The Development of Occupational Standards in English-speaking countries

A report prepared for the International Labour Organization, Moscow Office

21tst November 2014

Stephanie Allais, Carmel Marock, and Palesa Molebatsi
Centre for Researching Education and Labour,
University of the Witwatersrand

CONTENTS

1. INTRODUCTION

How are systems of occupational standards designed in English-speaking countries, and how do they link to systems of predicting skills requirements and systems for classifying occupations? What are they intended to achieve? How do they work in practice? How are occupational skills certified? What are the impacts of these systems on labour markets? This paper attempts to provide some insights into these and related matters, in English-speaking Western countries, with a focus mainly on systems for mid-level occupations.

All the countries in the study—Australia, Canada, New Zealand, the United Kingdom (UK), Ireland, and the United States (US)—have national systems of occupational classification, and these are briefly described. However, none of them has a single national system for the development, updating, and regulation of occupational standards, nor for certification. There are variations across different occupations as well as across states, territories, and devolved administrations. Legal frameworks differ across occupational areas, as do certification systems, the role of employers, and so on. There is considerable variation between high and mid-level occupations. The most regulated areas of work tend to be high-level work, or professional work; it is perhaps worth pointing out that the distinction between occupations and professions is very specific to English-speaking liberal market economies (Streeck, 2012). These countries all also have a variety of different mechanisms for attempting to gain insight into future labour market requirements. What can be learnt from the systems in these countries?

As argued by Allais (2010), policy advice is sometimes given without giving the full picture in the country that is being borrowed from. Further, official policy documents tend to be political documents, designed to present a consensus, and therefore are not able to capture for the outside world the debates, conflicts, and problems experienced in their country. Research into systems of occupational standards and qualifications makes it clear that things are 'never as they seem'. Often what is visible to the outside world is a snapshot of a moving target. Official documents and accounts often do not reflect that there have been real changes in the model since it was first launched, because they are aimed at practitioners and users within a country, and need to provide up-to-date information about how systems are supposed to work. But they may inadvertently create misleading impressions for those borrowing from the policies.

There are many manuals and guidelines, particularly in the English-speaking world, for what occupational standards should look like, the kinds of structures that should be set up to develop them, and what the processes should look like. They generally recommend the creation of sectorally based councils, led by or entirely constituted by employers, to develop statements of occupational competence or standards for their sector of the economy. They usually include descriptions of how to develop such standards (some of the approaches used are briefly discussion in Section 3 below). The standards developed are usually intended to be used as the basis of teaching, assessment, and certification. They usually do not link with labour market regulation or license to practice requirements; governments in English-speaking countries have largely favoured unregulated labour markets, with exceptions in a few occupational areas, and with the obvious exception of immigration requirements. The lack of labour market regulation of occupational standards is, according to many researchers, a contributing factor to the low success of systems for occupational standards in English-speaking countries.

In addition to weak regulation of mid-level occupations, the English-speaking countries in this study have a history of relatively weak vocational education systems and weak linkages between education and work:

> Complaints abound about vast differences in quality between universities, polytechnics, and community colleges in Anglo-American countries; about narrowly specialized and deeply fragmented curricula; about 'customized' firm-specific training with very little portability; about training modules that are broken down to the smallest teachable unit; about courses that bear no relation to the reality of work in real workplaces; and about the absence of coordination between workplace needs and school curricula, amongst other things. (Streeck, 2012, p. 338)

Another characteristic feature of English-speaking countries is that dramatic expansion of access to higher education has contributed to an erosion of vocational education. This effect has been less pronounced in collective skill formations; Busemeyer and Trampusch (Busemeyer & Trampusch, 2012a) speculate that one possible explanation is more tightly controlled learning pathways in some European countries; another could be that the wage premium of university education is less pronounced in systems with strong vocational tracks. Streeck (2012, p. 323) also argues that, "in the 1990s at the latest, the United States and Britain finally gave up on industrial upskilling and, with it, on the industrial working class. Instead they adopted a strategy of accelerated transition to a 'service economy' that relied on skills of a much different sort: those needed by a thoroughly deregulated financial sector." While policy makers in the vocational education arena in those two countries would probably disagree with this characterization, what is less disputed is the problems which these countries have experienced (Wolf, 2011).

Researchers of occupational skills (Busemeyer & Trampusch, 2012b) suggest that English-speaking countries can be grouped together as a general type of skill formation system, distinct from three other general system types. The four types are:

- Liberal countries with limited involvement of firms and state;
- Statist nations with a low level of firm involvement but a high level of state commitment;
- Segmentalist countries with high levels of firm involvement and low state commitment;
- Collective systems with high levels of both firm involvement and state commitment, and partnerships which often also include labour, and deliver copious portable certifiable skills.

The differences between the four stem from differences in the division of labour between firms, associations, and the state in providing and financing skills, as there are large differences across countries in the extent to which firms are willing to invest in skills that are not firm specific, and in public commitment to the development of skills, and therefore of financing it collectively (Martin, 2012). The English-speaking countries in this study fall into the first group, which is seen as the least successful in terms of the development of occupational skills. There is more heterogeneity within each of the second, third, and fourth categories, while English-speaking countries tend to me more similar to each other, although of course with some significant differences.

One problem which has plagued occupational standards systems as well as technical and vocational education and training (TVET) systems in English-speaking countries, is that

governments have focused in various ways, and with continually changing structures and systems, on attempting to pinpoint exactly what it is that employers want, but in the main employers have not valued the skills and qualifications coming from these efforts. The assumption has been that the main needed change is to get the suppliers of education to be more responsive to the believed needs of the demanders of education, and this has driven policy interventions. One problem with this is, even where there are real skill needs that are not being met by education providers, the types of standards developed through this type of approach have tended to be highly narrow and specific, as is discussed in more detail below. Another is that in focusing on current employer demand for skills, governments have done little to *change* employer demand for skill, by creating demand in the economy, or to increase employers' utilization and development of workforce skills (Rainbird, 2010). The case of Scotland, argues Keep, (2012b, p. 6) clearly demonstrates "that a country can create a relatively well-resourced and successful education and training system that creates large numbers of relatively highly qualified young people whose employability is quite highly rated by employers, but still end up with significant problems of youth unemployment, problematic transitions to employment, under-utilisation of skills and little discernible improvement in relative productivity at national level."

Despite these problems, models from the English-speaking countries are commonly replicated in other parts of the world, and have influenced the reform of occupational standards systems as well as of TVET in many countries in the developing world. This may seem to be a paradox, given the poor track record of these countries. Many European and Asian countries have far greater success in most aspects of occupational standards and training. There is, however, a good reason for the apparent paradox, and it is that the systems from the more successful countries are so embedded in the fabric of specific political economies that they are not easily transplantable across national borders. Researchers call our attention to "… the dynamic, partly contingent, and fundamentally political nature of skill formation processes" (Busemeyer & Trampusch, 2012a, p. 4), and point out that a country's predominant skill pattern may be explained historically by "nationally specific institutional constraints and opportunities for capital and labor, in particular with respect to the politics of work organization and of authority at the point of production" (Streeck, 2012, p. 343). For example, Streeck (2012, p. 343) suggests that the US and UK have high wage disparity and an oversized middleclass of managerial generalists because of

> …. successful particularism in the nineteenth century of elite workers with high but narrow skills; futile struggles of other workers with low or no skills for universal forms of social protection, against both employers and craft unions; and a successful effort at de-skilling by employers fighting the restrictive practices of skill labor.

By contrast, he argues that in other countries in the developed world,

> …. early elimination of elite particularism among workers, the rise of encompassing political trade unions, compressed wage scales through industry-level collective bargaining, and successful political mobilization for universal social rights gave rise, in some countries at least, to a tripartite public policy of general upskilling, allowing for low hierarchies, high flexibility, and considerable worker autonomy at the point of production, and in turn constraining employers to specialize on diversified products with high value addition.

Many different factors, such as labour market regulation, unionization, the nature and extent of employer organization and the role of industry peak bodies, the broader political, institutional, and cultural context, the degree of federalism in a country and the relative powers of national governments and states/provinces, and so on, all affect how people are educated for different occupations (Streeck, 2012; Thelen & Busemeyer, 2012). And further, these factors all interact with each other in complex ways; for example, the shape of labour market opportunities structures the incentives to learn (Keep, 2012b, p. 14). In short,

> ... the development and availability of skills is not a matter of unconstrained, rational choices but is strongly conditioned by and reflected in the institutional context of political economies, both historically and in the contemporary period (Busemeyer & Trampusch, 2012a, p. 3).

It is perhaps worth mentioning that some researchers argue that the move towards a qualifications framework in Europe, and specifically the focus on learning outcomes, could be seen as evidence that European countries gradually also starting to adopt the models of English-speaking countries (Brockmann, Clarke, & Winch, 2011), although other research suggests that in some European countries the adoption of qualifications frameworks has been a formality with little real change introduced (Lassnigg, 2012).

The systems in English-speaking countries *appear* more user-friendly than the deeply embedded systems from the countries which have better track records in collective skill formation. They are therefore appealing to countries which are attempting to develop new systems, as well as to donors and international agencies. However, one of the reasons for their apparent user friendliness is precisely that they can be described in ways that are disembedded from any context, and this may be part of why they have not always had great successes, leading policy makers in, for example the UK, to endless cycles of reforms of education and training.

For all these reasons, this paper does not present recipes and simple overviews. Instead, it tries to provide an overview of both information and analysis of how systems work in the selected countries. While there is no one single method or approach in any of the areas described, some general principles can be seen, and there are lessons from failures or problems that are worth highlighting. The paper starts, therefore, in Section 2, with some possible policy lessons for countries wanting to develop or improve their occupational standards systems. This is followed, in Section 3, by an overview providing a synthesis of key insights and experiences from the English-speaking countries. Finally, in Section 4, country overviews are provided to give further insights into aspects of the systems some of the countries (Australia, Canada, Ireland, the UK and the US), to highlight specific pertinent issues and provide an overview of aspects of the specifics of their systems.

2. SOME LESSONS FOR POLICY

This paper highlights the manner in which English-speaking countries have engaged with determining the skills demand, identifying occupations and mapping these against qualifications (standards), developing these standards and supporting and organizing provision of education and training against these. In particular it highlights the role of social partners in these arrangements. The paper explains different systems, and emphasizes both some of the common challenges in these systems, as well as the multiplicity of differences. The following is a list of some lessons for policy:

1. Analysis of skills requirements often focus on current shortages. Instead, there is a need to focus on understanding the implications of the economic policies with respect to areas of anticipated growth and the kinds of skills that will be required to support these. This should be coupled with the development of scenarios taking into account the anticipated trajectory of the economy based on economic policies and incentives as well as the ways in which industry leaders anticipate their sectors will grow and the skills implications of this. This analysis should be undertaken utilizing a combination of qualitative and quantitative techniques that focus on broad areas in which skills will be required; this could include an analysis of nation-wide data pertaining to the economy as well as key interviews.
2. Moving from an analysis of skills requirements to the development of skills to meet those requirements is difficult. This move is easier to make if the forecasting analysis defines the key occupations required at a broad level, so that decisions can be taken as to what should be prioritized for development, or review, as required. This assumes that there is a process to define occupational families and that decision are taken about the number, title and scope of the occupations per family.
3. Further, there is a need to ensure that feedback about demand is provided to institutions and that this is complimented by mechanisms that enable institutions to revise curricula where required and enroll additional students, and for students to access the programmes (through, for example, bursaries that support students to access priority programmes). It also means supporting education institutions, as they need time and resources to conduct research and have up-to-date knowledge of occupational areas; the setting of standards alone cannot provide insight into the bodies of knowledge required by different occupational workers.
4. Standard setting should take place for core occupations with broad profiles. These should directly refer to the major (work) tasks and processes of an occupational field and not to specific branch or enterprise workplaces. The starting point should be a range of core work activities and relevant competencies related to key production and service activities, and not a detailed profile for each specialization. Four to seven occupations per occupational group are usually sufficient. For example, in the field of electrical engineering an electrician for building and installation, an electronics technician for production/automation, an electronics technician for communication and one or two electrician/electronics technicians with different emphasis might cover the complete occupational field and all electric/electronic work at intermediary level. The implementation of new occupational profiles for every new highly specified task is not recommended.
5. This process requires meaningful and on-going engagement with social partners beyond the standard setting process and should include building strong relationships between education institutions and social partners. It should create the space for social partners to engage about matters pertaining to the organization of work and other labour relations issues.
6. The purpose of standards setting should be clear—what is its relationship to educational provision and what is its relationship to occupational regulation. While the two relate to each other, they are not the same. There cannot be a narrow relationship between occupational standards and curriculum, as there is never a narrow one-to-one relationship between the acquisition of bodies of knowledge and the use of knowledge in work. Curricula must be informed by scientific and disciplinary knowledge which enable the development of broad based occupational competencies as well as by the requirements of work. Education institutions need to develop curricula based on the bodies of knowledge which underpin autonomous

work in different occupational areas. They should have the autonomy to do so, without being expected to conform to rigid and narrow occupational competence specifications. Good relationships between education institutions and industry can contribute to ensuring that the bodies of disciplinary knowledge are selected correctly, and that specific areas of knowledge from the broader bodies of knowledge are correctly selected (for example, the physics required for motor mechanics). Further, qualifications or standards should allow education institutions the flexibility to make adapations as technology changes and should have sufficient depth such that learners are able to adapt as jobs evolve.

