

Developing expertise – moving beyond a focus on workplace competence, assessment and qualifications

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1. Introduction

This paper intends to highlight key trends in the development of expertise in the workplace in a way that goes beyond the current obsessions of many people with issues concerned with competence, assessment and qualifications when considering work-related skill development. In producing this paper we were asked to consider any possible discontinuities when looking at 2025 and beyond; uncertainties and any big tensions; and conclusions on what the key issues will be in future and initial reflections on any general implications for education. I will therefore highlight (**in bold**) any of these points within the general narrative.

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2. Assessment in the workplace

Assessment in the workplace is widely used in three contexts:

- assessment of performance linked to initial education and training (as in medical education)
- assessment of the development of expertise in knowledge-intensive work (eg in aerospace companies)

- and in the accreditation of competence in national systems of competence-based assessment.

Assessment in the first two contexts is strongly situated and generally works well, whereas the success of national competence-based systems is much more mixed. There has been some success where the primary concern has been upon supporting individuals getting their skills, knowledge and understanding related to current work roles assessed and accredited, but in other cases competence-based assessment has been problematic.

However, recent trends have seen growing interest in how **more formative workplace assessment can align individual development with organisational development**. This interest has included an examination of the extent to which processes of formative assessment and critical reflection in the workplace can support employees' commitment to lifelong learning and knowledge transformation processes at work.

2.1 Success of situated approaches to performance assessment and expertise development in the workplace

2.1.1 Workplace-based assessment of performance in the workplace

In settings such as clinical education there are moves towards systems where examinations of knowledge and clinical skills are retained but are now part of an overarching assessment framework that has extensive workplace based assessment (WPBA) of performance. The WPBA involves an evaluation of a (trainee) doctor's progress in performance over time, in hospitals or other clinical settings, in those areas of professional practice best tested in the workplace. **WPBA in this context works well because it offers the opportunity to reconnect teaching, learning and assessment and is authentic. [Conclusion]**

It provides an opportunity for the assessment to get as close as possible to the real situations in which doctors work. WPBA has also led to a softening of the distinction between formative and summative assessment, with trainee doctors being provided with continuing feedback on their performance. Schuwirth and van der Vleuten (2006) have highlighted the challenges of assembling evidence of performance, increasing use of portfolios, mini-clinical evaluation exercises, and 360° feedback. In 360° feedback the candidate asks colleagues to complete a questionnaire on his or her performance that rates technical skills, interpersonal skills, team skills, education and research skills, etc. These instruments focus on observable behaviour and can be used to provide feedback to trainees, but it is also clear **that rather than using a single instrument to provide an assessment of a particular competence it is better if the whole picture of someone's medical competence is portrayed using a variety of assessment instruments (Schuwirth and van der Vleuten, 2006). [Conclusion]**

2.1.2 Assessment of the development of expertise in knowledge-intensive workplaces

WPBA has also become increasingly important in the assessment of the development of expertise in knowledge-intensive workplaces such as in aerospace. In such contexts WPBA faces two particular challenges. First, a focus on competence in the workplace in the sense of outlining what workers did in the recent past will be an insufficient basis for preparation for future performance. Secondly, much learning takes place while working, rather than in recognisable education or training settings. In knowledge-intensive work settings, it is important to look beyond current competences as a basis for development, and instead take a **developmental view of expertise. Such an approach requires that the development of expertise should itself be viewed as a continuing process. [Conclusion]**

Thus even if employees are able to produce competent performance in a range of more or less challenging work settings, there has to be a facility within teams or the workforce as a whole to go beyond this. From this perspective, it is interesting that some companies are explicitly using a developmental view of expertise that goes well beyond expecting technical proficiency and a commitment to continuing improvement. Those companies are using competence inventories of their staff in order to differentiate between:

- Those who are technically able to perform a task but have very limited practical experience of actually doing so (eg the company could use them in an emergency or, if necessary, for a one-off activity)
- Those who have successfully performed the task on a small number of occasions (eg the company could use them if the intention was to develop their expertise further in a support role or if time is not necessarily a key criterion)
- Those who have performed the task many times and under a variety of conditions (i.e. experienced worker standard – completely reliable)
- Those who have substantial experience but are also able to support the learning of others (ie they can perform a coaching or mentoring role)
- Those who are world class, that is they are able to think through and, if necessary, bring about changes in the ways that tasks are tackled (eg could be chosen as a team leader for performance improvement activities).

