

DEFINING SKILLS NEED: THE ROLE OF RECOGNITION OF TECHNICIAN STATUS

Dr SCOTT KELLY

NEW YORK UNIVERSITY (NYU) IN LONDON



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The Gatsby Charitable Foundation
The Peak, 5 Wilton Road, London SW1V 1AP
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www.gatsby.org.uk

EXECUTIVE SUMMARY

Employers often report that they experience difficulties in identifying training and qualifications that meet their skills needs. This report investigates the link between the ability of employers to identify and articulate their skills needs and knowledge of the qualification system.

The extent of skills shortages and gaps is greater than headline data suggests and is particularly prevalent at technician level. These skills problems can impact on business performance, preventing specialisation and inhibiting business growth.

Research indicates that an ability to identify and meet skill requirements is a key factor in moving from medium value added to high value added business activity. However, technical qualifications are not well understood by employers and, consequently, employees in technical occupations are often either over or under-qualified for their role.

Employers and other social partners play a central role in determining the content of training in countries such as Germany, the Netherlands and Australia. The evidence suggests that in other countries where a sectoral approach to skills has been pursued with success, employees have also enjoyed a formal role in the process. Building strong, stable institutional anchors for the system of technical qualifications in the UK may play a key role in helping employers to match qualifications to their skills needs.

Research indicates that there is a strong link between the extent of training at level 3 and the way in which social partners are involved in determining its content. The Manufacturing Institute is also working to create stronger institutional anchors for technical qualifications in the US. Its work resembles that of the Technician Council in the UK in bringing together a number of partners that already provide credentials. However, its certification system goes further in accrediting non-technical cognitive skills.

PART ONE: THE EVIDENCE OF A SKILLS PROBLEM

The extent of skills shortages and gaps is greater than headline data suggests and is prevalent at technician level. These shortages and gaps may be a factor in inhibiting business growth.

Skills shortages and skills gaps are often used as interchangeable terms but in actuality refer to different types of skill problems. Skills shortages are experienced by employers at the recruitment stage where there is a lack of people with the right type of skills. This leads to a preponderance of hard-to-fill vacancies. Skills gaps refer to a mismatch between the skills of existing employees and business need. They occur where a firm feels that its employees do not have adequate skills to meet the organisation's objectives (Campbell et al., 2001).

In England both skills shortages and skills gaps are measured by the National Employer Skills Survey (NESS). Successive surveys have found that:

- 5-6% of establishments report having skills-related hard-to-fill vacancies (Skills Shortages).
- 15-23% of establishments report have internal skill gaps

The NESS findings would suggest the vast majority of firms are not experiencing any problems with skills levels. However, Geoff Mason has argued that the NESS does not necessarily provide a complete picture. Firstly, because it only provides a 'snap shot' of firms with hard-to-fill vacancies, rather than a longer-term picture. Secondly, because the questions asked by the survey narrowly define a skills 'problem' as not being able to fill a vacancy externally or internally. Research for the Sector Skills Development Agency (SSDA) in 2005, based on a survey of employers in four diverse sectors: telecoms services, vehicle maintenance and repair, mechanical engineering and textiles, clothing and footwear, found that a large majority of establishments in each sector reported that the skills of 'core groups' of employees stood in need of improving and updating (Mason, Osborne and Rincon-Aznar, 2005; SSDA Research Report No. 9).

The detailed questioning in the survey suggests that these gaps are most likely to be found in technical skills:

'For example, the sought-after improvements in technical skills centred in vehicle maintenance on diagnostics, electronics and keeping up to date with new technology. In the other three sectors updating in the use of new technology also featured alongside sector-specific technical skills such as improved product knowledge and electrical installation and cabling in telecoms services; machine-setting and specialised programming in mechanical engineering; and use of standard programmes and adaptation to new software in textiles, clothing and footwear.' (Mason, UKCES 2008)

This research suggests that there is a serious problem of incomplete skills at technician level. Closer analysis of data from the NESS confirms that there is a particular problem of skills shortages at technician level. Data from the 2007 survey reveals that over a third (34.3%) of vacancies resulting from skills shortages are in occupational groups associated with technician level skills (NEF, The Appliance of Science 2008).