7. Based on the analysis of occupations it should be possible to review existing qualifications and determine whether new qualifications and standards are required—usually they are not—whether there is a need to review and adapt existing qualifications—often this is also not needed—or whether changes can be introduced only at the level of curriculum and assessment. As indicated the process of prioritizing the qualifications that require attention should be linked to the scenarios for skills demand described above, but should also take into consideration the limitations of such scenario planning. A key learning from the countries studied is the need to ensure that the standards are not so prescriptive that any change in technology requires a new standard. This soon renders the standards obsolete with providers offering training against the standards and then including additional elements that actually address the needs of industry.
8. Social buy-in must be created in multiple ways, and these should be organic wherever possible—in other words, working with and building on existing institutions and systems wherever possible, instead of attempting to replace everything with new systems. Different logics may apply in different sectors.
9. Creating formal systems for standards setting is not enough, and frequently if there is not social buy-in the structures created are not supported by employers anyway. Relationships need to be built as part of the process of provision. There also needs to be effective involvement of social partners in the assessment process. However, another important lesson is that involvement needs to be strategic and limited to key engagements so as to ensure robust involvement. Very large structures with large and complex mandates tend to struggle to quorate and to struggle to engage with specifics. If standards systems contribute to a process of embedding collective understandings of skills and standards, including the knowledge requirements of curricula, even if only in a few sectors, this is an advance. One of the things they can do is 'get people in the same room', talking to each other. However, as indicated, this is not enough. They need to be talking to each other over a sustained period of time and about the right things, leading to consolidated relationships, and the focus cannot only be on standards, but also on the organization of work and other labour relations issues.
10. Implied in all the above is the need to support providing institutions. This focus includes instructor development that consolidates both teaching/learning and industry knowledge and that supports workplace-based training. An important lesson from English-speaking countries is that a focus on regulatory institutions absorbs large amounts of resources, leads to complex structures and systems, and may detract from the focus required on improving curricula and supporting the development of instructors of TVET. Further, educational decisions should not be narrowly linked to predictions of skill requirements, even at broad occupational levels, as there are many limitations to skill forecasting systems, and the relationships between educational qualifications and work are contingent and not always well understood. Educational

decision-making, even in occupational training, needs to be informed by broader educational criteria.

11. Similarly, overall coordination of the entire TVET and skills development system is crucial, but setting up additional coordination bodies may simply add another layer of complexity to the system. Institutions take a long time to build. In addition high levels of change bring about policy fatigue, and reduce trust in the system. Work with existing institutions wherever possible. Strengthen existing coordination structures, such as Inter-Ministerial Committees. Keep structures as small and focused as possible.
12. Skill formation does not happen in a vacuum. If real progress is to be achieved, governments need to attempt to understand the problems caused by the structure and incentives provided by current labour market, product market, and industrial relations regimes. The development of well-qualified workers is hindered by economic and labour market policies that do not create demand for knowledgeable workers and that do not address the nature and organization of work. For example, license to practice requirements create strong incentives for learners to enroll in education and training and for education and training institutions to have well-developed curricula. Policy changes may be required to develop broader occupational identities with relationships to knowledge and skills, including supporting progression in work, improving the quality of working life by changing work organization and job design as well as addressing wages and income distribution; ensuring that employees' voices are heard in any system changes. This report focuses on lessons from English-speaking countries. While the systems in the countries which have historically had more success in developing occupational skills cannot be transplanted as ready-made models, there are many important insights from the history and current practices of these countries.
13. There are no easy to apply 'models' for improving relationships between education and work. Focusing on pragmatic approaches based on the specifics of national contexts, and, equally importantly, sectoral contexts, may be more valuable in the long term; similarly, processes may be as important as structures and models.

3. OVERVIEW OF KEY ISSUES

Predicting skills needs

The United States Bureau of Labour Statistics pioneered one of the early approaches to planning educational provision against changing employment structures, in an attempt to secure jobs for soldiers returning from World War II, and similar experiments took place in post-war Europe (Marock, Yeowart, & Gewer, 2012). Since, then, many countries have tried to achieve some certainty about the supply of skills which their education systems should be producing, for, amongst other reasons, the fact that there are long lead times on investment decisions in education and training. One of the main reasons for attempting to forecast skills is to avoid skills shortages, but there is disagreement about what skills shortages are. Richardson (2007) suggests four types of shortages:

> **Level 1 shortage**: There are few people who have the essential technical skills who are not already using them, there is a long training time to develop the skills and training providers are stretched to capacity.

> **Level 2 shortage**: There are few people who have the essential technical skills who are not already using them, but there is a short training time to develop the skills and training providers are able to expand their provision.
>
> **Skills mismatch**: There are sufficient people who have the essential technical skills who are not already using them, but they are not willing to apply for the vacancies under current conditions.
>
> **Quality gap**: There are sufficient people with the essential technical skills who are not already using them and who are willing to apply for the vacancies, but they lack some qualities that employers consider are important.

Level 1 shortages are seen as the greatest threat as they are the most difficult to fix in the short-term, requiring longer-term planning and a strong and sustainable institutional landscape. Employers and education providers can usually address level 2 shortages within a relatively short space of time, if the incentive structures are favourable. A skills mismatch is caused by issues such as levels of remuneration or conditions of service and requires another form of intervention than training. The quality gap is the most difficult to pin down, and careful analysis is needed to determine which intervention would be most effective, remembering that skills shortages or surpluses are the products of a complex set of political and economic factors. Many researchers point out, for example, that while there is much policy focus on the skill deficits of labour forces, in fact levels of participation in higher education and adult education are at unprecedented levels:

> Job requirements have increased since the 1980s both in terms of formal education levels required for entry or performance as well as training time to learn the job. But increases in educational attainment of the employed labour force since the 1980s exceeds increases in the educational requirements of jobs, and the general rate of underutilization appears to be increasing. (Livingstone & Guile, 2012, p. 5).

Notwithstanding the debates in this area, whether governments require specific skills for an economic growth or industrial strategy, or whether they simply want to better plan provision of education, governments want some sense of what types of skills their country is likely to require in coming years. Skills forecasting should also ideally be able to provide some insights into the different causes of labour shortages in the short, medium, and long term, as inadequate provision from the education system is often not the root cause of specific skills shortages. Unfortunately, skills forecasting is difficult; some researchers argue that it is impossible. The less regulated an economy is, and the less actively a government intervenes in the economy through, for example, industrial planning, the more difficult skills forecasting is; for this reason the public sector often has more successes in planning for its own skills needs than for the skills needs of the private sector. One rule of thumb which can be discerned from the literature is that the more sectoral and short-term the predictions are, the more accurate they are likely to be.

The various systems for skills forecasting come under criticism, but most countries still attempt, through a variety of quantitative and qualitative methods, and a combination of sectoral as well as economy-wide approaches, to improve their insights into skills needs (Marock, Yeowart, & Gewer, 2012; Wilson, 2004). Wilson et al. (2004) list as the main approaches to skills forecasting: formal, national level, quantitative model based projects; sectoral studies; employer surveys; and focus groups or round tables.

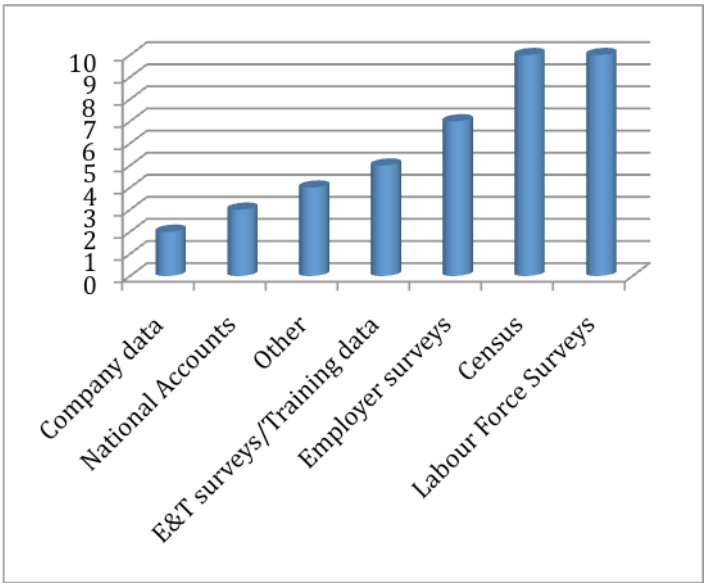
Quantitative modeling of skills requirements are intended to anticipate how the labour market will respond to different external forces. They attempt to provide detailed information for the whole economy, broken into sectors (Wilson et al., 2004). They can early warning signals in the future of demand for clusters of occupations and possible changes in the content of these occupations, at a fairly general level (Fretwell, Lewis, & Deij, 2001, p. 17). While they give indications of the general demand movements within the economy, they are less informative for key sectors of the economy (McGuiness & Bennet, 2008). They are expensive and need detailed and accurate statistical data (Marock et al., 2012). One problem, besides the cost and need for extensive accurate data, is that such models are based on past behaviour patterns which may not continue—labour market requirements for qualifications change over time.

Sectoral studies, often focused on specific geographical areas, provide specific information for a sector, which may be easier to translate into educational planning (Wilson et al., 2004). However, they do not provide a consistent picture of skills needed across sectors, and there are limits to using employer data as employers may see it as in their interests to have an oversupply of skills in order to reduce labour costs (Keep & Mayhew, 2010).

Surveys with employers and other groups can be conducted to assess current skills in the workplace and skills gaps. These surveys provide figures of immediate skills needs (Wilson et al., 2004). The strength of this approach is that it involves the employers who are directly experiencing skills shortages and are affected by the methods used to develop skills in the economy; its weakness, on the other hand, is that it can be subjective and inconsistent and can focus on vacancies rather than actual skills gaps in the workforce. Another approach combines focus groups and detailed interviews with stakeholders and employers to provide qualitative insights into specifics of skills (Wilson et al., 2004). Like other qualitative methodologies it can be subjective and inconsistent (Wilson et al., 2004).

In the main, forecasting is undertaken by independent research agencies, some of which are associated with universities (Australia, Austria, Netherlands) (McGuiness & Bennet, 2008). Where government does the forecasting, this tends to be in specialist units or research committees such as in Ireland (see below). In general, the responsibility for forecasting is centralized, although data sources utilized may be more decentralized. Only in Canada, (and in the non-English speaking world in France and Sweden) is there evidence of forecasting being done at a regional/state level. In all cases, national government or government agencies pay for the forecasts. In a few countries, there is financial responsibility for regional governments or agencies.

A study of 14 countries (Priority Skills Unit, 2008) found that 10 of these countries used the census, usually in conjunction with labour force surveys, for skills forecasting. It also found that employer surveys are also increasingly used, with only one country, Sweden, relying exclusively on questionnaires for forecasting skills needs. Australia undertakes a number of sample surveys, which are used together with the census data. Almost all countries (with the exception of Sweden) utilize two or more data sources in developing



their forecasts, with Germany using seven and France using six.

There is little evidence in the international literature about precisely how demand information is translated to, and used by, providers and social partners within the skills provisioning system. In the very short-term, labour market information systems that draw on, for example, employer data about vacancies, can occasionally produce information which can inform short-term technical training, but in the main, this type of information mainly informs immigration requirements. Some research (McGuiness & Bennet, 2008) suggests that forecasts are mainly utilized by national and regional governments, and less by educational providers. In the example from Ireland (discussed below) forecasting is translated into a plan for provision and is used as a basis for decisions relating to enrolment, curriculum and funding. One factor which seems to lead to success in this example is that the same national body plays a direct role in both forecasting and planning of provision.

There are different models which attempt to relate skills planning and labour market intelligence to educational provision (Powell & Reddy, 2014). One is a market-based model which uses the formal education system as the main mechanism for skills development. This is market-oriented in the sense of student perceptions of market requirements, as well as institutional perceptions to some extent. This model is generally seen to be operational in the UK, Hong Kong and former British colonies. A second model, which can be seen in the Netherlands, Scandinavian countries, and the Republic of Ireland, emphasizes workforce development through social partnership, as social partners are assumed to play an important role in identifying skill requirements and determining which types of skills to provide. It generally also includes structures dedicated to producing labour market intelligence. A third model, associated with what are sometimes referred to as 'developmental states', emphasizes the role of economic, and specifically industrial policy, in creating demand for higher level skills, and central control of education to ensure the production of the required skills. Finally, developing or middle income countries which are trying to jump-start development by improving the supply of skills are trying to adopt a holistic approach whereby macro economic policy and other national policies are linked to those of skills development, employment, and other employment issues. This, however, is easier to describe in policy documents than to actually achieve.

Aligning occupational classification systems to occupational standards and training programmes

Systems of occupational classification are typically designed to cover all occupations in a national economy in which work is performed for pay or profit, reflecting the occupational structure of the economy. Occupational classifications are used by government agencies, industrial and labour relations practitioners, students, job seekers, employers, and so on (Roberts, 2010). They are generally carried out and funded through state agencies and the data are gathered by occupational analysts (International Labour Organization, 2013). Over the years these systems have been revised with recognition of a need for lifetime learning given rapid technological advances that make today's occupations more complex; as Kotze (2014) notes, an interesting feature of the 'knowledge economy' is the sheer variety of the professional work that people do.

