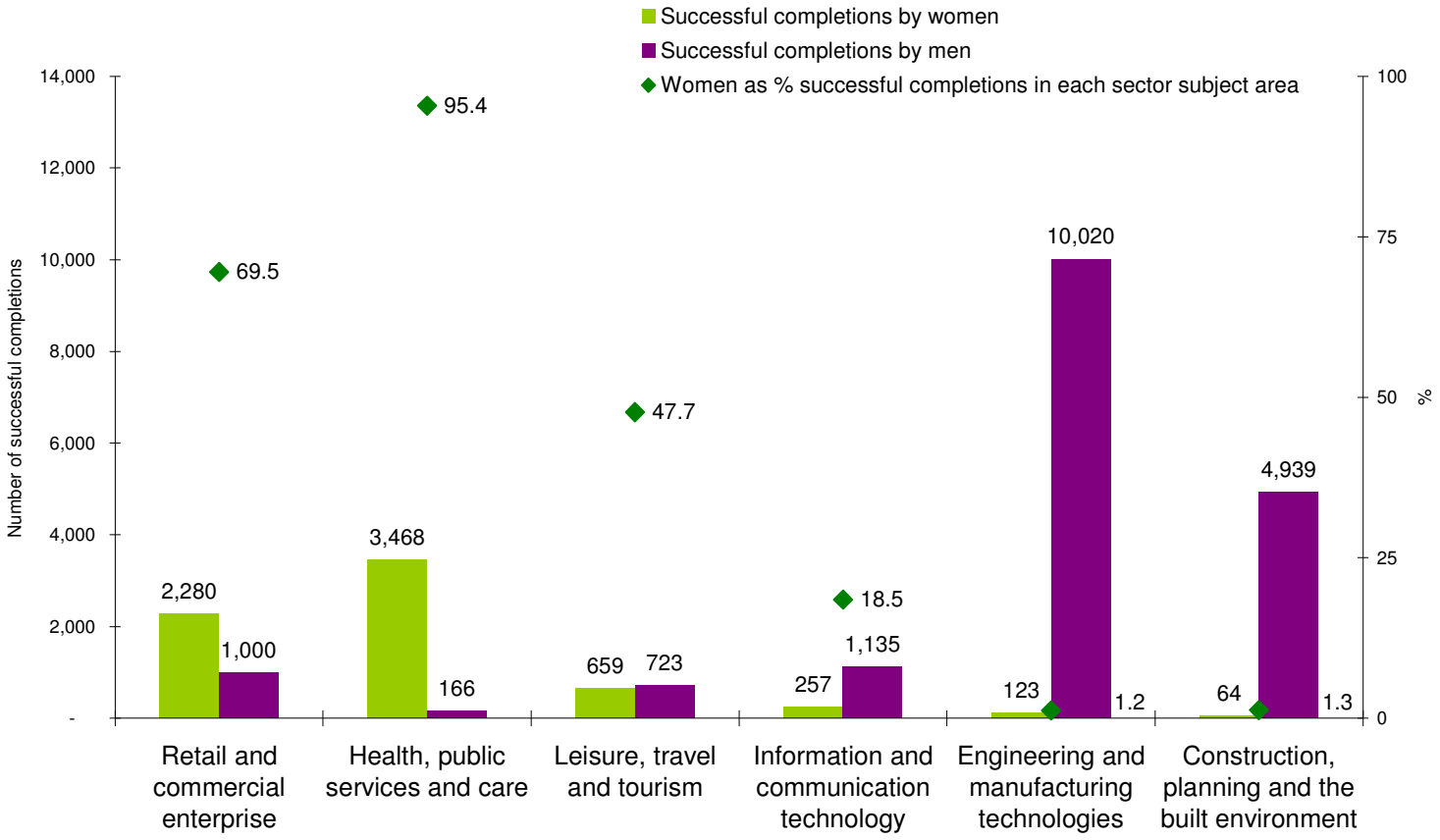
The main difference between NVQ/SVQs and UK apprenticeships is that employers recruit apprentices to specific work based programmes; they are employees and receive wages as they learn. This is unlike NVQ/SVQs which many students take voluntarily with or without support from their employer – often in evening classes, or in other cases are taken by college based students with a small amount of work experience. Similar subject groupings were selected as was used for NVQ/SVQ data (Fig 3). Again ICT apprenticeships are 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. However, both the numbers and proportions are much smaller than for NVQ/SVQs.