This approach to professional development recognises the importance of having a capacity to support the learning of others as well a capacity to change the way things are done. WPBA traditionally focused on the first three levels with a clear focus upon how workers perform the tasks being assessed. **If the assessment is broadened to cover aspects of interaction with others, both on task and at other times, it might also be possible to pick up those who are able to support the learning of others, as in Germany where such assessments have long been part of the *Meister* examinations for skilled workers seeking development and the attainment of higher level qualifications. [Conclusion]**

The highest level of performance, being able to change how tasks are tackled, can be recognised retrospectively (and the examples documented), but it is very difficult to predict through other forms of assessment. **This difficulty is because this type of expertise is often partly built around recognition of the importance of the integration of different kinds of knowledge. Professionals and other highly skilled workers often find that the most important workplace tasks and problems require the integrated use of several different kinds of knowledge. [Tension]**

Eraut (2004) argues that this process typically involves five inter-related stages:

- The extraction of potentially relevant knowledge from the context(s) of its acquisition and previous use
- Understanding the new situation, a process that often depends on informal social learning
- Recognising what knowledge and skills are relevant
- Transforming them to fit the new situation
- Integrating them with other knowledge and skills in order to think/act/communicate in the new situation.

The whole process is much more complicated than just desituating and resituating particular pieces of knowledge, and trying to predict in advance whether someone will be able to combine knowledge from education, training, work and possibly other settings is very challenging. [Tension]

WPBA in the form of recording of instances of such performances is authentic, fit for purpose and signals that the over-riding concern is with the holistic nature of performance in the workplace, if organisational performance is to be improved. [Conclusion]

2.2 Shortcomings of national competence-based systems focused on a narrow definition of competence and the characteristics of an approach to the assessment of workplace learning that is oriented towards the future, focusing upon how best to support employees' commitments to life-long learning and active knowledge transformation.

2.2.1 Competence-based assessment in the workplace

Assessment in the workplace in the two contexts illustrated above is strongly situated and generally works well, but the use of national competence-based systems presents a much more mixed picture. Assessment and learning in the workplace are not only related to each other, they are also linked to qualifications. National competence-based assessment regimes explicitly seek to link workplace assessments more towards qualifications than learning, in that they are expressly concerned with outcomes and downplay the significance of how things are learned. Such qualifications are assessment-driven and the link to individual development is through achievement of qualifications, including progression to the next 'level' in a qualification framework. These systems are by definition national in outlook and do not necessarily engage with individual development in the workplace or improved organisational performance, nor do they necessarily encourage individuals to continue learning in the workplace. Indeed, Grugulis (2001) shows how **compiling evidence of achievements at work against detailed performance criteria for competence-based qualifications, such as National Vocational Qualifications in England, can actually be antithetical to learning and development, because so much time was spent on the bureaucratic requirements of assembling evidence of existing competences. [Tension]**

Furthermore, competence-based work-related qualifications sometimes portray learning progression as an individual going through a single hierarchy of 'levels', whereas, in practice, an individual's learning requirements are likely to vary between domains and contexts and an 'expert' in one area may be a 'novice' in another, even if the fields are closely related. Also individuals have to learn to make judgements in different spheres (for example, in academic; cognitive; managerial; inter-personal; and experiential contexts) and again an individual may be at very different 'levels' in the different spheres. Grugulis *et al.* (2004) pointed out that the **major failing of narrow views of competence was that they had an almost exclusive concern with measurable outcomes. Through qualifications, competences were seen as a proxy to measure the increase in 'skills' of a population. [Tension]**

A national competence-based work-related qualifications system based on NVQs was predicated upon using similar templates that focus upon immediate achievements and measurable outcomes in the workplace. The qualifications supply information primarily about a person's skills and the knowledge necessary for carrying out the tasks and functions associated with particular jobs: that is, the assessment is concerned with the skills and knowledge necessary to underpin current performance. **Such an approach says nothing at all about a person's potential or their broader skills, knowledge and understanding that may not be needed in their current work but that could be utilised in future. [Tension]**

Assessment in the workplace, however, does not have to focus narrowly upon immediate achievements and outcomes, as it is possible for even competence-

based assessment to reflect a developmental view of performance in the workplace that acknowledges the value of promoting continuing learning.

[Conclusion] For example, more sophisticated notions of competence have been developed that acknowledge that **competence can be viewed as being held collectively** by, for example, a workgroup and that there can be considerable value in competence development being contextualised for particular work environments (Mills et al, 2000; Sandberg, 2001).