A 'job' is usually seen as a set of tasks designed to be performed by one individual in return for a wage or salary, while an 'occupation' is a set of jobs which are sufficiently similar in their main tasks such that they may be grouped together for classification (Australian Bureau of Statistics, 2009). Emmanuel and Cosca (2008, p. 1) describe an

'occupation' as the "collective description of a number of individual jobs performed (with minor variations)". Given these definitions, occupational classification schemes attempt to organize millions of jobs into discrete groups based upon their similarities as determined by the scheme's classification principles (e.g. skill level, skill type, etc.). Detailed occupations with similar job duties, and in some cases skills, education, and/or training, are grouped together, and each worker is classified into only one of the detailed occupations presented based on the tasks he or she performs (US Bureau of Labor Statistics, 2010).

However, classification of occupations is not a straightforward or simple matter, as it depends on interests and perspectives; divisions of labour within and across occupations are not just technical, but also reflect power relations. The notion of occupation varies in different languages, countries, and systems. Different traditions of the occupation-based organization of work and of vocational education and training lead to different conceptualizations of occupations, occupational qualifications, and occupational curricula. Further, occupations in real work contexts are multidimensional, while classifications systems not, and attempts to integrate the multidimensional structure in one hierarchical structure causes confusion.

The ILO's International System of Occupational Classification provides a model for national and regional classification development, as a benchmark against which each country sets up its domestic system of occupational classification. In the ILO's system a job is defined as a set of tasks and duties executed by one person; a set of jobs whose main tasks and duties are characterized by a high degree of similarity constitutes an occupation. There are 436 categories at the most detailed level of the International System of Occupational Classification, i.e. the unit group. While the criteria used to define the major, sub-major, and minor groups are the skill level and skill specialization required to competently perform the tasks and duties of the given occupations, these are not included as part of the classification, unlike some national classifications (e.g. Canada's National Occupational Classification) (Roberts, 2010). Most major groups are homogeneous in terms of skill level, again unlike some national classifications (e.g. the Australian and New Zealand classification) (Roberts, 2010).

Relating occupational classification systems to standard setting and the provision of training is even more complex. The classification of occupations in systems like the ILO's International System of Occupational Classification has different objectives than systematizing occupational profiles and programmes for TVET purposes. One key difference is that the logic of education and training, and hence of occupational standards, drives towards a reduction in the number of occupations, while for labour market analysis purposes a large number of occupations may be useful. The number of occupations in a system can vary from 200 to more than 1000. Complex clusterings of various tasks or detailed listings of narrow tasks may be useful for various analytical reasons; however, in countries with developed apprenticeship schemes the number of *training* occupations is 200 to 400 (i.e. Germany 350, Switzerland 200), and in fact in Germany around 60 % of apprentices are trained in only 20 training occupations.

This is also a political matter, and relates to the cost of training and the mobility of workers within the labour market: broader training is more expensive, produces workers better able to work autonomously, and also supports labour market mobility—something employers may resist.

For practical reasons, for the purpose of training, the development of new occupations and revision to occupational profiles is better done in occupational families, clusters, or

groups. Again, worldwide there are different approaches to cluster occupations to groups. In the international TVET practice between 6 and 16 vocational subject areas or occupational clusters such as health care, construction industry, agriculture, manufacturing or business administration have emerged. For example, in Germany there are 16 occupational families and in the UK there are 14 clusters (related to the social security system). The classification of occupations in Canada lists ten groups (management occupations; business, finance and administration occupations; natural and applied sciences and related occupations; health occupations; occupations in education, law and social, community and government services; occupations in art, culture, recreation and sport; sales and service occupations; trades, transport and equipment operators and related occupations; natural resources, agriculture and related production occupations; occupations in manufacturing and utilities).

The Hangzhou declaration, emanating from a UNESCO International Meeting on Innovation and Excellence in Teacher/Trainer Education, in Hangzhou in 2005, suggests the following clusters, for the purpose of defining competence in occupational/vocational fields: Business and Administration (production and distribution of goods, services, marketing, administration, finances, insurance, transportation, logistics, tourism); Production and Manufacturing (manufacturing, mechanical engineering design, supply engineering/ environmental engineering, automotive engineering); Civil Engineering (construction, wood, surface and coating technology); Electrical and Electronic Engineering and Information and Communication Technology (production systems, building equipment, information and communication technology, media technology); Process Engineering and Energy (applied sciences, energy conversion); Health Care and Social Care (health care, clinical care, personal hygiene, nursing); Education and Culture Travel (child and youth care, nursing education, adult education, special needs target groups, music and dance); Leisure, Travel and Tourism (travel, sports, tourist services, catering and hospitality); Agriculture, Food and Nutrition (agriculture, food production, domestic economy); Media and Information (printing, electronic-advertising, electronic-customer-service, sales promotion); Textile and Design (clothing production, fashion, interior design, art and craft); and Mining and Natural Resources (mining, oil and natural gas).

Developing occupational standards

This section provides an overview of some aspects of how systems for occupational skills are organized, considering: legal frameworks, participants, funding, and the development of occupational standards and skills.

Standard setting is, in theory, about putting in place a benchmark of the requirements for specific areas of work. It is supposed to be linked to the provision of training in that becomes the measure of the ability of people in a particular workplace to carry out specific functions, together with specific knowledge underpinnings and understanding (National Occupation Standards UK, 2014). The idea is to ensure that skills meet the needs of industry, and to build social consensus around the knowledge and skills required in different areas. In some countries, occupational standards take the form of a comprehensive classification system providing categories for monitoring the labour market; in others they are designed as benchmarks for measuring occupational performance, in either a work or an educational context; and in a third group, occupational standards describe the occupation targeted by a qualification and are developed in an integrated process with educational standards (Cedefop, 2009). In English-speaking countries the second approach is dominant.

In many European countries occupational standards are associated with strong provision of TVET and apprenticeships, and are embedded in collective understanding of competence emanating from tripartite corporate models and legal regulation (for example, Germany and Switzerland). In the English-speaking world occupational standards-setting has been dominated by qualification reform focused on reforming the provision of TVET, particularly since the 1980s and the introduction of the National Vocational Qualifications in the UK (discussed further below). The dominant logic in English speaking countries starts with the identification of occupations and then describes competencies for each occupation as occupational standards. These are referred to as national occupational or skills standards, and they set out what are supposed to be measurable performance outcomes for each occupation. The intention is usually for them to describe the skills, knowledge, and behaviour needed to perform competently in different occupational areas. These are the standards which provide the basis for the development of educational programmes as well as for assessment and certification (including the certification of smaller units of qualifications).

One approach used to develop these standards is called job or task analysis, another 'functional analysis', and a third DACUM (Developing A Curriculum) (Fretwell et al., 2001). Job or task analysis is based on repeated onsite observations through which tasks are identified, which can then be generalized to the occupation. It involves dividing and subdividing jobs and tasks into their constituent parts, in order to provide information for training (it is also used to develop benchmarks for piece rate wages). Instead of job observation, DACUM uses guided group discussion with expert workers. Functional analysis starts with the identification of the key purpose of an occupation, identifying the main functions, breaking these in turn down to sub-functions, and identifying outcomes for each function. Functional Analysis uses a consultative process that involves practitioners, managers, and, in some cases, the users or "consumers" of standards.

In functional analysis, employers may be asked to establish the key purpose of the productive function or service under study. A series of questions are asked to find out what functions need to be performed in order for the previous function to be achieved. A set of competence statements or learning outcomes are then created, which are further broken down into specific outcomes and performance criteria for the purposes of assessment. There are many variations of this type of approach, with different emphases and methodologies. In the UK, where this approach was first consolidated, the starting point was an analysis of occupational functions conducted by employers (Stewart & Sambrook, 1995). The hope was that industry-led bodies would develop 'statements of competent workplace performance' from sets of individual 'elements of competence' and their associated 'performance criteria'. These 'elements of competence' (later known as 'occupational standards') were then grouped together into 'units of competence'. The idea is that skilled people, who work in an occupation, can fulfil the needs of occupational profiles and can describe the required tasks, as well as the quality and context in which these tasks take place, more precisely than people from outside. The compilation of these broader characteristic tasks is supposed to provide a complete and holistic description of the occupation. Depending on the complexity, each occupation can be described by a limited number of such complex tasks (approx. 8-16) and the competencies.

DACUM is described as "a method to define systematically the tasks, jobs, competences and tools associated with a certain type of workplace" (Deissinger & Hellwig, 2005, p. 13). Small units are defined first. These are gradually extended to be applied in a broader context. Three assumptions underlie this. First, it is assumed that people doing activities

in workplaces can describe them in a realistic and precise manner. Second, it is assumed that an efficient approach to work and job analysis is to describe the tasks of a specialist precisely and completely. Finally, it is assumed that every successfully completed task requires special knowledge, skills, equipment, and behaviour which can be identified implicitly through work and job analysis (Deissinger & Hellwig, 2005).

Usually a two-day workshop is run with a trained DACUM facilitator and a committee of 5-12 expert workers from the position, occupation, or other area of analysis. The expert workers should have experience in the occupation that is the object of the analysis and are guided by a facilitator so that they are enabled to describe in a clear and precise way the knowledge and skills involved in the job position or occupation. In the workshop techniques of teamwork, group discussion, brainstorming and visualization are used. What is supposed to emerge from this is a detailed analysis of tasks related to the specific occupation, as well as knowledge and skills, tools and equipment, and worker behaviours. A slightly shorter version of this is based on expert-workers' workshops, with the assumption that work should be focused on the needs of the client or user for the product or service.

The National Vocational Qualifications developed in England, Northern Ireland, and Wales in the 1980s was the first large-scale attempt to introduce this type of system, described as "a new system of qualifications" that would "deliver the skills needed by industry" (Phillips 1998, p. 64). A major impetus for the introduction of the National Vocational Qualifications was the idea that the existing vocational education system needed to be dramatically changed in order to contribute to solving Britain's relative economic decline (Hyland, 1994). This model was taken from the UK to the reform of vocational education in Australia (Guthrie, 2009). Like the UK model, the reforms in Australia were aimed at reorganizing vocational education and training, with the hope that this would improve economic performance and international competitiveness (Phillips 1998; Spreen 2001). These reforms also started with a system of national qualifications, developed through analysis of workplace performance. The systems developed in these two countries, with variations, have formed the basis of much of what happens in the English-speaking world, with the exception of the US. Given this, it is important to note, as is discussed in more detail in the country overviews below, that the original National Vocational Qualification system in the UK was widely regarded as a failure, and has been changed many times since its original introduction; the Australian system has been similarly contested.

One of the problems was that the specification of outcomes and assessment criteria led to narrow atomized training programmes, focused on small pieces of skills. This is seen as a contrast to apprenticeship systems which are created to impart identities and occupational knowledge and skills which are broader than just the accumulated assessment of small pieces of skill. Critics in the UK argued that assessment on the basis of the prescribed assessment criteria proved unsustainable (Wolf, 1995). Young (1996, p. 28) argues that "[a]ll the experience of NVQs in England and other outcomes-based systems indicates that attempts to increase the precision of outcomes can only lead to them becoming trivialized". Similarly, in Australia, the National Council for Vocational Education Research (1999, pp. 2–3) argue that:

> CBT [Competency-based training] seems particularly effective for imparting procedural knowledge and routine problem-solving skills, making it well-suited for technical skill acquisition. It is not as well suited to the development of conceptual and experiential knowledge.

> CBT may have been less successful in developing flexibility, adaptability and capacities to innovate, all features seen as necessary for a workforce that will be competitive in a fast-changing, global marketplace.

In many cases occupational skills systems in English-speaking countries have been established with the hope of building relationships between employers and education providers. However, the focus on learning outcomes as a proxy for workplace competence divorced from educational contexts, which was seen as a mechanism to reform education provision in the hope that a more marketized system would be more responsive to the needs of industry and would deliver education more competitively, has caused difficulties. The specification of learning outcomes divorced from syllabuses and content of learning programmes has undermined the extent to which occupational standards can in fact mediate between work and provision of education. Further, judgment of and trust in a qualification always depends on factors that are not expressed in the written outcomes and cannot be 'written down'. Problems are avoided rather than faced when governments use qualification outcomes to drive the reform of vocational education and training and forget that they are relying on 'proxies' for a far more complex institutional process. The learning outcomes associated with these standards can, as a consequence, become overly presecriptive. In both the UK and the Australian systems many standards were developed and never used. In Ireland where there is a concern that the standards within TVET became so tightly defined they left little room for the provider to inject contextual knowledge and insights or to adapt the programme as required by industry, thus ironically serving to distance provision from industry rather than bring it closer.

Further, in practice employers in the UK have not been as interested in defining qualification outcomes as the government had hoped (Young, 2009). Some researchers suggest that this is because the officials who were responsible, with the help of technical consultants, were so focused on the functional analysis of occupations that they paid "too little attention to the complex, messy and heterogeneous pattern of employment situations and structures characteristic of the UK" (Raggat & Williams, 1999, p. 192). Similarly, the Australian system is also supposed to be explicitly 'industry-led', and the structures which design training packages are dominated by industry representatives, but there continue to be criticisms of the lack of a 'fit' between qualifications and labour market needs, and criticisms that standards are not in touch with the 'needs of industry' (Hoeckel, Field, Justesen, & Kim, 2008; Wheelahan, 2009). Wheelahan (2009) also describes considerable hostility from college teachers as well as confusion about the relationships between teaching, learning, and assessment.