International survey evidence indicates that the shortage of technician level skills is shared in countries with similar labour markets. Surveys by the U.S. based Manufacturing Institute, conducted since 2001, reveals that employers say they experience the greatest

number of skills problems¹ amongst 'skilled production workers'. The 2011 survey showed that 45% of manufacturing firms surveyed experienced a 'serious shortage' amongst 'machinists, operators, craft workers, distributors and technicians'. Much lower shortages were experienced at higher skill levels, including 'Engineering Technologists' and 'Scientists and Production Engineers' ('Boiling Point? The Skills Gap in U.S. Manufacturing, The Manufacturing Institute 2011).

The paucity of technician level skills can lead to the inappropriate deployment of skills which may in turn limit business expansion. A study in Australia in the mid 1990s (Richard Curtain, Australian Vocational Educational Review, 1997) found, through case studies of small, high tech enterprises, evidence of the use of young graduate engineers in non-graduate jobs. Few technicians were employed by the firms studied.

This also would appear to be the pattern in the UK. Previous research for the Gatsby Foundation has found a stark contrast in the qualification levels of people employed in science, engineering and technology (SET) occupations that generally require level 3 or 4 qualifications. In occupations generally requiring level 4 qualifications – laboratory technicians, building and civil engineering technicians, quality assurance technicians, science and engineering technicians, IT operations technicians, IT user support technicians, medical and dental technicians, computer engineers, installation and maintenance – all had more than 20% of the workforce at level 6 and above. However, there was also a significant proportion of the workforce – more than 30% – only qualified to levels 2 and 3. This pattern would indicate that these occupations are filled by a combination of people over qualified – to first degree level and above – and a large percentage of under-qualified workers. A broadly similar pattern was found in SET occupations generally requiring a level 3 qualification ('SET based Technicians: Lessons from the UK and European Labour Force Survey', N. Jagger, M. Signala, F. Sumption, Institute for Employment Studies, 2010).

One fundamental reason for the over reliance on higher level skilled employees is their relative cost. The difficulty with this strategy is that graduates may soon become frustrated with their job. If graduate engineers with high expectations, for example, are given work that is limited in scope and with little opportunity for training, they are likely to become dissatisfied with their work roles. This is likely to lead to a move to another employer offering better work prospects and skills enhancement opportunities.

The high turnover of skilled workers can impede an enterprise's ability to innovate and stay ahead of its rivals. The absence of internal mechanisms for retaining, enhancing and renewing skills could create an invisible barrier beyond which new enterprises are unable to expand. Reliance on new graduates and high cost specialists with their high levels of turnover may produce "niche companies" - small firms that are unable to grow into larger enterprises with stable, integrated high-technology capabilities (Florida and Kenny 1990).

Corresponding research suggests that high levels of technician level skills facilitate growth, giving firms an advantage in responding flexibly to changing markets, technology and supply chains. A study by Mason and Wagner (2005) of automotive supply chains in Britain and Germany concludes a firmer skills basis contributed to better German performance, enabling firms to produce higher quality products, operate in smaller batches, differentiate products and thus achieve higher prices and greater profitability. They also experience lower levels of staff turnover (IPPR, 2012).

¹ The question asked by the 2011 survey was 'Please select the option that best describes the availability of qualified workers for the following workforce segments at our company today, and indicate if you anticipate the shortage to increase, decrease, or not change over the next 3-5 years.'

PART TWO: THE LINK BETWEEN SKILLS DEFICIENCIES AND THE ARTICULATION OF NEED

Research indicates that the definition of skills needs is a key factor in moving from medium value added to high value added business activity. There is good evidence many qualifications are not well understood by employers and that training expenditure is not closely linked to sector specific need.