The narrow approach to competence-based assessment has a focus upon measurable outcomes and an essentially binary conception of competence: you have either reached the appropriate standard (typically defined as 'experienced worker standard') or not.

However, it is far more beneficial in inducing a more expansive frame of mind towards learning among employees to have a developmental view of competence as demonstrated by the example quoted earlier of companies working in knowledge intensive industries. [Conclusion]

A developmental view of competence reflects attitudes towards learning and development that go well beyond achievement of simple technical or behavioural competence. That such orientations are not amenable to reductionist, analytical approaches to competence development is clear from the work of Sandberg (2001) who shows that there are very different ways in which highly skilled professionals can approach their work: competence needs to focus upon higher levels of aggregation than just effective task completion. **The increasing need for employees with proactive approaches to learning and knowledge transformation makes this requirement ever more pressing. [Conclusion]**

2.2.2 Formative assessment and critical reflection in the workplace supporting employees' commitment to lifelong learning

One common method of professional development, used in a wide variety of occupational and organisational contexts, is to get employees to make an assessment or critical reflection on their own learning and development through, for example, the use of personal development portfolios or discussions with peers. The use of reflection upon learning at work can be a powerful formative assessment process, especially if it has a strong dialogical component, and can highlight not only what was learned but also the nature of the learning process. One outcome of a reflective formative assessment process might be the production of a portfolio that couples 'hard' achievements with development of 'soft' processes that provide examples of experience and achievement.

This reflective process can provide a spur to lifelong learning because it recognises the emotional component to learning; it aligns with the idea of continuing personal development (as the examples can be updated), and it acknowledges the inter-relatedness of changes in work practice and organisation, personal development and organisational performance. [Conclusion]

Williams (2001) highlights how when learning is mainly developed through working rather than formal education and training, then the development of self-consciousness (reflection) and continual self-critique (critical reflection) are crucial to continued competence. Such workplace-based self-assessment, in this case in nursing, could be facilitated either through active repeated guided practice or could be an outcome of earlier education and training that was focused on problem-based learning.

This type of assessment does not have to remain formative. At any stage of the process it should be possible to authenticate any particularly striking examples of experience and achievement through formalising the process, such that it could form the basis of a later claim for credit against vocational or academic qualifications at a future date. **This type**

of approach to assessment is primarily, rather than exclusively, formative, with the goal being to encourage learners to engage in further learning and skill development, and the use of mediating artefacts (portfolios; diaries; records; photographs etc.) can encourage active reflection and review. [Conclusion]

The assessment process thereby adds value to the learning process in recognising the achievements of the learner and the context in which the learning took place. One key aspect of this approach to assessment is that it increases the likelihood that learners would value the process and outcomes of assessment as supportive of their learning and further development. [Conclusion]

2.2.3 Workplace assessment supporting processes of knowledge transformation

One of the key characteristics of a move towards a more knowledge-based society is that processes of knowledge development and transformation of different forms of knowledge become much more ubiquitous in where they are sited. In particular, organisations and workplaces are becoming important sites of knowledge generation and transformation, and some forms of workplace-based assessment have been designed to support such processes. The underlying idea is that there is considerable value in attempting to link processes of knowledge creation with approaches to tackling the core problems of manufacturing practice or service delivery as a means of engaging employees as learners, including those employees in contexts such as small companies that have traditionally been difficult for formal education and training institutions to reach (Brown, 2005). These ideas link to processes of continuing improvement in that attention is given to problems and dilemmas that are central to manufacturing practice or service delivery and performance improvement, although there is also express concern for work-related learning, development and assessment. These problems and dilemmas have significance both for individual and organisational performance. The problems are likely to contain combinations of practical concerns, organisational issues and socio-cultural problems.

Processes of continuing development and process improvement require not only individuals to be reflective about their own learning but also for the networks involved in these development processes to be able to move knowledge and understanding between the individual and collective, the tacit and the explicit and assessment in the workplace can play a role in these transformations. [Conclusion]

While a focus on the core problems of practice (and projected performance improvements in quality, cost and delivery) can act as a strong catalyst to galvanise the interest of companies and individuals, a vehicle is also needed to broaden the interest of companies and participants in both learning and organisational effectiveness (Brown et al, 2004). The approach to **learning through networking could be seen as an example of an active model of learning** whereby learners are engaged in processes of self and peer assessment and reflection leading to the creation of 'new contextualised' knowledge, not recipients of a largely passive process of knowledge transmission (compare the processes of organisational knowledge creation outlined by Nonaka and Takeuchi, 1995).