Occupational standards involve a range of different role-players with different interests and types of expertise, which makes social partnerships very important. It also means that long-term relationships are necessary, as there is never a narrow translation from one context to another. Many countries have created industry advisory bodies, training or human resource bodies, or skills councils to attempt to institutionalize the voice of employers in standards development systems. The idea is that these employer-led, government licensed, and sometimes government funded, independent organisations provide accurate industry intelligence about current and future skills needs and training requirements. In most English-speaking countries there are sectoral skills councils or industry skill councils. Usually, they have two functions. They are supposed to provide accurate information and expertise about current and future skills needs and training requirements. Second, they are supposed to support the development, implementation and continuous improvement of training. This type of structure has dominated the

English-speaking world in an attempt to create the kind of social dialogue and consensus that has characterized countries that are seen to have successful skill formation systems, such as Germany. It has already been mentioned above that while policy-makers have wanted these structures to be employer-led, employers have not always proved keen to lead. Some researchers have pointed out that the various organizations which are set up to participate in standards setting, certification, quality assurance, and so on, seem to develop a life of their own. For example, in Australia Cooney and Long (2010) employer organizations now generate income from the provision of training services to enterprises.

Certification

The awarding of certificates is one of the most political aspects of any education system, as it has profound bearing on the future of individuals in terms of further study, as well as license to practice in different occupational areas. Rigorous certification systems are crucial to the trust built in any society with regard to any qualification. The role of certification is key in the development of nationally recognized certificates.

As in other aspects discussed in this paper, a contrast can be seen between countries with well-established skill formation systems, where skill certification has been institutionalized for a century, leading to good portability of occupational skills across firms, and general trust in occupational standards (Thelen & Busemeyer, 2012), and English-speaking countries. The latter have instead, especially since the 1980s, focused on systems to specify occupational standards, as well as to test and certify, in an attempt to create such recognition through the standards themselves. Because these systems come from policy makers who wish that industry was involved, as opposed to industry itself, and because the focus is narrowly on developing standards without addressing broader labour market and work issues, they tend to have low credibility. Because the structures are not really embedded in the culture of employer, worker, and education institutional cultures, the standards have little credibility, and do not lead to the desired certified and widely recognized skills. Further, the serial reform of qualifications in many English-speaking countries, while intending to improve the transparency of qualifications, has in many instances caused confusion about the meaning of different qualifications.

Central to certification is assessment. Whether certificates are issued by education institutions, institutions specifically set up for certification, or examining bodies, these institutions need well-run systems for administering assessment and issuing certificates, and trust in such institutions takes time to build in society.

Occupational assessment and certification systems desire to test and certify that a specific individual can execute specific work. This is a complicated matter. There is much debate within the education and training community about the best ways to carry out assessment. Written examinations are the cheapest to administer, as well as usually the best way of testing theoretical knowledge. However, TVET also requires practical assessment, and it is here that there is much difference. In some systems practical application is tested through externally set and examined trade tests which attempt to test holistic execution of key tasks. In many English-speaking countries, assessment was decentralized in an attempt to make it as authentic to specific work situations as possible, so that individual assessors could go into workplaces and observe the performance of individuals in real working conditions. These systems also separate teaching from assessment from certification. In practice this requires many individuals to be licensed as assessors, which further requires a complex and expensive regulatory system. Further, it has proved very difficult to maintain standards across such highly individualized

judgements. Institutionalized tests are of necessity further from real work contexts, but may be better able to test holistically and rigorously across individuals, maintaining a similar application of standards; further, it may be easier to involve employers in such systems. An independent examination (or assessment) board representing the world of work (professional organizations, representatives from enterprises (employers and trade unions) and TVET providers) can improve transparency, acceptance, and cooperation between different stakeholders. However, it is always best to build on existing structures, rather than attempting to develop entirely new institutions.

Another issue is that of theoretical knowledge. Some occupational training systems have attempted to only test practical application in the workplace, based on the assumption that any theoretical knowledge required must inform the application, and therefore does not need to be tested separately. One problem with this assumption is that because in many English-speaking countries the occupational standards are used as the basis for curriculum design, theoretical knowledge is then neglected in teaching, as it is not specified in the standards. Secondly, an individual may have success in some applications without fully grasping bodies of theoretical knowledge which would in fact inform competent work, particularly the ability to make executive decisions and work autonomously.

Labour market requirements affect occupational testing and certification issues, and vary substantially across countries in terms of where there are license to practice requirements, as well as other regulations in the labour market. License to practice requirements usually emerge when members of a profession or occupation have enough political strength to influence the government to establish requirements regulating entry into the profession; one key reason for doing so is to limit competition and maintain high salaries. Licenses to practice are important to protect the public in areas where it is difficult for a layperson to judge the quality and safety of a product or service (Bailey & Berg, 2010). Arguments about protecting the public are used to convince governments to enact regulations for occupational areas. This is often in areas of work with higher-level skills, which are seen as more difficult to understand and having significant public safety implications; further, it is usually highly educated workers who have the requisite political influence to get their occupational areas regulated. Particularly in English-speaking countries, certification in the sense of license to practice is usually associated with professions as opposed to mid-level occupations. As can be seen in the country discussions below, mobility across occupations and professions is to some extent linked to the regulation of occupational standards, but can have other political drivers. Further, as Streeck (2012) points out, there are many factors other than skills and certification which affect labour market mobility; for example, Japanese auto workers who have much broader skills than American counter parts have effectively non-portable skills because of employer collusion against worker mobility.

4. COUNTRY OVERVIEWS

Australia

Forecasting and occupational classification

Skills forecasting in Australia, done mainly by the Centre for Policy Studies at Monash University, uses data from the national census as well as a large number of sample surveys conducted by the Australian Bureau of Statistics (McGuiness & Bennet, 2008). The information obtained is used by the national and the state authorities.

An important role-player in this area was the Australian Workforce and Productivity Agency, which is supposed to provide advice to the Federal Minister of Industry regarding Australia's current, emerging and future skills and workforce development needs. The agency described itself as directing skills funding to sectoral and regional industry needs, and suggests that this is achieved through the high-level expertise at the agency, as well as union leadership and collaboration, which together make it a recognized authority in workforce development[1]. Among other things, the Agency developed and monitored sectoral skills and workforce development plans in collaboration with industry and the Industry Skills Councils (see below). The functions of this organization were taken over by the Department of Industry this year.

It is worth noting that the Australian labour market has relatively high levels of casual employment, with growth in highly-skilled jobs, a slight decline in less-skilled jobs, and declining levels of employment in middle-ranking skilled jobs such as trades and advanced clerical and service jobs (Cully, 2008; Keating, 2008). Cully also points out that there has been declining union membership in Australia, as a result of deregulated markets and deliberate policies to weaken union powers.

In terms of occupational classification, the first edition of the Australian Standard Classification of Occupations (ASCO) was completed in time for the 1986 census. Prior to this, the Australian Bureau of Statistics used the Classification and Classified List of Occupations which was modelled on earlier International Systems of Occupational Classification, while employment services, education, and other users used different classification systems (Budlender, 2003). With the next major review of the classification the systems of Australia and New Zealand were merged, developing a common Australian and New Zealand Standard Classification of Occupations (ANZSCO) that brought together the Australian Bureau of Statistics and Statistics New Zealand to create it (Australian Bureau of Statistics, 2014). The current Australian and New Zealand Standard Classification of Occupations is version 1.2 of 2013 (Queensland Government, 2014), for which there is a development team reporting to a project board consisting of senior officials from both countries (Budlender; 2003). The Australian Bureau of Statistics suggests that the use of the Australian and New Zealand Standard Classification of Occupations has resulted in improved comparability of occupation statistics produced by the two countries.

The Australian and New Zealand Standard Classification of Occupations system uses skills (skill level and specialization) as the central organizing concept in classification (Budlender, 2003). Based on skill levels of 1 to 5 (where 5 is the lowest level i.e. a Senior Secondary Certificate of Education), the classification provides for 8 major occupation groups (e.g. Major Group 3: Technicians and Trade Workers), 43 sub-major occupation groups (e.g. Sub-Major Group 21: Arts and Media Professionals), 97 minor occupation groups (e.g. Minor Group 224: Information and Organization Professionals), 358 unit occupation groups (e.g. Unit Group 7213: Forklift Drivers) (Australian Bureau of National Statistics, 2014). This structure organizes a total of 1023 occupations. Skill specializations are intended to group together occupations across which individuals should be able to move without significant formal retraining (Bundlender; 2003).

The classification is used for both statistical and administrative purposes(Roberts, 2010). While the Australian and New Zealand Standard Classification of Occupations, like other national classifications and the International Standard Classification of Occupations,

[1] http://www.awpa.gov.au retrieved 21 October 2014

divides occupations across groups and units which are then coded, it is somewhat different in detail: the Australian and New Zealand classification has greater detail than the international and many national classifications. The additional level detail is in the disaggregation of the unit group level (United Nations Statistics Division, 2014).

Some concerns around the use of the Australian and New Zealand Standard Classification of Occupations include: under-coverage of emerging occupations, occupations and industries that are not readily relatable, and incorrect skill levels which do not reflect the heterogeneity of an individual occupation (Roberts, 2010). Roberts argues that the effects are, among other things, inaccuracies in data representation, leading to limitations on funding for training and access to migrant workers in those occupations that are highly demanded. The Australian and New Zealand Standard Classification System is also criticized for failing to keeping pace with changes in the various occupations already listed and emerging. This framework is used to understand skills shortages, and problems with it create difficulties for industry in communicating the extent of skills shortages.

Structures and systems for standards setting, assessment, and certification

The Australian system of occupational standards setting is contested in Australia (Guthrie, 2009; Schofield & McDonald, 2004; Wheelahan, 2008). It has strong supporters, and its approach to competence-based training and Industry Skills Councils has been used as a model in many countries around the world. Notwithstanding this, Australia generally has weak education/labour market relationships (Cooney & Long, 2010, p. 29):

> The Australian VET system remains a *segmented system* of vocational education and training with weak links between vocational education and training and employment and between vocational and other qualifications.

The links are tightest in the trades and other regulated occupations such as electrician and physician occupations (Wheelahan, 2009).

The system has many stakeholders and role-players. This includes government departments, Industry Skills Councils, regulatory authorities (i.e. the Australian Skills Quality Authority, the Victorian Registration and Qualifications Authority and the Training Accreditation Council); state and territory government departments, and national policy organizations (such as the Australian Qualifications Framework Council and Education Services Australia). The roles and composition of some of these bodies is discussed below. For now it is important to point out that this complexity makes the system difficult to navigate and expensive. Wheelahan (2012) points out, for example, that in 2012/13 $32.8 million was allocated by the Australian government to the regulatory authority for vocational education (the Australian Skills Quality Authority) compared to $19.5 million to the higher education regulator (the Tertiary Education Quality Standards Authority); there are 4900 active registered training providers in vocational education as opposed to 170 in higher education. This also makes it difficult to give a clear account of the systems and institutions, as some of the specifics of the different structures shift over time. For example, until recently standards setting in Australia was overseen by the National Skills Standards Council (NSSC) of Australia[2]. Early this year this Council was done away with, leaving its various functions to be delegated to industry representatives and selected senior officials through the Industry

[2] http://www.nssc.natese.gov.au/home Retrieved 29 October 2014.

and Skills Council Advisory Committee. More information, particularly on methodologies used, can be found in Bewick and Abbott (2010).

Since the 1980s various reforms attempted to create a national vocational education and training and occupational standards system. A key driver behind this was a desire on the part of government to create an open, competitive training market, which was nationally coherent, with portable qualifications which were led by industry (Wheelahan, 2009). A National Skills Framework was created, consisting of the Australian Quality Training Framework and training packages, discussed below. The Quality Training Framework was concerned with regulating the providers of training, while the training packages were about the qualifications issued. The success of the marketization drive is contested. Wheelahan (Wheelahan, 2009) argues that there is little evidence that it has achieved the outcomes sought by government, and Malloch and Cairns (2014) suggest there is increasing evidence that public provision has become considerably weaker.

Training packages are the nationally endorsed standards and qualifications, which contain competence standards in a specified format, and are thus seen as defining skills and knowledge required in workplaces within specific occupational fields (Deissinger & Hellwig, 2005, p. 32). As in the UK, they are supposed to be the benchmark for defining performance in both work and educational contexts. In terms of education, they are intended as the basis for course development and assessment, and as a mechanism to enable articulation and portability within vocational education and training (Crawford, 2003). They are officially intended to:

- enable the VET system to achieve an a match between industry skills demand and skills supply,
- encourage relevant and flexible workforce development and learning,
- provide national recognition of the vocational outcomes of learning, and
- guide and support individuals in their chosen careers and the relevant training[3].

Training packages are supposed to be essential components or features of the Australian national vocational education and training (VET) system because they are the basis for most programmes offered through the VET system, including apprenticeships, occupational licensing, training courses offered through private training organizations, and so on. They are also supposed to enable qualified assessors to assess endorsed units of competency outside of any formal learning programme, thereby "giving equal status to formal, informal, and non-formal learning" (Byron 2003, p. 66).

As mentioned above, this system has been subject to substantial criticism and debate (Guthrie, 2009; Wheelahan, 2010). The standards in the training packages were found by a high level review to be poorly differentiated; it was argued that the same groupings of units of competence could lead to "multiple qualification outcomes for vastly different content and training effort" (Schofield & McDonald, 2004, p. 10). A recent OECD review (Hoeckel et al., 2008) cited problems such as the length and complexity of documentation associated with the standards, as well as a lack of national assessments. The Industry Skills Councils recognize that the large number of registered training providers makes it hard to maintain standards nationally, and that policymakers urgently

[3] www.serviceskills.com.au/about-training Retrieved 28 October 2014.

need to restore confidence in standard-setting relations if enterprises, governments and individuals are to continue investing in nationally recognized training[4].