The relationship between the level and type of skills in the workforce and business strategy and performance is a complex one. That firms experience skills shortages and report the need to up-date their skills does not necessarily inhibit their performance. Indeed, research by Geoff Mason shows that firms that pursue high value-added (HVA) business strategies are actually more likely to report skills shortages and skills up-dating needs (Mason, 2011). However, this reflects their relatively high skills standards and dynamic approach to skills resourcing. Conversely, firms not following a high value-added strategy are more likely to experience skills gaps that potentially constrain their product strategies. That firms with high level product market strategies are less likely to have skills gaps indicates they have greater awareness of their skills needs than other employers. They are able to identify future requirements, preventing actual skills gaps from emerging as they anticipate them and deal with them before they do.

Other research by Mason shows that High Value Added (HVA) business activities are clearly skill-intensive, for example, continuous product innovation in plastics; the process innovations underlying successful automated production in printing; the resolution of difficult problems in the transportation of valuable and/or cumbersome equipment in logistics; and in general insurance, the negotiation of appropriate terms and cover for business customers facing a number of different risks. Therefore high levels of skill and knowledge are indeed prerequisites for success in high value-added production.

A high value-added competitive strategy is associated with a number of fundamental business characteristics including industry sector; establishment size is another important characteristic. Small firms, with fewer than 25 employees, are less likely to be high value-added or to invest significantly in training (IPPR, 2012). The experience of recent growth is also an important characteristic of firms pursuing a high value-added strategy. In general it is larger, more innovative and growing concerns that are most likely to have high levels of training and a high value-added competitive strategy.

Mason's research suggests that the ability to define and fill skills gaps is a prerequisite for moving from medium value added (MVA) to high value added activity:

'To the extent that MVA firms need to adopt higher value added product strategies in order to survive, they will need to define the skill gaps that confront them with precision and ensure that appropriate on- and off-the-job training is provided to fill those gaps. In many cases this will entail carrying out substantially more training (in proportionate terms) than their HVA counterparts in order to catch up with the superior stocks of skills that HVA firms have accumulated.' (Mason, 2005)

While having a strong skills base does not by itself explain why a firm would develop a HVA product strategy, the evidence does suggest that high current skills levels does make a positive contribution. The ability of a firm to respond to new opportunities will be determined in part by the skills it has accumulated over time (Mason, 2011).

Helping employers to access the training and accreditation that will enable them to grasp opportunities that may arise in the future could play a key role in building a higher value-added economy. Yet while certain long-standing qualifications are well understood by employers (BTEC, HND/HNC), others are much less so. A discussion convened by the New Engineering Foundation with leading employers on the shortage of technician level skills found that matching need to qualifications presented a major problem:

'Employers understood the old technical qualifications, such as the ONC/D and HNC/D, as they knew what to expect from individuals holding these qualifications. In the current array of qualifications, employers, when recruiting post-16 school leavers, often feel lost as to whom they should be employing as the candidates' qualifications do not reflect the occupational requirements and the requisite skills needed to undertake the job at hand.' (NEF, Op Cit.)

Similarly, an OECD review into vocational education and training concluded that employers found it difficult to articulate and communicate their skills needs to Government:

'During the visits in England and Wales, the OECD team heard employers complain about misunderstandings and mismatches between what they desire and what government offers.' (Learning for Jobs: OECD Reviews of Education and Training: England and Wales, 2009)

The weakness of the link between qualifications and specific occupations is supported by research that has found less sectoral linkage in the employment of SET technicians in the UK than in other EU countries. The researchers concluded that the most likely explanation of this was that unspecific job titles mean that some SET technicians in critical sectors are not identified as such because 'there is not the continental tradition of specific sectoral qualifications being aligned with specific job titles.' ('SET based technicians' Op Cit)

Specialisation is often essential to business growth, yet businesses may face a major barrier in expanding and adapting to a high value-added business strategy because the information costs involved in defining their skills needs and finding suitably qualified people are high.

A survey by the Institute of Directors (IoD) from 2010 found that 31% of members had difficulty filling vacancies, primarily because of skills shortages. The survey found that:

'Skills deficiencies wreak considerable damage: higher costs, compromised quality, lost orders, stifled innovation and increased workloads for employees. 80% of employers suffering from skills gaps believe this will affect their ability to capitalise on economic recovery.' ('Shackled by the skills crunch', IoD 2010)

The IoD predominately represents those SMEs which, according to the NESS are likely to rank their goods and services as 'higher quality'. Skills shortages may prevent the expansion that is important to build a broader based economy in the future.