This approach makes use of a social model of knowledge creation and transformation, where for genuine knowledge transformation to occur knowledge has to move from the individual level into wider communities of interaction that cross organisational boundaries. This approach, when it works well, possesses the dynamism continually to create new knowledge, fuelled by processes of assessment, reflection and development.

The assessment processes used to power the knowledge development cycle include critical reflection, with a focus on adaptability and forward thinking, and learning portfolios allowing individual and collaborative reflection on learning and knowledge transformation processes. **Portfolios can help employees pull their learning together, provide supporting evidence for use in company appraisal processes, help learning become more shareable, portable and transferable, and act as a stimulus to innovation and the development of adaptability of the team as a whole, evidenced by the ability to perform effectively in a range of contexts (Brown et al, 2004). [Conclusion]**

2.2.4 Assessment of workplace learning supporting lifelong learning and active knowledge transformation

Exemplary forms of WPBA as outlined above are already supporting processes of lifelong learning and active knowledge transformation at an organisational level. **At the national level, however, such approaches will need to be underpinned by a developmental view of competence. [Conclusion]**

This change would imply rather than the focus being on individuals being viewed as competent to perform current tasks at a particular level, it would recognise that people could still develop in a number of ways (at a range of 'levels') in order to improve their own performance, that of a team or enhance the effectiveness of the organisation. [Tension]

There is a need to stop thinking in terms of levels as being indicative of overall level of skills, knowledge and understanding of someone. [Discontinuity]

The forms of WPBA of engaging in peer assessment and self-reflection in order to continue to develop a range of skills and to have a broad conception of expertise would also seem to offer, at a societal level, some possibility of moving towards a knowledge-based society. [Conclusion]

In such a society there would be a need to focus more upon supporting the processes of formative assessment, learning and development, and to adopt a more expansive view of the nature of skills, knowledge and competence development. [Conclusion]

This more expansive view could pay particular attention to the need to address issues of transfer of skills, knowledge and experience between different settings, how to support individuals in developing a frame of mind whereby they continually look to improve their own performance through learning and development and to support the learning and development of others, and to recognise that in any organisation a commitment to continuing growth and development of its members is strategically important. [Conclusion]

The narrow view of competence-based assessment, by contrast, could be seen as the societal equivalent of what, at an organisational level, Argyris (2004) called 'skilled incompetence', where the focus on doing current activities well can result in neglect of professional growth and longer-term development. **A drift towards skilled incompetence could be challenged, however, by the use of processes of formative assessment and critical reflection within a more developmental view of how competence and expertise can be fostered.** This broader view could also help deal with a second problem: in many occupations the types of knowledge developed through education and work differ, and either is often insufficient as it is the combination and integration of different types of knowledge that is often the major challenge.

From this perspective processes of formative assessment and critical reflection in the workplace could play a key role in the immediate post-qualifying period by recognising that this is a time in which a great deal of learning takes place and support offered to individuals for their learning and development could have significance for establishing themselves in their career. [Conclusion]

Early in their careers people learn a great deal from challenges at work, and provided that they receive support as required to facilitate processes of formative assessment and critical reflection, then a virtuous circle of confidence, support and challenge can be created (Eraut et al, 2004).

There is also value in building a stronger dialogical element into the assessment of work-related competences, especially where there is a focus of work-related learning upon the 'core problems' of practice (Onstenk and Brown, 2002). Learning from their own experience is important for the newly qualified, but so is learning from the experience of others. Newly qualified staff need opportunities to discuss and practise thinking about complex cases handled by their more experienced colleagues.

The approach to seeking to tackle complexity through processes of formative assessment and critical reflection puts interpretation and a shared search for understanding as the heart of "the discursive nature of professional practice" (Webb, 1996, p111). [Conclusion]

Assessment of workplace learning also needs to help meet the challenge of coping with the demands for flexibility, adaptability and the ability to transfer skills, knowledge and understanding between contexts in the workplace, particularly for those operating in highly skilled or professional contexts. The hallmark of successful occupational practice is the ability to draw on knowledge, abilities, skills and attitudes used in an integrated, holistic way (Gonczi, 1994). This approach to the performance of professional practice draws attention to three important features.