There are two levels of apprenticeship – the higher level is called 'advanced' apprenticeship. Figs 4 and 5 below 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. 74% of men successfully completed a first level apprenticeship but only 64.4 % of women. At second level the success rates of men and women were the same 51.6% and 51.4%

Figure 4 : 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.

Figure5 : 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.

Patterns of gender imbalances seen in apprenticeships and advanced apprenticeships across England seem more closely related to the occupational segregation that exists in these SET employment sectors than the figures for NVQ/SVQs. In 2008, women formed just 14.4 per cent of ICT professionals. There was a higher proportion of women in the lower-paid 'IT service delivery occupations':24.4 % (UK Labour Force Statistics). For most levels of IT occupation in the UK men and women are equally likely to have first degree, or higher vocational level qualifications (called level 4 or 5), see figure 6.

Figure 6 is interesting, first because it suggests that a high proportion of people working in high level IT occupations in the UK do not have high level qualification of any kind.- roughly 35% of IT managers and professionals, whereas nearly half of IT operations technicians do have high level qualifications. In general men and women are equally well qualified 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. It appears that in the UK at least, significant numbers of the ICT workforce have no high level qualifications. Is this because the field is new, or because there are routes to high level jobs which do not require high level qualifications? What is the impact of this on recruitment to ICT VET?

Figure XX: IT occupations by Qualifications held 2008[6]

Occupation	Gender	% with level 4 or 5 qualifications
1136 ICT Managers	Male	65%
	Female	63%
2131 IT professionals	Male	65%
	Female	67%
2132 Software professionals	Male	72%
	Female	59%
3131 IT operations technicians	Male	47%
	Female	46%
3132 IT 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

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 we will reproduced elsewhere. Not only are there cultural issues about the suitability of certain kinds of people to certain kinds of jobs, the economic circumstances of any country will impact on the number in VET. For example while the numbers of apprenticeships available will drop during a recession, but the numbers of people registering for courses - both academic and VET -will increase because they opt to stay in education rather than enter a competitive and shrinking labour market. It is important therefore to look at some examples of VET from other counties to give a wider picture. The next sections contain comparative data with three other countries.

[6] This chart was sent in a private communication by Mark Underwood in response to a query about data contained in The IT Scorecard 2008.