Industry Skills Councils are established and mandated with the responsibility of developing these training packages for each industry. There are 11 Industry Skills Councils in Australia: in Construction and Property Services; Community Services and Health; AgriFood; Energy Skills; Government Skills; Service Skills; Transport and Logistics; Innovation and Business; Manufacturing Skills; Forest Works, Construction and Property Services and Drilling, Mining, Quarrying and Civil Infrastructure (Industry Skills Councils Australia, 2014). Industry Skills Councils are funded by the Australian Government and governed by independent industry led boards. These Councils consult with relevant stakeholders such as educators and unions, and oversee the standards system; for example the Community Services and Health Industry Skills Council occupational standards cover over 500 job roles carried out by over 800 000 workers in Australia. These jobs are coded and classified in the Australian System of Occupational Classification, although there are constant changes. The official roles of Industry Skills Councils involve:

- providing integrated industry intelligence and advice on workforce development and skills needs to the Australian Workforce Agency and Productivity Agency, the government, and businesses,
- supporting the development, implementation and continuous improvement of high quality training and workforce development products and services including the training packages discussed above,
- providing independent skills and training advice to businesses, including matching identified training needs with appropriate training solutions; and working with enterprises, employment service providers, Registered Training Organisations, and government to allocate training places under the Enterprise Based Productivity Places Program, and
- engaging with State and Territory Governments, State and Territory industry advisory bodies and peak representative bodies in their respective areas of industry coverage.

Industry Skills Councils claim to represent industry, and ensure that policies are industry-led. In practice they represent, at most, certain voices within industry. The match between supply and demand of skills is primarily determined by the market, and employers often prefer experience to qualifications (Wheelahan, 2009).

The Australian Skills Quality Authority, an agency of the national government, is concerned with the national regulation of Australia's vocational education and training sector and works with the Councils with respect to the training packages. It endorses training packages once the Councils have developed and validated them through research and consulting with industry stakeholders.

Regulatory bodies across states and territories may also specify training and assessment criteria for licensing in the respective occupations that they regulate. This then creates various levels of control over industries and the relevant jobs within each industry. There are a number of trades that are regulated on top of having industry occupational standards developed by the skills councils e.g., plumbing or electrical trades. Apprentices

[4] http://www.isc.org.au/vet-quality Retrieved 27 September 2014.

have to sit an examination, usually at the state level. Government has apparently tried to change this in various ways, such as by getting rid of any exams on top of the training package, but have not been successful. They also tried to have a system of national recognition so that exams undertaken in Victoria were recognized in Queensland and vice versa, and there is some mobility across states.

Canada

Forecasting and occupational classification

Human Resource Development Canada does most skills forecasting in Canada, paid for by the Labour Ministry. Independent research institutes also produce both federal forecasts and regional and sectoral forecasts. Two main approaches are workforce projection and labour market analysis (Canadian Council on Learning, 2007). Labour market analyses are supposed to identify and continually adjust to current regional and short-term trends. They use 'signals' such as newspaper job listings, or data from provincial and public employment and social insurance services to collect information about job openings, placements, and unemployment rates. However, data gathered from newspaper listings and public employment services are not generally available in a form that can easily be analyzed, and are unlikely to be complete since many jobs are not posted and many unemployed do not register with public services. Other types of signals used include employer and household surveys, enrolment data and tracer studies. Workforce projection produces longer-term forecasts at a federal and provincial level, informed by state policies which will affect education and training requirements. It is usually seen as long to medium-term prediction.

As discussed above, the further ahead the forecasts are made, the less accurate they become. Even at a sectoral level, where projections tend to be more accurate, according to the Canadian Council on Learning translating the anticipated skills changes into information which can inform decisions and policies regarding training and education requirements proves difficult. The federal government uses information obtained for planning for training; sector councils use it to assess training needs, develop syllabi, and develop occupational standards, as well as to evaluate training effectiveness of training. Career counselors also use information from labour market predictions—CD-ROMs are distributed to schools (McGuiness & Bennet, 2008).

There is anecdotal evidence of labour shortages but little data to corroborate these. The Bank of Canada Business Outlook Survey (Bank of Canada, 2013) shows immediately after the recession unfilled vacancies grew, but in general have lower than for much of the past decade. A recent report of Human Resources and Skills Development Canada based on the Canadian Occupational Projection System does not show significant occupational shortages, except in specific geographic areas (Mendelson & Zon, 2013).

Canada has a National Occupational Classification which is organized into two volumes describing occupations in terms of aptitudes, interests, education, physical activities, and so on[5]. A separate index further classifies over 25,000 job titles from the listed occupations. It is published by Human Resources and Skills Development Canada, a government department which supports public policies for labour market, social development, early childhood and post-secondary education, in conjunction with Statistics Canada.

[5] http://www.statcan.gc.ca/subjects-sujets/standard-norme/noc-cnp/2011/introduction-eng.htm Retrieved 29 July 2014.

The National Occupational Classification is a four-tiered hierarchical arrangement of occupational groups with successive levels of disaggregation, containing broad occupational categories, major, minor, and unit groups. Ten broad occupational categories are presented (each with a unique one-digit code and composed of one or more major groups), with 40 major occupational groups (each with a unique two-digit code), 140 minor occupational groups (each with a unique three-digit code) and 500 unit occupational groups (each with a unique four-digit code).

While the National Occupational Classification is one of the main data sources that supports the Working in Canada Tool which is part of the Government of Canada's 'Going to Canada' Immigration Portal, a version exists that is managed and maintained by Statistics Canada known as the National Occupational Classification for Statistics (NOC-S). The two classifications are based on similar classification criteria (i.e. skill level and type), although the criteria for defining skill level in the National Occupational Classification are specifically for the Canadian context (United Nations Statistical Division; 2014). The Canadian National Occupational Classification has more classes for supervisors than the international classification (United Nations Statistical Division; 2014). Moreover, different to the Australian and New Zealand Standard Classification of Occupations (and similarly to the classifications of most other countries), the National Occupational Classification 2011 is broadly structured, with only half the number of detailed categories in the Australian and New Zealand Standard Classification of Occupations (Roberts, 2010). Canada's National Occupational Classification 2011 also contains a smaller total number of featured occupations compared to the Australian and New Zealand Standard Classification of Occupations and does not specify skill levels for each category like the former (Roberts, 2010).

Standards setting systems and structures

Canada has voluntary national occupational standards, except in the trades where they are mandatory but may be provincial. Occupational standards are intended to enable recognition workers' knowledge and skills across Canada, and to facilitate labour mobility across Canada. They are also supposed to support the process of recognizing foreign credentials. Awards against recognized standards are made by certification bodies. This is also voluntary. Over 3000 standards are developed by the Canadian Standards Association, an independent not-for-profit membership-based organization. The core competencies include project management, research and analysis, stakeholder engagement, consensus building, standards development and implementation, and education and training. Essential skills, which are seen as necessary for other learning, are also included (reading text, document use, numeracy, writing, oral communication, thinking skills, working with others, computer use, continual learning). Essential Skills Profiles describe how each skill should be used by workers in particular occupations. They are intended to integrate Essential Skills into National Occupational Standards, thereby providing complete picture of the requirements of an occupation, and highlighting which skills are transferable to other occupations[6]. Guidelines to support training against the national occupational standards as well as for certification and accreditation are produced by the Canadian Standards Association and the Alliance of Sector Councils. Accreditation of educational or training courses and programs is also voluntary, and there is a range of different accreditation bodies across sectors and regions.

[6] http://www.unevoc.unesco.org/e-forum/Setting-the-Standard-EN.pdf Retrieved 5 November 2014

Like other English-speaking countries, Canada has sector councils which are industry-led partnership organizations (Bewick & Abbott, 2010). There are about 27. They are intended to address skills development issues and related issues in key sectors of the economy. The include representatives from business, labour, education and other professional groups. They make available information on employer expectations and hiring practices, as well as the planning, development, and delivery of training in their sector, and labour market conditions within their sector. Other issues which they cover include career opportunities for the sector; apprenticeship programs; assessing foreign credentials; integrating immigrants into the workplace; and developing occupational standards and certification programs. Councils work nationally. Information about standards, labour market requirements, suitable and accredited educational offerings, and so on, is provided to states, which have practical and jurisdictional responsibility for labour market training, although there is some contestation about this (Bramwell, 2011). Regulation of professions and trades takes place at a state level[7].

The Alliance of Sector Councils is a coordinating body for the sector councils as well as organizations representing business, labour, education, and other professional groups. Its role is to analyze and address sector-wide human resource issues nationally[8]. The Canadian Immigration Integration Partnership works with sector councils, to obtain up-to-date information about sector needs, develop tools to assess prospective immigrants, and other immigration-related tasks[9].

Republic of Ireland

The focus here is mainly on one aspect of the Irish system, which is the relationship between skills predicting and training, as it appears that this system may work relatively well in Ireland. It seems to be the only example in the current study of a structure which is directly responsible for advice on both labour market requirements and the planning of training.

In Ireland forecasting relies on the 'Expert Group of Future Skills Needs', which is comprised of representatives of business, employees, education, government departments, and state agencies. The Expert Group advises the Irish Government on skills needs and labour market issues that impact on enterprise and employment growth. The Expert Group has recently undergone structural changes. It used to be constituted under Forfás, which was Ireland's policy advisory board for enterprise, trade, science, technology and innovation, established in 1994 as an agency of the Department of Enterprise, Trade and Employment. Following the commencement of the Industrial Development (Forfás Dissolution) Act 2014 on 1 August 2014, Forfás' policy functions have been integrated with the Department of Jobs, Enterprise and Innovation. The composition and functions of the Expert Group have remained essentially consistent; it has the following responsibilities (Expert Group on Future Skills Needs, 2011, p. 3):

1. Advise Government on projected skills requirements at national and sectoral levels and make recommendations on how best to address identified needs;

[7] http://www.albertacanada.com/opportunity/working/education.aspx Retrieved 5 November 2014.

[8] http://www.unevoc.unesco.org/e-forum/Setting-the-Standard-EN.pdf Retrieved 5 November 2014

[9] http://www.newcomersuccess.ca/index.php/en/partner-engagement/sector-councils Retrieved 5 November 2014.

2. Advise Government on associated priority training requirements and the most cost effective ways of responding to them;
3. Advise on any skills requirements that cannot be met internally in Ireland at a given time and so must be met through inward migration;
4. Advise on developments in content and delivery systems that support excellence in training quality elsewhere and on adaptations necessary to incorporate such developments into training provision here;
5. Respond to any request for advice from the Minister for Enterprise, Trade and Employment on training programmes that are supported through the National Training Fund; and
6. Report on progress made in the implementation of its recommendations.

The Expert Group has supported research to explore changing skills requirements within different economic sectors and the changes in the demand for specific occupations within each sector (Expert Group on Future Skills Needs, 2007). This analysis includes a review of the basic and generic skills required within the economy. The research identified ICT, medical devices, pharmaceuticals/ biotechnology, food and drink, and high-value engineering as sectors that hold the potential for future growth. In each of these sectors the Expert Group developed a more detailed plan and a strategy for supply (Expert Group on Future Skills Needs, 2014). This includes developing an analysis of which programmes are required and proactively liaising with education institutions to ensure that they both support increased enrolment and are able to make adaptations to their curricula to ensure that they are relevant to the identified needs. Programmes offered can result in one of four classes of award-types:

- **Major** awards are the main class of award made at a level. Within the major awards, there are 16 generic award types that have been developed with at least one at every level.

- **Minor** awards provide recognition for learners who achieve a range of learning outcomes but not the specific combination of learning outcomes required for a major award. That is, they achieve a component of the qualification. These awards allow learners to build up units of learning at their own pace to meet their own needs.

- **Special-purpose** awards are made for very specific, relatively narrow, purposes — for example, the Safe Pass certification of competence in health and safety in the construction industry.

- **Supplemental** awards are for learning which is additional to a previous award. They could, for example, relate to updating and refreshing knowledge or skills, or to continuing professional development.

On each of the 10 levels, there are one or more award-types which are associated with what are termed "named awards", with indications of specific fields of learning. The system though has been through a number of iterations, which is a source of some frustration and confusion for social partners. One paper observes that, "some of the

original reforms have themselves been reformed over time"[10]. The most recent change was in 2012 where a single award body, Quality and Qualifications Ireland was established. Quality and Qualifications Ireland is a new integrated agency, which replaces the Further Education and Training Awards Council, the Higher Education and Training Awards Council, and the National Qualifications Authority of Ireland and the Irish Universities Quality Board.

To enable the development of standards Quality and Qualifications Ireland invites applications for new standards development that are required to complete a proposal that provides information to address questions such as: what the award standard (s) will be called, the field of learning (Quality and Qualifications Ireland indicates the different fields of learning and related domains), purpose, whether existing standards exist (related), what relevant international work has been done, who has been consulted and whether the Expert Group on Future Skills needs has been consulted.[11] Quality and Qualifications Ireland also provides an assessment matrix, which indicates what needs the nature of the assessment and how this should be approached. Templates to guide these processes are provided so as to ensure that all standards include the agreed upon information. Quality and Qualifications Ireland[12] guidelines state that they will prioritize the development of certain awards. These will take into account the needs that have been indicated by bodies such as the Expert Group of Future Skills Needs.