First, complex professional duties can be performed in a variety of ways. Second, these duties can draw on different combinations of knowledge, skills, abilities and attitudes in effective performance. Third, this approach implies that there is scope for professional judgement, not least in the ability to balance competing demands and the pressures of time. [Tensions]

This means that individuals may come up with very different ways of responding to the demands for flexibility and transferability in the workplace. Indeed one way forward for the newly qualified and experienced practitioners alike may be to use processes of formative assessment and critical reflection to review the different ways individual practitioners seek to tackle their workload as a whole. By this means it should be possible to discuss and share ideas about the most effective ways to tackle a range of problems in practice. [Conclusion]

2.3 Summary

There is increasing evidence drawn from practice in a number of settings of how workplace assessment has affected employees' willingness to engage in lifelong learning and/or has supported processes of knowledge transformation in the workplace. **From these particular examples it is possible to put forward the design characteristics of an approach to the assessment of workplace learning that is oriented towards the future, in that it focuses upon how best to support employees' commitments to lifelong learning and active knowledge transformation. [Conclusion]**

It is possible to devise pedagogically-driven assessment regimes that support employee development and improvements in organisational performance in ways that are meaningful to the learner and encourage further learning, thereby facilitating commitments to both life-long learning and active knowledge transformation. The cornerstones of such an approach would acknowledge:

- **the importance of formative assessment**
- **focus upon individual performance in the enterprise or wider labour market rather than being almost exclusively concerned with seeking alignment with formal education and training programmes and qualifications**
- **build a stronger dialogical element into the assessment of work-related competences with a focus of work-related learning and assessment being upon the 'core problems' of occupational practice**
- **value in acknowledging the importance of 'soft qualifications' in strengthening individual commitments to undertake continuing vocational training**
- **and draw on the experience of organised programmes of learning and development for organisational 'change agents' that focus both upon organisational development and the value of continuing learning and development. [Conclusion]**

3. Is the focus upon levels, learning outcomes and qualifications misplaced – do we need a more developmental view of expertise in order to move towards achievement of a more knowledge-based society?

National (and European) qualifications frameworks, the specification of learning outcomes and grand targets like the Lisbon goals of increasing the supply of graduates in Europe in order to achieve a more knowledge-based society are all predicated upon the idea of moving people through to higher and well-defined levels of skills, knowledge and understanding. However, **a more effective way to move towards a more knowledge-based society is for as many people as possible, whatever their supposed highest overall 'level' of skills, to believe that they should develop their skills, knowledge and competence in a number of ways unrelated to their current highest 'level'.** [Conclusion]

This means rather than having an essentially binary conception of competence at the heart of the levels, it would be far more beneficial in inducing the frame of mind required of a knowledge-based society to have a developmental view of expertise. Such an approach can address three particular challenges that a 'levels' approach finds difficult to accommodate. First, there is the issue of transfer – there would be an expectation that graduates would be some way from 'experienced worker standard' when they completed their initial training. Secondly, such an approach could provide the conditions in which a commitment to continuous improvement at work could flourish, as most people would believe that they needed to develop in a number of ways (at a range of 'levels') in order to improve their performance. Thirdly, this approach of continuing to expect people to continue to develop a range of skills would offer some protection against the development of 'skilled incompetence' (where organisations and individuals continue to focus upon what they do well without paying due regard to the future).

This also overcomes the common trap to think that a more highly qualified workforce equates to a more highly skilled and more knowledgeable workforce. [Discontinuity]

The focus on levels, qualifications and learning outcomes can be comforting because it gives the illusion of progress, but a much more sophisticated model of skill development and expertise is required to underpin meaningful movement towards a knowledge society. In the context of the European Lisbon goals there is a temptation to focus upon the targets (percentage of people receiving qualifications at a particular level) rather than the goal of moving towards a more knowledge-based society.