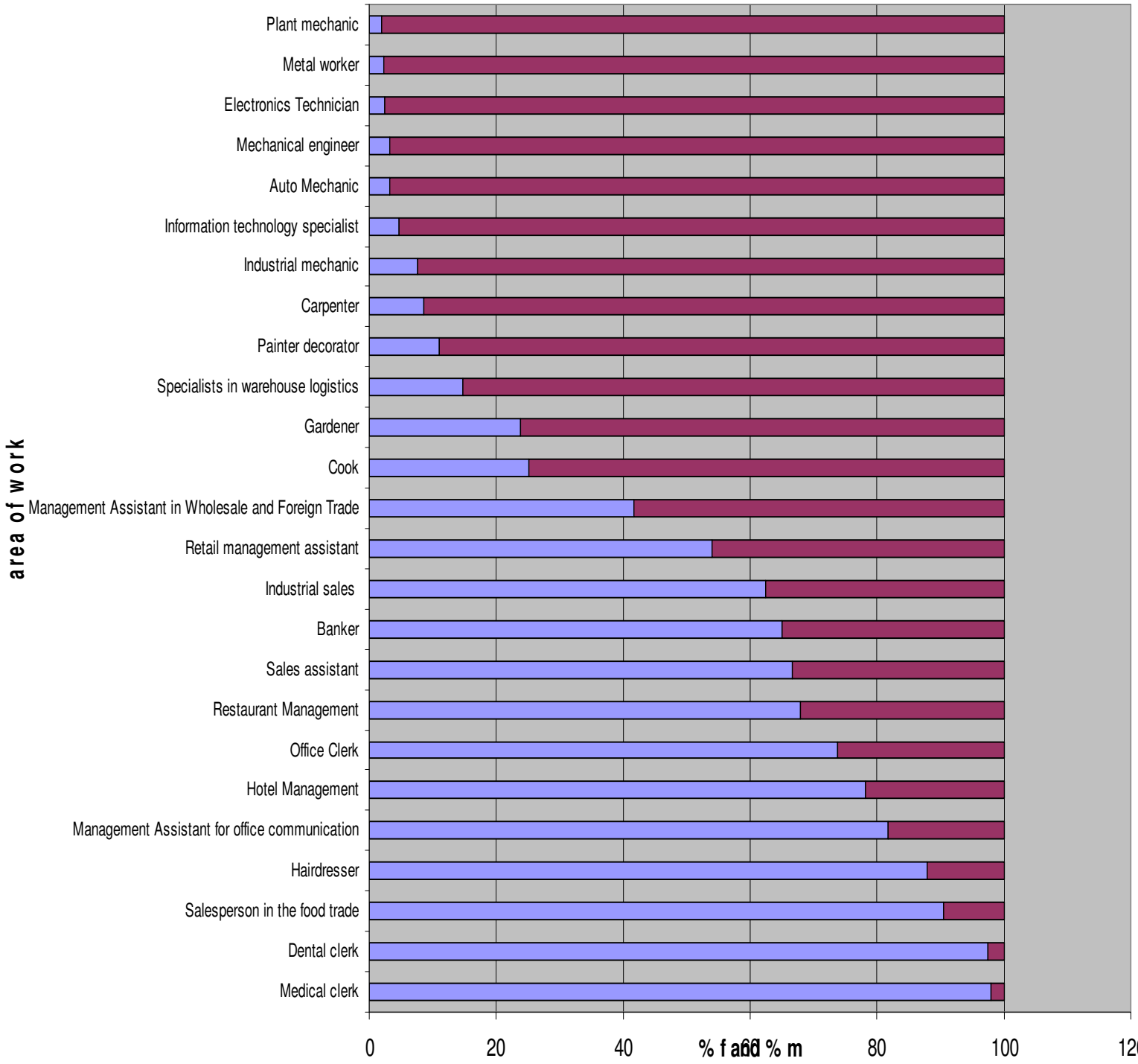
2.2 Women in ICT VET in Germany

Germany has a regulated and unified the vocational training system (the Berufsausbildungsgesetz) in which responsibility for VET is shared between the state, the trades unions, professional associations and employers. The system is very popular. 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 very small agreed to offer apprenticeships.

Figure 7 below is taken from a very recent document showing the gender participation of women 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. This would suggest that ICT work in the German labour market is much more gendered than in the UK.

This table also proved a challenge to translate, in particular 'Management Assistant for Office Communication' – there is no UK equivalent. I understand from discussion with a German colleague that this is a good translation and reflects that fact that the job has been renamed – it might previously have translated a clerical or administrative assistant. It has been changed to reflect that fact that the job is about the use of technical communications systems of all sorts to manage information in an organisation. This raises a question I will revisit in the final section: whether by focusing on those jobs that make 'hard' ICT technical skills visible we are missing the ICT skills that are now embedded in if not a key component of other occupations. Should we be looking for the presence of ICT skills in 'feminised' occupations, rather than looked for the presence of women in 'traditional' ICT occupations? Doing so and using results to argue for increasing the status of those jobs, and consequently their pay might be more beneficial for women, as well as having a greater impact on challenging the gendering of work and identity.

Figure 7: Gender of trainees on VET programmes in Germany (2010) [7]