The Expert Group also interacts with providers. Once they have set the priorities they write to every institution, telling them the priority areas, and asking whether they can adapt their courses to meet priority needs and enrol more students. They reach agreements with providers and government supports the providers to offer the required programmes, and learners to access them. Agreements reached with education institutions are then supported by government and additional funding is made available to enable institutions to make the requisite changes to their curricula. Further, government provides incentives to institutions to increase enrolment in priority areas and makes bursaries available to students to attend studies in these areas. This is a very practical translation of priorities into provision, and it does not require new qualifications, typically just new modules and increased numbers, so is achievable relatively quickly, and ensures providers are thinking about what priorities are and how to address these in a meaningful way.

United Kingdom

Forecasting and occupational classification

The UK Commission for Employment and Skills is a social partnership, with representation from large and small employers, trade unions, and the voluntary sector. It is intended to ensure that skills levels increase, with a view to driving enterprise, creating more and better jobs and promoting economic growth. This includes providing labour market intelligence and working with businesses to develop the best market solutions which leverage greater investment in skills; maximising the impact of employment and skills policies, and employer behaviour to support jobs and growth and secure an

[10] Quality and Qualifications: enhancing pathways to lifelong learning and employability, Barbara Kelly, Head of Industry and External Partnerships, Quality and Qualifications Ireland, undated.

[11] QQI Guidelines and Criteria for Proposing the Development of New Award Standards or Review of Existing Ones, 21/10/13

[12] QQI Guidelines and Criteria for Proposing the Development of New Award Standards or Review of Existing Ones, 21/10/13s

internationally competitive skills base. It has commissioned what it describes as the most detailed and comprehensive set of UK labour market forecasts available, Skills forecasts in the United Kingdom "Working Futures 2010-2020" (Wilson & Homenidou, 2012). This paper forecasts the demand for skills as measured by occupation and qualification. It suggests that there will be a continued trend of employment growth in higher skilled, white-collar occupations, including managers, professionals and associate professional roles. The study estimated two million additional jobs in these occupations by 2020 in the UK. The Commission works with government and researchers to develop an evidence base and pool expertise. As a UK-wide body, it hopes to ensure a strategic approach to skills development across a number of different government departments and in the four devolved administrations. It recognizes that employer engagement is critical but very hard to achieve in the UK, and attempts to improve this in the TVET system. The Sector Skills Councils (discussed below) also play a role in labour market intelligence.

Prior to 1990, the Office of Population Census and Surveys had an occupational classification which was used both for the census and surveys (Budlender, 2003, p. 49). The Employment Department Group used what was called a Key List of Occupations. The revision of the census classification for the 1991 census represented a significant break in that the government wanted to align the different classifications. Working with both the previous Population Census and Surveys classification and Key List of Occupations, the developers came up with a framework containing 371 occupational codes. The classification became known as System of Occupational Classification (Budlender, 2003). The UK's occupational classification system continues to be revised every ten years, for use in the decennial population census (Budlender, 2003). The System of Occupational Classification 2010 is the latest revised edition and is divided into three volumes[13]. It is maintained by the Classification and Harmonization Unit of the Office for National Statistics. In this latest revision jobs are classified in terms of their skill level and skill content. Occupations are categorized into 9 major occupational groups and 25 sub-major groups, and then further divided into 90 minor groups and then 369 unit groups. It is designed to work in harmony with the International System of Occupational Classification, and is seen as relatively well aligned with the international system. Unlike the classifications of the US, Australia and New Zealand, and Canada, the UK classification is less detailed than the international classification. On the other hand, the UK System of Occupational Classification is similar to the classifications of the other nations mentioned here insofar as the principles and concepts underlying the UK classification are the same as those of the other nations, making "skill level" and "type" central. The UK classification differs in occupational coding, so that the two systems are not identical. Again, similar to the other national classifications discussed here (aside from the Canadian), the UK System of Occupational Classification is used for both statistical and administrative purposes. While the alignment of the UK System of Occupational Classification with the International Standard Classification of Occupations makes data comparisons possible at the 4-digit unit occupational group level, the dissimilarities cause some problems; there are some 143 unit occupational groups that cannot be mapped across the two systems.

[13] http://www.ons.gov.uk/ons/guide-method/classifications/guide-to-classifications/index.html Retrieved 29 July 2014.

Systems for standards setting

By international standards, the UK has complex systems of qualifications, education, and training, decentralized wage bargaining, and weak links between education and work. It also has a history of weak and fragmented vocational education provision: "concerns about the poor state of technical education and training, and its potentially deleterious impact on economic performance can be identified as far back as the 1850s" (Raggat & Williams, 1999, p. 5). Some argue that the problem is a dominance of academic topics in the curriculum, while others suggest the problem is the absence of state intervention in the economy and labour market, and the primacy of volunteerism, which led to a loose, incoherent, and fragmented training system. Like the system in Australia, there is frequent policy change, as well as changes to the systems and structures for standards setting, as well as the role of the state, the nature and composition of sectoral bodies, and the mechanisms for distributing state funding. Keep and Mayhew (2010, p. 271) describe these changes as based on "a limited, repetitious menu of supply-side policy moves—targets, institutional change, new qualifications, new delivery programmes, fresh streams of government subsidy, employer 'voice' issues, and exhortation". There are various government departments which have interests and responsibilities in this policy arena, and they themselves have changed names and responsibilities over the years. There is a proliferation of agencies and organizations which has been established, modified, and replaced over the years. Because of the drive to political devolution in Northern Ireland, Scotland, and Wales, there are now four distinct national training systems, rather than one, although across all of them there are no strong institutions that have proved capable of cooperation, coordination, and social partnership on training (Rainbird, 2010, p. 267).

An 8 level framework of qualifications is supposed to be an important organizing tool for occupational standards setting. The framework includes all general and vocational qualifications in England, Wales and Northern Ireland. There is also a framework for Higher Education Qualifications designed by the higher education sector. It provides an overview of all the main higher education qualifications offered by universities or higher education colleges, and a Qualifications and Credit Framework that contains vocational qualifications available in England, Wales and Northern Ireland, developed from 2005 onwards. The credit system is intended to clarify how the different types of qualifications interrelate and allows credit from assessments to be transferred flexibly between qualifications (Musset & Field, 2013). This framework is central to the development of occupational standards, as it sets the rules for the design of vocational qualifications.

Standards are designed by awarding bodies, from units in the databank of the framework. The units are derived from National Occupation Standards developed by the Sector Skills Councils. There are close to 175 awarding organisations, which are officially recognized by the Office of Qualifications and Examinations Regulation (Ofqual). Ofqual accredits awards and monitors the activities of awarding bodies, including their fees. Units are brought together to form qualifications. Qualifications include awards (between 1 and 12 credits), certificates (between 13 and 36 credits) and diplomas (requiring at least 37 credits).

According to an OECD review, there are wide differences between the different qualifications available. This is supposed to enable flexibility, but also can be confusing for different stakeholders (Musset & Field, 2013, p. 15)

As discussed in Section 3, government's focus in terms of mid-level occupations since the 1980s has been on the reform of qualifications, through the creation of national vocational qualifications, which were competence-based qualifications covering almost

every industry and occupation (Young, 2009). As described above, the idea was that the starting point in designing a qualification should be an analysis of occupational functions, conducted by employers (Stewart & Sambrook, 1995). Industry-led bodies would develop 'statements of competent workplace performance' from sets of individual 'elements of competence' and their associated 'performance criteria'. These 'elements of competence' (later known as 'occupational standards') were then grouped together into 'units of competence'. Each national vocational qualification was made up of a number of related 'units of competence' (Young, 2009). The first National Vocational Qualifications were awarded in 1988. They have no prescribed programme of learning. Government policy-makers hoped that because employers "owned" these new standards (because they had been developed by employer-led bodies), they would use them to assess their employees.

However, the development of these standards relied on two assumptions that proved to be flawed. The first was that employers would have the time, commitment, and expertise to develop standards and assess trainees against them. The second was that the standards would be a reliable basis for judging workplace performance. In fact, many employers resisted taking on these responsibilities as too time-consuming and bureaucratic. The assessment of occupational competence was therefore taken over by Awarding Bodies who, funded by government, developed a complex hierarchy of assessors, and internal and external verifiers in an attempt to guarantee quality (Young, 2009).

Vocationally-Related Qualifications are run in parallel to NVQs and awarded through traditional awarding organizations, including bodies such as BTEC (Business and Technician Education Council) and City and Guilds. Unlike competency-based qualifications (NVQs), they do not require a learner to show evidence of being able to do a particular job to a specific standard, and are therefore not purely based on the National Occupational Standards. They are not assessed in the workplace and are taken at colleges or other educational establishments (Lester, 2011).

As mentioned above, the original National Vocational Qualifications system was sharply criticized within the UK, and has been the subject of continuous policy reform ever since its introduction. The qualifications created through this framework were seen as undesirable not only by parents and youth, but also by employers, the very constituency they were primarily aimed at (Wolf, 2002). Hyland (1994, p. 10) provides additional evidence of lack of employer support, and quotes a major report which described National Vocational Qualifications as "a disaster of epic proportions". The vast majority of qualifications were awarded at low levels, in areas in which there were no perceived additional needs in the labour market. Supporters argued that people who had previously not been able to access education were now doing so. Detractors do not deny this, but point out that they were being given access to low-level qualifications with few labour market benefits. Young (2009), Wolf (2002), and Hyland (1994) all argue that National Vocational Qualifications contributed to lowering the status of vocational education and polarizing education and training. A recent high-level government review has argued that at any moment in the UK there are several hundred thousand young people, between a quarter and a third of post-16 learners, enrolled for qualifications with little or no labour market value (Wolf, 2011). Some researchers argue that the reason for this is that with the nature of the standards-setting system: because of its focus on task analysis derived from workplaces as opposed to the development of knowledge in order to develop broad-based competences, the trend has been for ever narrower skills, which are not underpinned by any substantial knowledge and which may contribute to trapping people in below skilled employment (Brockmann, Clarke, Méhaut, & Winch, 2008). Similarly,

Keep (2012a, 2012b) argues that the focus on practical skills with little knowledge in the system introduced in 1986 has perpetuated the divide between academic and vocational education in the UK, and suggests that more recent developments, such as the Leitch Review of Skills, reinforce this trend. Keep further argues that in economies and labour markets where the proportion of low paid, dead-end jobs is substantial and liable to remain so (or even rise further), there are few incentives to learn for those who are either in or are being expected to enter courses that lead to a low level vocational qualification, and who believe themselves destined to enter such employment. Casualization aggravates this problem, as does the clustering of young people's labour market entry points to sectors with a high percentage of this kind of employment.

Current structures for standards setting

Sector Skills Councils are independent, employer-led, UK-wide organizations that are intended to help build a skills system driven by employer demand. There are 19 Sector Skills Councils, divided by sectors, covering over 90% of the UK's workforce. They are supposed to represent the skills and training interests of small to large businesses. They operate alongside various other national employer organizations (the Business Council of Britain, the Federation of Small Businesses, and the British Chambers of Commerce). They play a key role in the development and approval of vocational qualifications in the UK. They have a coordinating role, but are described as "primarily concerned with improving information about skills needs and adapting public provision to meet the needs identified" (Rainbird, 2010, p. 260). The four key goals of the Sector Skills Councils are to:

1. reduce the skill gaps and shortages;
2. improve productivity, business and public service performance;
3. increase opportunities to boost the skills and productivity of everyone in the sectors workforce, including action on equal opportunities; and,
4. improve learning supply, including apprenticeships, higher education and national occupational standards (McGuiness & Bennet, 2008).

The work of the Sector Skills Councils is complemented and supported by the Sector Skills Development Agency. This is a public institution responsible for funding, supporting, and monitoring the Sector Skills Councils, including ensuring that skills provision is designed to meet sector needs; that 'generic' skills are effectively covered in the work of the Sector Skills Councils; and to collect high quality labour market intelligence and make it available. Both the Sector Skills Councils and the Sector Skills Development Agency are part of the Skills for Business Network which is intended to improve skills and productivity within the UK (McGuiness & Bennet, 2008). The UK commission was previously responsible for overseeing the work of the Sector Skills Councils. As of March 2012, however, the relationship changed from one based on grant funding and minimum core specification of services to one based on "investment". Now the Sector Skills Councils are licensed by government to articulate the employer input into the development of programmes and qualifications. Sector Skills Council partnerships bid competitively on an annual basis to develop new national occupational standards and update existing ones (Musset & Field, 2013).

Another recent policy tries to shift employer engagement by encouraging employers to own their skills agenda rather than relying on a policy agenda set by government with incentives for employers to join in, although the new policy represents another form of government funding what it thinks employers should be doing: in 2011 the Prime

Minister announced a fund of up to £250 million to test mechanisms that policy makers believed would encourage employers to take control of skills development (Musset & Field, 2013). Despite the setting of sectoral standards for training, there are no formal links to work organization and pay in the UK's decentralized collective bargaining system, since these are normally determined by the company (Rainbird, 2010, p. 250). Rainbird (2010, p. 261) characterizes the system as "a highly centralised state intervention in the supply side of the labour market". Further, the lack of labour market regulation, especially limited use of licence to practice requirements, creates low incentives. Keep and Mayhew (2010) argue that if any real progress in occupational training is to be achieved, governments need to attempt much more carefully to understand problems caused by the structure and incentives provided by current labour, product market and industrial relations regimes. They suggest that policy changes required could include the development of broader occupational identities and their links to skill; revision of labour market structures to support progression; improvement in the quality of working life, changing work organization and job design; reorganization of industrial relations to ensure that the employee's 'voice' is heard; addressing wage setting and income distribution; and greater intervention in industrial policy, amongst others.