The focus upon outcomes and levels may make the goal harder to achieve as it may exacerbate the problem whereby people think that a qualification marks a significant end to the learning process, rather than simply being a marker for a change of focus of learning. [Tension]

Furthermore, levels can often be treated as if they have some universal meaning and this assumption acts as a bar to genuine skill development. In reality all skill profiles are likely to be spiky (as performance in some aspects are much stronger than in others), whereas attribution of a level represents an aggregation of performance. [Tension]

Attribution of qualifications to levels is also always a political process, as it depends upon valuing certain types of skills, knowledge and understanding over others, and upon decisions about how demanding to make initial qualifications. [Tension] For example, the initial training of people to take X rays depends largely upon the breadth of training: 10 weeks for an assistant radiographer or three years for a radiographer trained to use a wider variety of equipment and given greater underpinning knowledge. An even more explicit example of the political process concerns the development of guidance practitioners – those with a full range of counselling, training, development, coaching and mentoring skills may possess a qualification at level 4 or 5 in the National Qualification Framework (NQF), yet an executive coach, with a very much reduced set of skills for influencing and supporting others, can obtain a level 7 qualification. The argument is that the volume of learning is very much less in the latter case but the level is higher. In practice, however, it is hard not to believe the decisive factor is the status of the person being coached: a senior executive!

The arbitrariness of levels is though perhaps best illustrated by another Level 7 NQF qualification: the Diploma in Translation (from the Institute of Linguists). This is a professional qualification intended for those who, having reached a level of linguistic competence at least equivalent to a good Honours degree, wish to embark on a career in professional translation. The Diploma tests the ability of candidates to translate to a professional standard, together with their awareness of the professional task of the translator. This qualification also illustrates how transfer between academic and professional qualifications is not straight forward. An Honours degree would rarely be sufficient to enable a candidate to pass the requisite examinations and they would normally need to complete a further programme of study and gain some professional experience. On the other hand, for someone with professional experience (based on linguistic competence as a native speaker) but without a degree completion of the Diploma would give, for example, only 60 credits at level 2 towards an undergraduate degree (equivalent to NQF level 5).

The above example gets to the crux of the matter – moving from a level 7 to a level 5 qualification not only clearly represents progression at the individual level, but would also add value to the general stock of skills, knowledge and understanding of the workforce and make sense in terms of the Lisbon goals.

However, for the Lisbon targets it is not making the individual worker or the workforce as a whole more highly qualified: the proxy for more highly skilled (i.e. more highly qualified) is preferred in policy terms to more highly skilled in practice. [Tension]

The focus upon levels, qualifications and learning outcomes is also a misdirection in that it can draw attention to the need for people to become more highly qualified (in moving towards a higher level), when in order to become more skilled and more effective in terms of improvement of their performance it would be beneficial to pay attention to the development of their skills, knowledge and understanding at lower levels. [Tension]

An example of this was a materials scientist with a PhD who admitted his contribution to a performance improvement team was greatly hampered by his inability to communicate effectively with people without his level of expertise. Brown et al (2004) outline a number of 'case stories' that show how **substantive and effective work-based learning may involve learning and development of skills, knowledge and competence at a variety of levels, with most employees not being concerned about qualifications or levels, and learning and development being principally regarded as processes designed to effect improvements in organisational effectiveness. This is at odds with a systemic focus on qualifications. [Tension]**

Rather than an expectation that HE will deliver graduates who have completed their intellectual development to the requisite level, it would be more useful for the development of a knowledge-based society to recognise that thinking in these terms is itself problematic. Additionally, public policy should seek to support the learning and development of staff in small companies that are apparently thriving, because it is at that time that support for further professional development is likely to be squeezed and a drift towards 'skilled incompetence' might be underway, with negative consequences for the development of a knowledge-based society. [Conclusion]

Such an approach would immediately address the issue of transfer – most individuals completing education and training, including graduates from vocational HE programmes would still be, and crucially under this model everyone would expect them to be, some way from 'experienced worker standard' when they completed their initial training. This approach could also provide the conditions in which a commitment to continuous improvement could flourish, not only would most people believe that they needed to develop in a number of ways (at a range of 'levels') in order to improve their performance, but also the 'working coaches' so critical to supporting the learning of others would increasingly be in place.

An approach of continuing to expect people to continue to develop a range of skills and to have a broad conception of expertise would seem to offer some protection against the development of 'skilled incompetence' because continuing professional development and growth would be recognised as being strategically important.