These problems may be exacerbated by the changing nature of the UK economy. Since the 1980s there has been a dramatic growth in the number of registered businesses in the UK: from 2.4 million in 1980 to 4.8 million by 2009. Employment growth has been focused on small businesses (those with fewer than 50 employees) – 47.1% of private sector employment is now accounted for by small businesses. (BIS Statistical release, 24/5/11)

PART THREE: HOW TRAINING PROGRAMMES ARE DEVELOPED IN OTHER COUNTRIES

Employers and other social partners play a central role in determining the content of training in Germany, the Netherlands and Australia. The evidence suggests that in countries where a sectoral approach to skills has been pursued with success, employees have also enjoyed a formal role in the process.

Developing better institutional anchors for qualifications may well be an important part of the answer to the problem of helping employers define and fill their skills needs (Ryan and Unwin 2001). It has often been noted that the structures responsible for training in Britain have been unstable and subject to almost constant change. As an OECD review of adult education noted:

'...just as there is constant change and development of policies related to adult learning, there is a constant change and creation of institutions and bodies devoted to different tasks with the lifelong learning arena.' (Thematic Review of Adult Learning: Country Note: The United Kingdom, OECD, 2005)

The complexity and instability of the institutions responsible for the content and funding of vocational and technical education has been identified as one of the main 'challenges' facing the system in England and Wales by the OECD, and a challenge likely to inhibit employer engagement. In other countries studied by the OECD the role of employers is central to qualification and funding systems. These countries have often achieved much greater stability in the way training standards are set and funded than Britain. It is also notable that these arrangements also regularly involve a role for employees.

Germany has probably the best known and most firmly rooted process by which the content of apprenticeship training is established and approved. The relationship between employers, apprentices and vocational schools is regulated by the Federal Law for Vocational Education and Training (Berufsbildungsgesetz) and the Crafts and Trades Regulation Code (handwerksordnung). The Main Board of the Federal Institute for Vocational Education and Training (the Hauptausschuss des Bundesinstituts für Berufsbildung) is the body, under the Federal Law, responsible for consultation with social partners. It consists of representatives from Federal Government as well as from employer groups, trade unions and Länder. The Board gives advice on all training regulations, providing nationwide standards for apprenticeships (UKCES, 2012).

However, although Germany may be the best known example of social partnership it is by no means the only one. In the Netherlands, employers and employees also play a statutory role in the development of the vocational curriculum. Under the 1986, WEB Act, sectoral bodies called Kennicentra (Knowledge Centres) identify and express the skills that are required for their sector. Social partners are responsible for defining the profile of particular occupations. These profiles form the basis of qualification profiles developed by Knowledge Centres and discussed with social partners and regional colleges. Following approval by a public body run by the Ministry of Education, these curricula are fed to regional colleges through the BVE Raad, the umbrella body for technical colleges.

As Raddon and Sung note in their study of sectoral approaches to skills development:

'The 1996 WEB Act means that the whole VET system (i.e. the 43 regional colleges) is driven by the requirements of the 19 Knowledge Centres. This contrasts strongly with practices in other countries in which educational institutions and civil servants oversee the curricula within the VET system. Employers (together with other social partners) define the content as well as training places annually required. Not only do employers participate in the process of defining skills, but they also provide all the work-based training places. The work-based pathway is popular with employers and young people. The majority of new entrants into enterprises are trained through this route, particularly since it attracts a fiscal incentive and trains entrants to industry standards.' (Raddon and Sung, 2006)

Similarly, social partners play an important role in the development of the vocational curricular in Australia. Training programmes, comprising a set of nationally endorsed competency standards, assessment guidelines and approved qualifications are developed by sector based Industry Training Councils. They are subject to a process of review and update through a process of consultation with employers, industry associations, unions and government (UKCES, 2012). As one recent study concluded:

'Industry engagement has led to a system that is a partnership between businesses and employers on the one hand and the national and state governments and government agencies on the other. Organisations representing non-government providers, employers and specific interest groups have a key role in some areas.' (M. Cully et al, 2009 quoted in UKCES, 2012)

PART 4: THE LINK BETWEEN THE WAY TRAINING CONTENT IS DETERMINED AND THE EXTENT TO WHICH IT IS FIT-FOR-PURPOSE

Research indicates that there is a strong link between the extent of training at level 3 and the way in which social partners are involved in determining its content. Work being undertaken by the Manufacturing Institute in the US also seeks to bring together a number of partners that already provide credentials.

While recent UKCES research identifies different and distinct weaknesses in the German, Dutch and Australian training systems, what unites all three is that they have achieved higher levels of intermediate level training than the UK. One possible explanatory factor is the stronger institutional underpinning for training content and standards. As the authors of the report conclude:

'In contrast to the UK, all three intermediate level skills systems have enjoyed relative stability over a decade or more, which is likely to enable strong brand recognition for intermediate level qualifications, time for employers and learners to see the returns of such qualifications.'

It is likely that the dimension of social partnership has both helped to secure this stability and to ensure that the content of training balanced the needs of individual employees, employers and the wider needs of the economy:

'In all three countries there are elements of social partnership in the specification of training standards with representatives of employers, employees, and the State involved in decision making at various levels.'

'Arguably it is the balancing of these views which ensures that both the short- and long-term needs of the economy are met and that the interests of all three groups are satisfied.' (UKCES, 2012)

In countries with a similar intermediate skills problem to the UK, work is also being undertaken to strengthen the institutional anchors for the formulation of the content of training. In the US, the Manufacturing Institute has developed a manufacturing skills certification system to help address the problems of skills gaps identified by their successive skills surveys. The work is similar to that of the Technicians Council in the UK in that it brings together a number of partners that already provide credentials, including ACT (American College Testing), the American Welding Society, the Manufacturing Skills Standards Council, the National Institute of Metalworking Skills and the Society of Manufacturing Engineers.

One way in which the new American certification system differs from the new title of registered technician in the UK is the extent it accredits non-technical cognitive skills as well as technical skills. It also certifies skills below technician level as well as above.

While the EngTech standard does accredit some soft skills the Manufacturing Institute goes further using the National Career Readiness Certificate (NCRC), provided by ACT, to test and accredit cognitive skills. While the EngTech standard relies on personal records, such as reports, presentations and minutes of meetings to demonstrate 'effective interpersonal skills', or soft skills, the NCRC requires applicants to take three online tests in applied mathematics, locating information and reading for information to demonstrate cognitive skills. The differing standards are shown on the table below.

EngTech – Interpersonal Skills	Manufacturing Institute – Cognitive Skills
	Problem solving Critical thinking
Communicate in English with others at all levels	Reading and using work-related text
Present and discuss proposals	Applying information from workplace documents to solve problems
Demonstrate personal and social skills	
	Applying mathematical reasoning to work-related problems
	Setting up and performing work-related mathematical calculations
	Locating, synthesizing, and applying information that is presented graphically. Comparing, summarising and analyzing information presented in multiple related graphics.

The Manufacturing Institute has the goal of awarding 500,000 certificates by 2016. President Obama has cited the certification system as part of his policy drive to build an educated and skilled manufacturing workforce. In 2011 the Institute issued 84,738 certificates. The system is now deployed in 113 colleges. (Press Release: 'Manufacturing Institute and partners Increase Credentialed Workforce' 2/5/12).

CONCLUSION

In recent years there has been a focus in government policy on freeing colleges and other training providers so they can meet the training needs of employers ('Skills for Sustainable Growth'). Some have argued that this approach is based on a false assumption that there is 'pent-up' demand for skills on the part of employers that is stifled by central planning and control (Payne J and Keep E 'One Step Forward, Two Steps Back? Skills policy in England under the Coalition government 2011'). This criticism tends to ignore the parallel work that has been undertaken to encourage demand for training through, for example, the introduction of higher apprenticeships and efforts to increase the visibility and recognition of technician level skills through the introduction of registered technician status. However, although policy is not wholly concerned with supply side reform, the research cited by this paper indicates that more needs to be done to build an institutional structure that facilitates the identification and articulation of skills needs by employers and ensures that these needs are matched to training and qualifications.