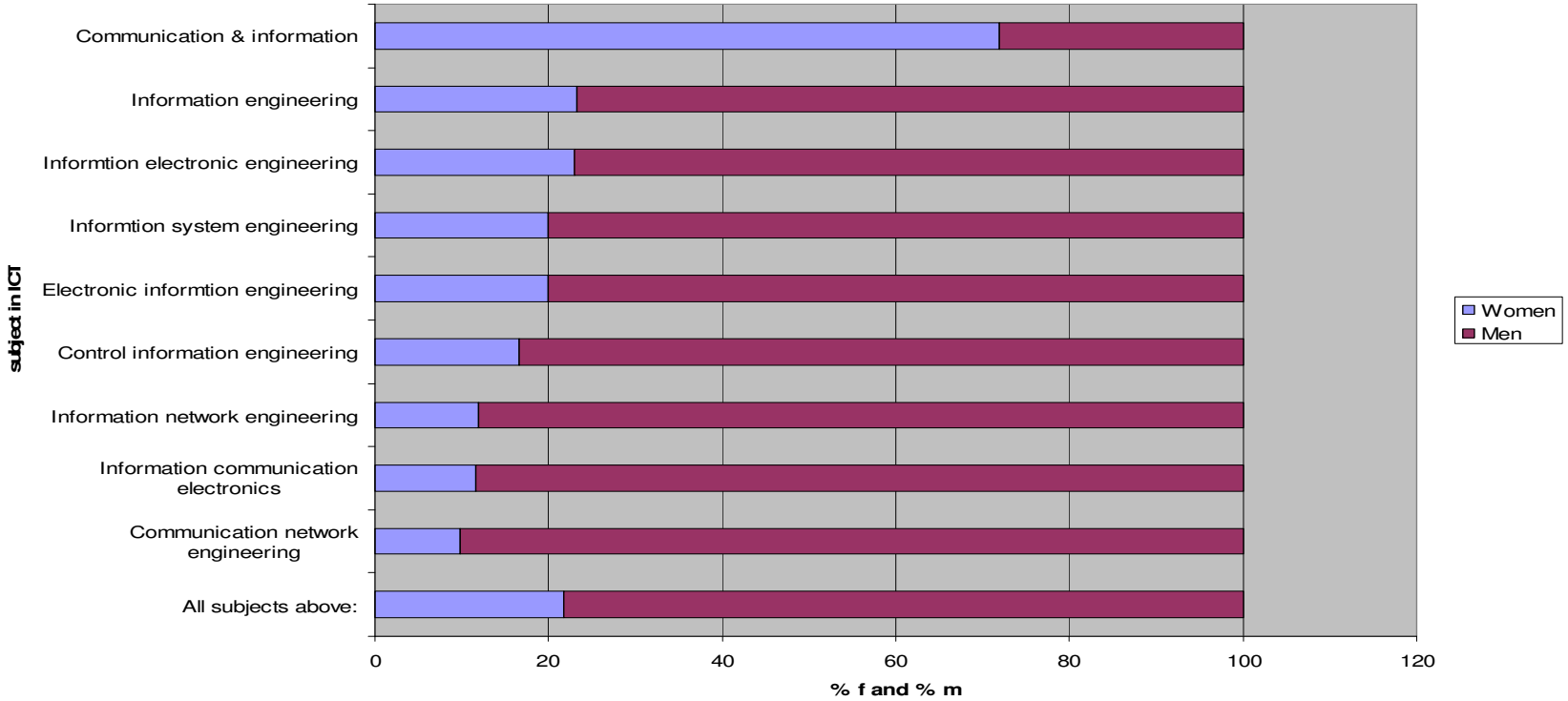
[7] This table is a translation of Figure 23, from Sehrbrock (2010) Ausbildungsreport 2010

2.3. Women in ICT VET in Japan

Japan has a binary system of education with specialised colleges for vocational education: Senmon Gakko :Colleges of Technology. 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. Like junior colleges in the USA, they are mostly relatively low status and, private (91 percent) rather than public funded . (Nagasawa 2005). Colleges of technology have very low female enrolments (18 percent); and the number of women enrolling has been decreasing.

Figure 8 taken from the most recent Japanese statistics on trainees in Senmon Gakko colleges shows all those specialism 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 small 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. Clearly in this culture and its education system the 'harder' the ICT technology the more 'masculine' its identity with 'softer' aspects of the technology seen as more 'feminised'.

Figure 8 Gender of trainees on VET programmes in Japan (2010)[8]