If we are to move towards a knowledge-based society we need to focus more upon supporting the processes of learning and development, and to adopt a more expansive view of the nature of skills, knowledge and competence than that enshrined in the current manifestation of the NQF levels. This more expansive view will pay particular attention to the need to address issues of transfer of skills, knowledge and experience between different settings; how to support individuals in developing a frame of mind whereby they continually look to improve their own performance through learning and development and to support the learning and development of others; and to recognise that in any

organisation a commitment to continuing growth and development of its members is strategically important. [Conclusion]

In this view VET programmes, including those with a substantive amount of work-related learning, should seek to help individuals move in the direction of chosen learning outcomes but their achievement should be regarded as partial – the value of VET can probably only be properly judged some time after individuals have been applying their skills, knowledge and experience in work settings over time and ideally across a range of contexts. [Conclusion]

Overall, this argument about the need to pay greater attention to learning at the workplace is not an argument for a particular type of education and training programmes. A more coherent and comprehensive view of the type of learning and development required to support continuing learning at work can interact with a wide range of education and training provision that varies according to subject, breadth, depth and timing. [Conclusion]

4. Role to be played by informal learning in enhancing skill development at work

Formal continuing vocational education and training for many technical and professional workers, particularly in the context of dynamic and/or uncertain labour markets, for example through updating existing skills or developing new skills via training, remains important. Skill development in such contexts is often a factor in maintaining employability over a long period. However, **to view participation in such training as necessarily decisive for personal professional development overlooks the fact that much skill development for technical and professional workers takes place outside formal training contexts. [Tension]**

Much learning and development takes place while working. Additionally, it may be that it is social capital, developed through participation in work-related networks, which also plays a role in helping individuals sustain their employability (Brown, 2005). In a range of contexts those individuals whose work regularly took them to other workplaces, or changed jobs frequently early in their career, developed strong networks as well as experiencing challenging work in a variety of contexts, a process which honed their skills in a number of respects, including the development of tacit skills. In such circumstances the informal learning of technical, social and networking skills could be very helpful for an individual's skill development at work. In other cases technical and professional workers starting their career had high level qualifications, and what they often needed to become more effective at work was practical experience gained while working rather than formal skills or knowledge updating through formal training programmes, so again informal learning could be very important.

The informal learning associated with personal networks was often important in many contexts over a career, from hearing about job opportunities and gaining initial entry to work through to many aspects of continuing career development, including choices about different ways of updating professional skills, knowledge and experience. [Conclusion]

These networks often had a pragmatic and informal nature and the functioning of these informal social networks re-emphasised the point Granovetter (1973) made about the 'strength of weak ties', with the network spreading out to include help of relatives, friends, colleagues or even through spontaneous relationships embedded in other social environments. Progress in work is often supported by spontaneous forms of learning in

which informal work-based learning and self-managed competence development converge and both are often at least partly dependent upon the quality of support from personal networks (Brown, 2005).

The cases outlined above illustrate how in contexts where (technical and professional) work itself is challenging, then much continuing vocational learning takes place through a mixture of formal and informal learning outside formal training programmes. Additionally, **there is a need for employees not only to update their technical skills but also to develop further a range of more generic skills, including planning, problem solving, communication, IT and management skills and much skill development in these areas can come through informal learning while working coupled with short periods of explicit formal learning and reflection upon experience. [Conclusion]**

Another valuable skill to be developed relates to learning to become more self-directed in your approach to learning at work and this can lead to significant work-related learning. Use of personal networks can be an effective way to critically reflect upon work and hence can be an important source of work-related learning. Learning how to support the learning of others (especially for those with management and supervision responsibilities) is vital to improve the likelihood of significant learning while working, but can help in the development of your own skill set as well as those of others. Learning how to organise knowledge effectively and apply it appropriately are vital for technical and professional workers' development and these skills are, par excellence, those that can be developed effectively through informal learning coupled with more formal reflective and deliberative learning. [Conclusion]

Overall, it is clear that informal learning can play a significant role in skill development at work, particularly when it is combined with imaginative complementary formal learning opportunities. **This means that the focus of strategies for skill development should be upon continuing vocational education, training and learning, rather than just upon participation in CVET *per se*, and greater attention should be given to helping employees become more effective in supporting the learning of others at work. [Conclusion]**

It is also clear that innovation and learning within and across organisations are essentially social processes and both personal networks and cross-company networks need to pay attention to building relationships to support development as well as focusing upon substantive issues. **There is also a need to consider the interaction between formal and informal approaches to learning, skill development and knowledge creation as a particularly effective way forward not only for enhancing personal professional development but also as a means to improve organisational effectiveness. [Conclusion]**

The organisational dimension is important because the thrust of the approach outlined here leads to jobs themselves becoming more learning-enriched and this leads to more embedded learning which is sustainable, compared to training operating on a deficit model that is going against the grain of what is happening at work, if there are seldom opportunities for individual learning, reflection and development. **On the other hand, it is also necessary to address the problems of employers offering mainly learning-impooverished jobs. [Tension]**