One of the great benefits of a common framework of registration for STEM technicians is that it reduces the information costs borne by employers in navigating a complex system of qualifications. Employers can appoint registered technicians with the confidence that they have the requisite technical skills. Building on the model of registered technician could help to develop a better alignment between the needs of employers and the content of education and training.

Britain lacks the kind of industry owned and employer facing institutions that determine the content of training in countries that have secured higher levels of intermediate work-based qualifications. The evidence suggests that social partnership – with employee and professional bodies also playing a formal role – helps to explain the stability and longevity of these institutions in other countries. Building strong institutional anchors could improve the understanding and recognition of the qualification system by employers and thus increase their levels of engagement.

A key role of such institutions would be to develop clear, stable and well-understood technical training routes. Part of this would be to develop a stronger link between qualifications and specific job titles. While in the UK there is a relative shortage of SET technicians qualified to an intermediate level, a stronger sectoral link in countries such as Germany helps to ensure more consistent skills amongst occupational groups. There needs to be a shared understanding across employer, employee and professional bodies of what exactly it means to be qualified to fill specific job roles in the workplace.

BIBLIOGRAPHY

- Campbell, M., Baldwin, S., Johnson, S., Chapman, R., Upton, A., and Walton, F., *Skills in England 2001*, DFES, Nottingham, 2001.
- Curtain, R., *Using Technician Level Skills to Overcome Skills Shortages in Leading Edge Exporters*, Australian Vocational Education Review, Vol.4, 1, 1997.
- Deloitte, Manufacturing Institute, *Boiling Point? The Skills Gap in U.S. Manufacturing*, 2011
- Florida, R., and Kenney, M., *The Breakthrough Illusion: Corporate America's Failure to Link Production and Innovation*, Basic Books, New York, 1990.
- Harris, M., *Shackled by the Skills Crunch*, Institute of Directors, 2010.
- Hoeckel, K., Cully, M., Fiefl, S., Halasz, G., and Kis, V *Learning for Jobs: OECD Reviews of Vocational Education and Training: England and Wales*, OECD, 2009.
- Jagger, N., Sigala, M., and Sumpton, F., *Lessons from the UK and European Labour Force Surveys*, Institute for Employment Studies, Report 475, 2010.
- Lawton, K., Lanning, T., *No Train, No Gain: Beyond Free-Market and State-Led Skills Policy*, Institute for Public Policy Research, 2012.
- Mason, G., Osborne, M., Rincon-Aznar, A., *Raising Sector Skills Levels – How Responsive is Local Training Supply?* Research Report 9, Sector Skills Development Agency (SSDA), 2005.
- Mason, G., *Employer Data on Employment and Skills: Issues in the UK*, United Kingdom Commission for Employment and Skills, 2008.
- The New Engineering Foundation (NEF), *The Appliance of Science: Applied Science, Science Technicians and the Science Diploma*, 2008.
- OECD, *Thematic Review of Adult Learning: Country Note: The United Kingdom*, 2005.
- Payne, J., Keep, E., *One Step Forward, Two Steps Back? Skills Policy in England under the Coalition Government*, SKOPE, Cardiff University, 2011.
- Raddon, A., Sung, J., *The Role of Employers in Sectoral Skills Development: International Approaches*, Centre for Labour Market Studies, University of Leicester, 2006
- Ryan, P., Unwin, L., *Apprenticeship in the British 'Training Market'*, National Institute Economic Review, October 2001.
- Vogler-Ludwig, K., Gienalczyk, H., Stock, L., Hogarth, T., *International Approaches to the Development of Intermediate Level Skills and Apprenticeships: Synthesis Report*, UKCES, 2012.