United States

Forecasting and occupational classification

The US Bureau of Labour Statistics organizes national occupations into 22 major groups, defined and described in the 'System of Occupational Classification'. The 22 major groups are then broken into 97 minor occupation groups, and each minor group is broken into 461 broad occupation groups, so that in total 840 occupations are presented. This is detailed by international standards, similar to the Australia and New Zealand classification. The US System of Occupational Classification is used for both statistical and administrative purposes, like the international and Australian classifications, and unlike the Canadian classification which is used only for administrative purposes (United Nations Statistics Division, 2014).

The definitions and descriptions are based on the characteristics of each occupation, including industry, skill type, skill level, mobility, and so on (Standard Occupational Classification Policy Committee, 2010). Occupations are classified based on a combination of factors, including work performed, and skills, education, and/or training needed to perform the work competently. However, both licensed and non-licensed workers performing the same work are grouped together in the same detailed occupation within the System of Occupational Classification, and there are many different systems for measuring occupational competence. Both the US and international systems jobs are classified by occupation with respect to the type of work performed. However, in the International Standard Classification of Occupations as well as the Australia and New Zealand, and Canadian systems, the basic criteria used to define the system are the 'skill level' and 'skill specialization' necessary to competently perform the tasks and duties of the occupations. In the US the major groups represent aggregations of detailed occupations with broadly similar duties, such as management or legal occupations; detailed occupations within major groups do not share the same skill level (United Nations Statistics Division, 2014). The last update of the USA's System of Occupational Classification (SOC) took place in 2010, while the next is scheduled for the year 2018. The System of Occupational Classification Policy Committee serves as a standing committee, performing maintenance functions such as recommending clarifications of definitions, placement of new occupations within the existing structure, and so on (US Bureau of Labor Statistics, 2010).

In the United States the key mechanism used to support skills forecasting is an extensive survey of establishments conducted on a regular basis by the Bureau of Labour Statistics (Wilson, 2004). Wilson (p. 58) notes that, "considerable efforts have been placed on measuring generic skills in the US in recent years, including the development of the O*NET system. This is probably the most sophisticated (and complicated) system for measuring and assessing such developments anywhere in the world". O*NET is a large-scale, multi-year research programme under the Department of Labour. It has produced a comprehensive occupational analysis system which is continually updated with information on occupational requirements and characteristics (Lapolice, Carter, & Johnson, 2008). It draws on the Standard Occupation Classification system, and has a database organized around six broad content domains: (a) worker characteristics, (b) occupation characteristics, (c) worker requirements, (d) occupational requirements, (e) occupation-specific requirements, and (f) experience requirements. These are detailed further as follows:

1. Person-oriented information that describes the typical, necessary, and/or beneficial characteristics of people working in certain occupations (e.g., declarative knowledge, procedural skills, and physical abilities);
2. Work-oriented information that describes the activities (e.g., job tasks and duties) commonly undertaken in an occupation; and
3. Context-based information that provides insight into how aspects of the social, organizational, and/or physical environment shape the experience of work (e.g., tools and technology used and working hazards like exposure to heat).

O*NET is increasingly being used in the States for skills forecasting. For example, the State of California uses economic-based projections of employment patterns and then links (via O*NET) predicted changes in occupations to changes in underlying skill needs. The idea is that by utilizing standardized descriptors of occupations, stakeholders involved in various aspects of occupational training can isolate underlying skill and work trends and can facilitate a range of effective and targeted interventions (Gloss & Thompson, 2014). For example, while critical occupations often require unique combinations of job-related knowledge, procedural skills, and personalities, attempting to teach various aspects of job-related knowledge (e.g., best practices in town/urban planning) in secondary education or even vocational training might be ineffective due to changing work conditions and professional practices. Understanding, and teaching, certain underlying procedural skills for those occupations (e.g., developing systems analysis skills for town/urban planners) might be a more effective and reliable way to enhance the long-term supply of well-prepared entrants into these professions.

By populating occupational codes with detailed person, work, and contextual information, a wide variety of skill development interventions can be developed (Gloss & Thompson, 2014). This includes everything from primary, secondary, and tertiary education to vocational training and on the job training. For example, foundational skills and cognitive abilities that are amenable to change through years of formal education can be targeted by primary and secondary education. In addition, more specific and job related procedural skills and declarative knowledge domains can be addressed through vocational training and tertiary education. Finally, workplace-training interventions can be informed by a detailed activity based understanding of job performance. By rating multiple occupations on common characteristics, indices of similarity between occupations on any number of dimensions are made possible. This information can be used for a number of policy and training purposes. For example, if shortages exist in a

given occupation, other occupations that use similar skills, attract people with similar personalities, involve the use of similar tools or technologies, and require working in the same sort of physical contexts could be identified.

The occupational characteristics of not only occupations, but entire sectors/industries, and regions can be estimated by combining detailed occupational information with sector and regional employment data. This information can facilitate a detailed understanding of regional skill gaps; knowledge 'clusters'; areas where various workplace hazards might be pronounced; and regional economic sectors requiring targeted interventions. Emerging trends in the world of work can be seen across occupational titles. For example, the United States has prioritized an understanding of the greening of the workforce. By not just labeling occupations as green, but by identifying certain skills, technologies, activities, etc. that tend to be associated with green occupations, a more detailed and nuanced understanding of the greening of the workforce can be gained. The idea is for organizations to use person, work, and context-oriented information to write detailed job descriptions, and to design more effective training. In addition, people can make more informed choices about how occupations are different from one another and whether the activities and work contexts of those occupations would be a good 'fit' for them.

Skills standards and occupational training

Like other English-speaking liberal market economies, vocational skills are provided in low status tracks at high school, or through community or vocational colleges that have limited institutional linkages to the labour market and require students to pay tuition fees (Busemeyer & Trampusch, 2012a). The social consensus is that every student should at least in principle have the choice of enrolling in college. The practical implication of this is that vocational education at a secondary level is only acceptable if it also prepares students for college, which means limiting the amount of occupational specialization, to ensure that a substantial amount of academic or general education is received (Bailey & Berg, 2010).

Martin (2012, p. 44) argues that "two-party competition and federal competition led to the absence of industrial self-regulation by employers and trade unions. Consequently, the development of the training system was strongly influenced by professional school reformers who integrated training into public schools". Martin (2012) also argues that the reason for the lack of development of certified recognized skills for industrial workers in the US can be traced to the two-party system, and the ways in which agricultural elites in the Southern states were able to prevent any national initiative to develop portable certifiable skills (in part because they didn't want their agricultural workers to be able to move, in part because they prevented the establishment of peak employer bodies). This is even though by 1920 manufacturing accounted for a much larger percentage of GDP than agriculture; the nature of the federalist system meant that the industrialists, who were mainly in the Northeast could not get national support.

The National Skills Standards Board was created in 1994. A driving force behind its creation was the view that work preparation in the US was less effective than that in Europe because young people did not know which skills were required for which jobs, and employers could not judge applicants' skills (Bailey & Berg, 2010). The board was intended to make the whole process more systematic and transparent. It collected information on the creation of skill standards, assessments, and certification. It did not set skill standards, but rather established guidelines to endorse standards which, it hoped, would be created by coalitions called 'Voluntary Partnerships'. Prior to the creation of the Board, the Departments of Education and Labour had funded pilot projects to create

standards in 22 industries and occupations. The board categorized the workforce into 15 sectors, and intended to oversee the development of standards in each of them, but funding ended before this could happen. The Board's work generated interest and discussion, and some projects continued in retail trade and advanced manufacturing, but the board was not able to establish a national system of skill standards (Bailey & Berg, 2010). One of the key problems was employer involvement. Employers were involved in the Board and its work to some extent, but did not systematically use the standards and assessments which were developed. One problem is ascribed to the fact that its creation was not driven by employers, who did not particularly want a national system, and did not demand that its work continue.

Regulation of occupational standards

How all this relates to occupational standards and training is complex, as standards in mid-level occupations are voluntary in the US, although with a lot of variation across areas, and vocational education is generally considered to be a second choice option.

The proportion of workers whose occupation requires them to have licensing or certification beyond the basic qualification has risen six fold over the past 50 years. The higher the level of education, the more likely it is that a worker is required to have occupational certification or a license to practice, where occupational regulation is believed to be useful to protect the public against incompetent practitioners (Kleiner & Krueger, 2011). It is primarily within professional work that occupational regulation affects the qualification system. Much occupational regulation in the US is not federal; according to Humphris et al. (2009), more than two-thirds of occupational regulation in the USA took place at the state level by the year 2009. Regulatory requirements for a given occupation or profession vary from one state to another. Consequently, individuals licensed to carry out an occupation in one state, for example, may not qualify for licensing of the same occupation in another state.

There are generally three forms of regulatory control exercised over labour market occupations. The least restrictive form is registration, where individuals are required to file their names, addresses, and qualifications with a government agency before practicing their occupation; this may require posting a bond or filing a fee. A tighter form of regulation is where certification requires the government, a private or non-profit agency to administer an examination and then certify those who have achieved the level of skill and knowledge deemed appropriate; this applies, for example, to travel agents and car mechanics in the US. The most restrictive and most complex form of regulation is license to practice, whereby working for compensation in an occupation without meeting the appropriate standards is illegal (Kleiner & Krueger, 2008). The regulation of occupations differs across industries and may be more or less complex from one occupation group to another. Lower-middle skill occupations by definition require the same competence acquired through compulsory education, but involve longer periods of work-related training and experience e.g. machine operation, driving, caring occupations, retailing, and clerical and secretarial occupations[14].

Examples where federal regulations apply are the trucking industry, which requires workers to have a Commercial Driver's License, but license obtained in a driver's home-state will qualify a driver to work in other states (Occupational Outlook Handbook,

[14] http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/previous-foi-requests/labour-market/highly-skilled-and-low-skilled-job-statistics/index.html Retrieved 28 September 2014.

2014). The Federal Motor Carrier Administration (a division of the United States Department of Transportation) ensures that this and other requirements are met by interstate commercial drivers so that industry regulation takes place at the national level. The Occupational Outlook Handbook further states that delivery truck drivers will all hold a high school diploma or equivalent and undergo a month of on-the-job-training. Trucking is generally regarded as a lower-middle level occupation. Similarly, bookkeeping, accounting, or auditing clerks are registered, certified, and licensed at the national level. The required qualification is only a high school diploma, although many employers prefer some post-school education—preferably in accounting. Like the commercial truck driver, this occupation is categorized as lower-middle level. Not all clerks will seek out certification or licensing, but for those that do, the American Institute of Professional Bookkeepers endorses their skills and competencies is areas such as overseeing payroll, balancing accounts, etc. This then makes the candidate a certified bookkeeper. Before pursuing certification, candidates must have at least 2 years of full-time bookkeeping experience or equivalent part-time work, and then pass a four-part exam, as well as adhere to a code of ethics. The National Association of Certified Bookkeepers carries out the same function. This is a slightly more complex process than that undergone by the trucker, who only requires a state license and undergoes no further examination, despite the national-level regulation of both occupations. Nonetheless, these examples suggest that some lower-middle level occupations in the US are not so state-based in terms of regulation, allowing ease of mobility within such occupations.

Upper-middle level occupations, defined by the UK Office for National Statistics as those occupations where competence is acquired through post-secondary education but not to degree level, such as technical occupations and trades, licensing may be more state-based, and a license in one state may not enable someone to practice in another. According to the Occupational Outlook Handbook, electricians as an example require a high school diploma or equivalent qualification as a minimum and some will attend a technical school and receive credits towards their apprenticeship. Further work towards completing an apprenticeship programme will include 144 hours of technical training and 2000 hours of paid, on the job training. Further courses around safety practices, changes in electrical codes or training on the specific products of manufacturers may then follow. The Occupational Outlook Handbook further specifies that electricians will need to pass a test and acquire licensing through various states, where each state will have varying requirements articulated through the state electrical licensing board e.g. the Nebraska Electrical Division.

In the case of nurses, most states require certification from nurses and this is available at the national level through bodies such as the National Board of Certification and Recertification for Nurse Anesthetists, or the American Midwifery Certification Board (Occupational Outlook Handbook; 2014). For advanced practice registered nurses, registration, certification, and licensing occur at the state level, where nurses have to have a registered nursing license, complete an approved graduate-level programme, and pass a national certification examination; most states recognize each other' regulations in this regard. This may be because a wide variety of professional nursing organizations, including the National Council of State Boards of Nursing, have developed a consensus model of regulation for professional nurses. However, the nature of occupational regulation, and the degree to which it is state or federal based, varies across upper-middle level occupations. High-level occupations are in general the most tightly regulated, and often (for example, in engineering) registration and licensing is carried out by each state so that each registration or licensing is only valid within the state in question. While this may limit the general mobility of American engineers across states, most will hold

registration or licensing in numerous states. According to Humphris et al. (2009, p.5) occupational licensing is disproportionately focused on health care, with about 76 percent of non-physician health care workers being required to have a license from the government.

REFERENCES

Allais, S. (2010). *The Implementation and Impact of Qualifications Frameworks: Report of a study in 16 countries*. Geneva: International Labour Office.

Australian Bureau of Statistics. (2009). *The Conceptual Basis of ASCO*. Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/0/176EB288428057F3CA25697E00184D40?opendocument Retrieved 18 July 2014.