[8] 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

2.4: Women in ICT VET in Australia

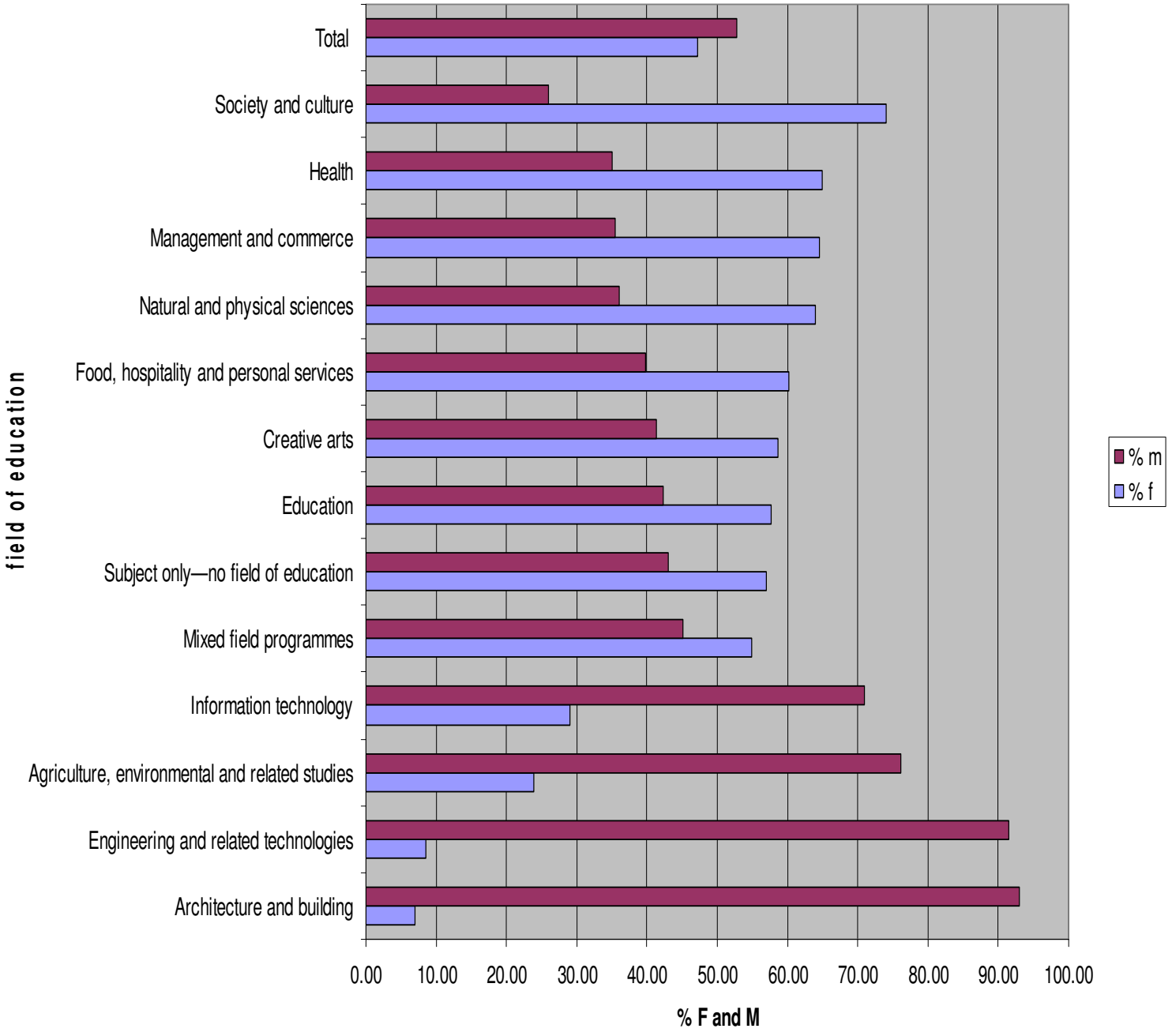
The Australian VET system grew out of a UK model and has many similarities. VET is provided initially at secondary school, where students can choose vocational subject streams, and take examinations in the Senior Secondary Certificate of Education and also credit towards a nationally recognised VET qualification. These qualifications comprise what is called the Australian Qualifications Framework (AQF). After school students can go onto a Technical and Further Education (TAFE) College and study for a vocational diploma. Like the UK, the Australia system tries to offer both parallel academic and sequential vocational streams i.e. some students go from school directly to university, others go to TAFE college then to university. Graduates can also enter TAFE colleges for graduate VET. Australian apprenticeships are government supported and although they combine paid work with training they can be full-time, part-time or college based[9] .

Figure 9 below shows a familiar pattern. Women are nearly 30per cent of students on Australian ICT VET programmes; a figure more like the percentages in UK NVQ/SVQ programmes, and much larger than that on German or Japanese ICT technical courses. Without a deeper investigation of issues such as curriculum content, student recruitment, relationship with employment, and the gendering of the local/national labour force, it is impossible to guess from the figures alone why there are such differences between the participation of women on national ICT VET programmes in these four countries.