If employers do not endorse an approach to organisational development that involves upgrading the learning content of the jobs on offer and/or presents opportunities for workers to upskill or reskill, then public policy interventions should be addressed to helping people acquire the skills which could allow

them to leave their unsatisfactory and precarious jobs and to self-design a new vocational future in the same sector or even outside it. [Conclusion]

One particularly important way informal learning plays a role in skill development for employees working in learning-rich jobs is by 'learning by interacting' – that is, learning through interacting within communities and networks is a fundamental way for constantly rebuilding personal cognitive approaches both to specific issues and reconstructing the sense of the whole work experience. Technical and professional workers were often engaged in a wide range of networks that helped with different aspects of their work-related learning and development, only some of which were explicitly linked to the organisation for which they worked. On the other hand, in some settings access to a broad set of interactions was restricted to a particular group of technicians, whose opportunities for learning as part of their everyday work were consequently much richer than those whose work and contacts were more restricted.

It was also noticeable that in both personal and explicit company-linked work activities the search for knowledge was broad, going well beyond just development of technical skills. The search did incorporate aspects of technical know-how (how to apply technologies), but also involved know-what (where and when technologies and knowledge could be applied), know-who (not just in relation to customers but also an active search for people who would be valuable as members of a personal network), and know-why (a fuller understanding of phenomena and processes, including in some cases a deeper scientific understanding). **This desire for sense-making could be driven by one, or a combination, of an individual search for understanding, be embedded in occupational identities (thereby influencing attitudes and behaviour) or a function of participation in networks with an explicit learning dimension (Brown, 2005). [Conclusion]**

While acknowledging the value of informal learning, technical and professional workers also realised such learning was an insufficient basis for personal professional development. They seemed to be well aware that learning does not grow only 'by doing' (accumulating experience through performing work processes) or 'by using' (particular tools and techniques), but **there were also advantages to a more systematic approach to learning and development, whether this utilised some or all of the following: the systematic exploitation of the web, participation in specialist networks, relationships with technologically advanced customers or colleagues, more general participation in innovation activities, or using opportunities for formal education and training. Learning from others with acknowledged expertise is sometimes facilitated through particular activities (eg work shadowing), sometimes through explicit knowledge development and sharing activities and at other times is built into the organisation of work activities (eg in the construction of project teams). [Conclusion]**

Collaboration was deemed to be a support in a wide range of situations, a natural environment for informal exchanges of information and knowledge, and a stimulus to enrich one's competencies. Being a member of a team and/or of a wider community of practice was almost universally valued. Indeed in the instances where individuals were trapped in low quality jobs one of their major grievances was that they had few opportunities to collaborate and this restricted further their opportunities for personal development (Brown, 2005).

Overall, much learning undertaken by professional and technical workers is concerned with 'sense making' (both in relation to technical processes and work process knowledge more generally). That is, developing a 'vision' of how work process knowledge fits in their work activities and those of the company more generally is an important driver of learning. Technical and professional workers often want to make sense of their experience of work as a whole and in order to achieve this goal they draw upon a range

of approaches to learning that comprise both formal and informal learning. **The overall approach could be interpreted as representing a desire for learning through working and interacting and self-directed learning leading to contextual understanding interspersed with periods of more formal learning and development that allow for more considered reflection, a linking (and integration) of what has been learned by experience and informal means, and more rounded professional and personal development. [Conclusion]**

5. Final thoughts

Bearing in mind the famous quote by William Gibson that 'the *future* is *already here*, it's *just unevenly distributed*' it is hard not to believe that belief in a developmental view of expertise in the workplace will not be much more prevalent in 2025 and beyond. Current obsessions with focusing on issues concerned with competence, assessment and qualifications as proxies for work-related skill development will be recognised as unhelpful.

The implications for supporting workplace learning are clear, but whether there will be a 'backwash effect' into initial education is unclear. The two most challenging aspects would be whether much greater emphasis is given to encouraging pupils to support the learning of others and for this to be seen as a higher level of achievement than individual technical proficiency and to encouraging pupils to think about alternative ways in which activities could be tackled. Some activities that are currently considered to be 'cheating' or 'off-task' would need to be encouraged rather than censored – whether such a future is possible, probable or preferable to a focus on individualistic achievement of specified learning objectives and moving through prescribed levels depends on value judgements about what should be learned within formal education and what may be best developed in other settings.

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