Bailey, T., & Berg, P. (2010). The Vocational Education and Training System in the United States. In G. Bosch & J. Charest (Eds.), *Vocational Training. International Perspectives* (pp. 271–294). London and New York: Routledge.

Bank of Canada. (2013). *Business Outlook Survey: Results of the Spring 2013 Survey* (Vol. 10, April 8.). Halifax: Bank of Canada. Retrieved from http://www.bankofcanada.ca/wp-content/uploads/2013/04/bos-spring2013.pdf Accessed 13 May 2013.

Bewick, T., & Abbott, P. (Eds.). (2010). *Think Global Act Sectoral*. London: International Network of Sector Skills Organizations.

Bramwell, A. (2011). *Training Policy for the 21st Century. Decentralization and Workforce Development Programs for Unemployed Working-Age Adults in Canada*. Toronto: Mowat Centre for Policy Innovation.

Brockmann, M., Clarke, L., Méhaut, P., & Winch, C. (2008). Competence-Based Vocational Education and Training (VET): the Cases of England and France in a European Perspective. *Vocations and Learning*, *1*, 227–244.

Brockmann, M., Clarke, L., & Winch, C. (Eds.). (2011). *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?*. Abingdon and New York: Routledge.

Budlender, D. (2003). *Improving Occupational Classifications as Tools for Describing Labour markets: A Summary of Recent National Experiences* (Working Paper No. 10. Policy Integration). Geneva: Department Bureau of Statistics International Labour Office.

Busemeyer, M. R., & Trampusch, C. (2012a). The Comparative Political Economy of Collective Skill Formation. In M. R. Busemeyer & C. Trampusch (Eds.), *The Political Economy of Collective Skill Formation* (pp. 3–38). Oxford and New York: Oxford University Press.

Busemeyer, M. R., & Trampusch, C. (Eds.). (2012b). *The Political Economy of Collective Skill Formation*. Oxford and New York: Oxford University Press.

Canadian Council on Learning. (2007). *Is it Possible to Accurately Forecast Labour Market Needs?*. Canadian Council on Learning.

Cedefop. (2009). *The dynamics of qualifications: defining and renewing occupational and educational standards* (Cedefop panorama series). Luxembourg: Office for Official Publications of the European Communities.

Cooney, R., & Long, M. (2010). Vocational Education and Training in Australia: The Evolution of a Segmented Training System. In G. Bosch & J. Charest (Eds.), *Vocational training: international perspectives*. Abingdon and New York: Routledge.

Crawford, L. (2003). Reviewing current National Qualifications Frameworks and regional qualifications initiatives in Australia. In E. French (Ed.), *Qualifications and Standards: Harmonization and Articulation initiatives* (pp. 85–98). Pretoria: SAQA.

Cully, M. (2008). *Working in harmony: The links between the labour market and the education and training market in Australia*. Adelaide: National Centre for Vocational Education Research. Retrieved from http://www.ncver.edu.au/publications/1993.html. Accessed 28 April 2009.

Deissinger, T., & Hellwig, S. (2005). *Structures and Functions of Competence-based Education and Training (CBET): A Comparative Perspective*. Mannheim: InWEnt - Capacity Building International, Germany.

Emmanuel, A., & Cosca, T. (2008). *Occupational Classification Systems: Analyzing the 2010 Standard Occupational Classification Revision.* Washington D.C.: Bureau of Labour Statistics.

Expert Group on Future Skills Needs. (2007). *Tomorrow's Skills. Towards a National Skills Strategy, 5th Report*. Dublin: Expert Group on Future Skills Needs.

Expert Group on Future Skills Needs. (2011). *The Expert Group on Future Skills Needs Statement of Activity 2010*. Dublin: Forfas, Expert Group on Future Skills Needs.

Expert Group on Future Skills Needs. (2014). *The Expert Group on Future Skills Needs, Statement of Activity 2013*. Dublin: Forfas, Expert Group on Future Skills Needs.

Fretwell, D., Lewis, M. V., & Deij, A. (2001). *A Framework for Defining and Assessing Occupational and Training Standards in Developing Countries* (Information Series No. 386). Washington D.C., Columbus, Ohio, and Turin: World Bank, Center on Education and Training for Employment, and European Training Foundation.

Gloss, A., & Thompson, L. F. (2014). *Estimating the underlying characteristics of South Africa's critical/scarce occupations: A proof-of-concept study* (Draft report to Adrienne Bird , Department of Higher Education and Training Republic of South Africa). IOTech4D Lab North Carolina State University.

Guthrie, H. (2009). *Competence and competency based training: What the literature says*. Adelaide: NCVER.

Hoeckel, K., Field, S., Justesen, T. R., & Kim, M. (2008). *Learning for jobs. OECD reviews of vocational education and training. Australia.* Organization for Economic Co-operation and Development (OECD). Retrieved from http://www.oecd.org/dataoecd/27/11/41631383.pdf accessed 26 August 2010

Hyland, T. (1994). *Competence, Education and NVQs. Dissenting Perspectives.* London: Cassel.

Industry Skills Councils Australia. (2014). Industry Skills Councils: Creating Australia's Future. Retrieved from http://www.isc.org.au/vet-quality Retrieved 27 September 2014.

International Labour Organization. (2013). International Standard Classification of Occupations. Retrieved from http://www.ilo.org/public/english/bureau/stat/isco/ Accessed 29 July 2014.

Keating, J. (2008). *Matching supply and demand for skills: International perspectives*. Adelaide: National Centre for Vocational Education Research. Retrieved from http://www.ncver.edu.au/vetcontext/publications/2000.html. accessed 10 June 2009.

Keep, E. (2012a). Education and Industry – Taking Two Steps Back and Reflecting. *Journal of Education and Work*, *25*(4), 357–379.
Keep, E. (2012b). *Youth Transitions, the Labour Market and Entry into Employment: Some Reflections and Questions* (SKOPE Research Paper No. 108). Cardiff: SKOPE, Cardiff University.
Keep, E., & Mayhew, K. (2010). Moving beyond skills as a social and economic panacea. *Work, Employment and Society*, *24*(3), 565–577.
Kleiner, M., & Krueger, A. (2008). *The Prevalence and Effects of Occupational Licensing* (CEPS Working Paper No. 147). Centre for Economic Policy Studies.
Kleiner, M., & Krueger, A. (2011). *Analyzing the Extent and Influence of Occupational Licensing on the Labour Market* (Discussion Paper Series, IZA DP No. 5505). Institute for the Study of Labour.
Kotzee, B. (2014). Differentiating forms of professional expertise. In M. Young & J. Muller (Eds.), *Knowledge, Expertise and the Professions* (pp. 61–77). London: Taylor & Francis.
Lapolice, C. C., Carter, G. W., & Johnson, J. W. (2008). Linking O*Net Descriptors to Occupational Literacy Requirements using Job Component Validation. *Personnel Psychology*, *61*, 405–441.
Lassnigg, L. (2012). "Lost in translation": learning outcomes and the governance of education. *Journal of Education and Work*, *25*(3), 299–330.
Lester, S. (2011). The UK Qualifications and Credit Framework: a critique. *Journal of Vocational Education and Training*, *63*(2), 205–216.
Livingstone, D. W., & Guile, D. (2012). *The Knowledge Economy and Lifelong Learning. A Critical Reader.* Rotterdam: Sense.
Malloch, M., & Cairns, L. (2014). *The future of VET in Australia: implications of current and past policy agenda*. Presented at the ECER Annual Conference, Porto, Portugal.
Marock, C., Yeowart, S., & Gewer, A. (2012). *Alignment of Sector Skills Planning to National Growth Plan.* Johannesburg: Singizi.
Marock, C., Yeowart, S., & Singizi, A. G. (2012). Alignment of Sector Skills Planning to NGP.
Martin, C. J. (2012). Political Institutions and the Origins of Collective Skill Formation Systems. In M. R. Busemeyer & C. Trampusch (Eds.), *The Political Economy of Collective Skill Formation* (pp. 41–67). Oxford and New York: Oxford University Press.
McGuiness, S., & Bennet, J. (2008). *An Assessment of International Trends in Occupational Forecasting and Skills Research: How Does Northern Ireland Compare?* (Report commissioned by the Northern Ireland Department for Employment and Learning). Priority Skills Unit, The Economic Research Institute of Northern Ireland.
Mendelson, M., & Zon, N. (2013). *The Training Wheels Are Off: A Closer Look at the Canada Job Grant*. Ottawa and Toronto: Caledon Institute for Social Policy and Mowat.
Musset, P., & Field, S. (2013). *A Skills beyond School Review of England* (OECD Reviews of Vocational Education and Training). Paris: OECD Publishing.
National Centre for Vocational Education Research. (1999). *Competency based training in Australia* (Research at a Glance) (pp. 1–8). NCVER.
Powell, M., & Reddy, V. (2014). *Information Systems for Skills Planning: Lessons and Options for Reform in South Africa* (Report from the Labour Market Intelligence Partnership Human Sciences Research Council, February 2014). Pretoria: HSRC.
Priority Skills Unit. (2008). *An Assessment of International Trends in Occupational Forecasting and Skills Research: How Does Northern Ireland Compare?"* (Report commissioned by the Northern Ireland Department for Employment and Learning). Economic Research Institute.
Raggat, P., & Williams, S. (1999). *Government, Markets and Vocational Qualifications. An Anatomy of Policy*. London and New York: Routledge.
Rainbird, H. (2010). Vocational Education and Training in the United Kingdom. In G. Bosch & J. Charest (Eds.), *Vocational Training. International Perspectives* (pp. 242–270). New York and London: Routledge.
Richardson, S. (2007). *What is a Skills Shortage?; Sue Richardson, NCVER, 2007, p.9*. Adelaide: National Centre for Vocational Education Research.
Roberts, S. (2010). *The Australian and New Zealand Standard Classification of Occupations: Scoping Study* (Report for Skills Australia). Skills Australia.
Schofield, K., & McDonald, R. (2004). *Moving on... Report of the high level review of training packages*. Brisbane: Australian National Training Authority (ANTA).
Standard Occupational Classification Policy Committee. (2010). *SOC User Guide.* USA Bureau of Labour Statistics.
Stewart, J., & Sambrook, S. (1995). The Role of Functional Analysis in National Vocational Qualifications: A Critical Appraisal. *Journal of Education and Work*, *8*(2), 93–106.
Streeck, W. (2012). Skills and Politics: General and Specific. In M. R. Busemeyer & C. Trampusch (Eds.), *The Political Economy of Collective Skill Formation* (pp. 317–352). Oxford and New York: Oxford University Press.
Thelen, K., & Busemeyer, M. R. (2012). Institutional Change in German Vocational Training: From Collectivism toward Segmentalism. In M. R. Busemeyer & C. Trampusch (Eds.), *The Political Economy of Collective Skill Formation* (pp. 68–100). Oxford and New York: Oxford University Press.
United Nations Statistics Division. (2014). National Classifications. Retrieved from http://unstats.un.org/unsd/cr/ctryreg/ctrydetail.asp?id=1264 Retrieved 29 July 2014.
US Bureau of Labor Statistics. (2010). *2010 SOC User Guide*. Washington D.C.: US Bureau of Labor Statistics.
Wheelahan, L. (2008). Can learning outcomes be divorced from processes of learning? Or why training packages make very bad curriculum. In *11th Annual Australian Vocational Education and Training Research Association Conference*. Adelaide.
Wheelahan, L. (2009). From Old to New: The Australian Qualifications Framework. In S. Allais, D. Raffe, R. Strathdee, M. Young, & L. Wheelahan (Eds.), *Learning from the Early Starters* (Vol. Employment Sector Working Paper no. 45, pp. 114–138). Geneva: ILO.
Wheelahan, L. (2010). *Why Knowledge Matters in Curriculum*. Abingdon and New York: Routledge.

Wheelahan, L. (2012). VET has too many qualifications and is too complex. Retrieved from http://www.lhmartininstitute.edu.au/insights-blog/2012/06/89-vet-has-too-many-qualifications-and-is-too-complex Retrieved 13 September 2014.

Wilson, R. (2004). *Developing a National Skills Forecasting Tool for South Africa, Annex B: Labour Market Projections: A Review of International Best Practice*. Institute for Employment Research University of Warwick.

Wilson, R., & Homenidou, K. (2012). *Working Futures 2010-2020* (Evidence Report 41). UK Commission for Employment and Skills. Retrieved from www.ukces.org.uk/assets/ukces/docs/publications/evidence-report-41-working-futures-2010-2020.pdf accessed 20th October 2014

Wilson, R., Woolard, I., & Lee, D. (2004). Developing a National Skills Forecasting Tool for South Africa. Institute of Empoyment Research and Human Sciences Reserach Council.

Wolf, A. (1995). *Competence-based Assessment*. (H. Torrance, Ed.). Buckingham: Open University Press.

Wolf, A. (2002). *Does Education Matter? Myths about education and economic growth*. London: Penguin.

Wolf, A. (2011). *Review of Vocational Education - The Wolf Report* (Report commissioned by the Secretary of State). London: Department for Education and Department for Business, Innovation, and Skills, United Kingdom.

Young, M. (2009). NVQs in the UK: their origins and legacy. In S. Allais, D. Raffe, R. Strathdee, M. Young, & L. Wheelahan (Eds.), *Learning from the Early Starters* (Vol. Employment Sector Working Paper no. 45, pp. 5–29). Geneva: ILO.