In the next section a final comparison is with data from a global commercial training provider: Cisco® .

[9] See http://www.australianapprenticeships.gov.au/about/default.asp accessed 2.11.2010

Figure 9 : Gender of trainees on VET programmes in Australia (2009)[10]



[10] Source:NCVER Commonwealth of Australia, 2009 National VET provider collection

2.5. Women on Cisco® training Courses.

In the first section of this paper Cisco® was discussed as a major global provider for ICT VET. I have been unable to source gender data for Cisco® qualifications world wide. However, the Open University is now a Cisco® partner, offering some Cisco® courses as part of its undergraduate and post-graduate programmes[11]. Data from the OU give an indication of proportion of women who might be taking these courses anywhere in the world.

Figure 10. Students entering and completing a Cisco® qualification on an Open University UK (OUUK) 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	still running	46

Figure 10 shows student data from four OUUK courses which give Cisco® accreditation. The proportions of women on these courses are very low. They are smaller than the percentage of women taking communication network engineering in Japan, but similar to the proportion of German women training to be electronic technicians. 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.*

[11] An example of VET being incorporated into academic learning and qualifications.

This goal is supported by the Women's Empowerment Program (WEP), which helps women overcome challenging economic or social circumstances.' [12]

It has funded research into why girls in schools are not attracted to ICT (Gras-Velazquez 2009).

However, in the UK in particular it would be safe to guess that women are a very small proportion of Cisco® trainees., and the aims Cisco® has to increase the participation on women on its courses is far from being achieved. It is worth noting that women are more likely to succeed in the OUU Cisco® courses. In each course in Fig 10 women were a largeer proportion of course graduates than of entrants. This contrasts with UK apprenticeship data where women were much less likely to complete basic apprenticeships than men.

Earlier in the paper I ask whether ICT work and VET has escaped from the association that traditional SET skills had with masculinity. The data in this section of the paper have show that overall it has not. The data reviewed here confirmed earlier reviews of VET by others:

'Even in countries where the apprenticeship model has long been associated with a wide range of sectors, such as in Germany, Austria and Switzerland, and females have formed a higher proportion of the total apprentice cohort, there is little evidence to suggest that females and males are crossing occupational gender barriers. More recently, governments in Australia and New Zealand have adopted apprenticeship as a vehicle for training reform […]and are promoting its expansion, but again patterns of participation in apprenticeships and their associated occupations remain highly gendered.' (Fuller 2005 p 299)

[12] 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

However the association is stronger or weaker in different countries. There appears to be a trend that 'soft' ICT skills (these are often expert user skills, and communication skills) are in incorporated into feminised occupations, and 'hard' skills incorporated into masculinised occupations. This then feed back in VET which is designed as preparation for these occupations.

The next section engages with some of the issues that need to be addressed if

1. ICT VET is to be a better preparation for women to get 'good' employment
2. ICT VET is to be a vehicle to challenge the gender of ICTs skills and ICT work as male.

3. What are the possible causes for the gendering of ICT VET?

VET is a problematic area of education for feminist intervention. The increase in the participation of girls and women in SET education in academic fields in school and in higher education has not been paralleled in VET. We can speculate on a number or reasons for this, but most have to do with the tight relationship between employed and VET, and the association of skilled technical work with masculinity (Cockburn 1985)

Traditionally VET has prepared people for skilled working class jobs, for example hairdressers and childcare workers for girls and technicians and skilled SET craftsmen (what in, the UK, is sometimes jokingly referred to as 'white van man') for boys. These are careers in which women and men recruit family members and friends; often to small family run businesses. Rogers (1998) refers to this preference for employing family members for SET jobs as the 'lads of Dads' syndrome, and it extended 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. Apprenticeships are one kind of VET where employment is a pre-requisite for training, and seems to be the form of VET that is most gendered, even in ICT.

Traditionally VET prepared people for a working class social positions. Young people choosing a VET, rather than an 'academic' educational pathway are choosing a class position very early in their lives. This is especially true of systems with binary parallel routes: the route via university and an 'academic' degree in theory offers membership of higher social classes to working class students. In practice university at least delays the inevitability of membership of any social class, since the identity of university students is one of 'student' – a kind of temporary social class which retains the historical legacy of upper or middle class identity. In places like the UK class identity is different depending on the university attended. Over the last twenty years young women have chosen

university in increasing large numbers – so they are now over 50% of the world's university students. Although within universities subject choice is still gendered, it has become less so. There are increasing numbers of women entering traditional university SET courses which prepare them for SET professions. Colding (2006) studying ICT workers in Denmark, argues that women prefer the academic rather than the VET route into ICT. ON the academic route do not have to challenge the gendered nature of their final occupation until they leave university, by then with an academic degree which publically confirms them as new members of a profession. This prior-to-entry membership gives them confidence and an amount of authority to resist the norms they see operating in their workplaces. Young VET students are positioned as 'peripheral participants' of their professional community (Wenger 1999) until they have adopted the practices of their community. They are also aware that they are entering or remaining in a particular social class during their training. The status of skilled working class is not the same everywhere – even within Europe. For example in Germany the status of skilled workers is higher than that of the UK, and this factor will pay a part in the status of VET and the choices students make (Dehmel 2005).

ICT is developing as a set of occupational skills in two ways. 'Hard' skills, such as those that deal with electronics have continued to reinforce their association with 'masculine' SET occupations, and often have the word 'engineer' attached to them. This is clearly seen in the data from Germany and Japan. 'Soft' skills such as expert user skills are being defined as female and in many cases being incorporated into traditionally female occupations such as office work – they are being feminised. They are also increasingly in demand (Santiago et al 2008). But as they lose their association with masculinity, and they lose their status and usually with that their relative pay advantage. ICT expert user occupations – e.g. IT help desk, IT customer service job, data analysis jobs etc. have become feminised. Researchers should be wary of increasing the invisibility of these aspects of women's ICT work and skill by focusing on those areas which are becoming self defined as IT professions and IT skills. We need to engage in a challenge to what are considered ICT skills

Occupational groups still seek to control entry through operating entry level criteria: qualifications and training. Penn (1998) argues that the slow change on the gender patterns of UK skilled compared to a much faster change in the US is due to the power of UK Trades Unions in controlling entry. Occupational entry qualifications are supported by national governments (such as the UK and Germany) and employers who want citizens/employees to invest in their own education and training. ICT occupations are following this route. However the UK data on ICT occupations shows that large numbers of men and women have high level ICT jobs without degree level qualifications and conversely have degree level qualifications and work in a technician level occupation. This might be an aspect of the UK labour market where the demand for ICT jobs outstrips people with qualifications, but it also might be an aspect of the UK market where employers pay badly and this has an impact on recruitment. ICT jobs in Europe and the USA have also been made insecure by a combination of outsourcing to countries where skilled ICT workers are cheaper as well as the increasing automation of many ICT tasks.

The position of women in the labour market overall has changed. Women have not only increased their share of the labour market in the last 30 years, in the UK for example the proportion of working age women who are registered as unemployed (4.0% in 2008) is smaller than the number of men (5.3% in 2008) (see UKRC statistics). This is of course partly due to the proportion of women who are not in employment and not looking for work (26%) , although the percentage of working men in the same category is surprisingly high (16%). The recession – in the UK and USA has had a greater impact so far on men than on women. Women have more choices about the work they do and their income is vital to a household. We would expect to see this change the occupations they choose to train for – perhaps avoiding those lower page jobs like childcare and hair dressing for better paid ones – like ICT work. So far this has not happened in significant numbers. Seybert (2007) found that the gap between the numbers of men and women in ICT jobs in Europe had increased between 2001 and 2006 rather than decreased. Women also engage in more ICT VET than men but the relationship between training and improvement in wages is less for women than men (Bassanini 2004, Hebbar 2006).

There is no way for this author to neatly weave together all these potential issues: causes and effects of the gendering of ICT VET into a neat model which give a clear indication of where there is leverage for change. VET organisations have worked hard to recruit women and recruit them to non-traditional areas but with limited success (Miller et al 2005). Employers espouse their commitment to recruiting women to apprenticeships and trainee positions in non-traditional work, but in the UK for example they are not willing to commit the amount of funding to employer based VET that the government would like – or would bring about significant change to the system (Corning 2007) . The strong mixture of gender and social class (race too although it has not been part of this paper has been studied by others, see Colding 2006) identity attached to training is now attached to ICT training, and appears to be consolidating.

Gill Kirkup 7.11.2010

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