Competence in the Workplace: Implications for Research, Policy and Practice Edited by C Velde (2009) Springer, Dordrecht

Chapter title: Workplace Competence

Abstract

Understanding what constitutes workplace competence stands a key concern for those who rely on and aim to develop and/or sustain that competence. Without a comprehensive understanding of this competence, it is difficult to advise individuals, enterprises, and governments how they should, respectively, plan their development throughout working life, manage the continuity of their workforce's skills, and organise how education systems can prepare and further develop individuals' capacities for work. Yet apprehending what constitutes workplace competence is not so easily undertaken. Rather than being uniform across an occupation or even nationally consistent, competence is shaped by situational factors, emerging technologies, specific occupational requirements, and the capacities of those who enact those requirements. Moreover, both the requirements for performance and personal capacities are dynamic, being shaped and remade by workers in response to the changing and particular demands of work performance. Yet, ultimately, competence at work is something enacted: a performance and judgements about that performance that can only be made through accounting for the circumstances of the performance and also the capacities of the performer. In this way, there is a need to understand to competence from both socially shaped and personally constituted perspectives.

Competence as a personal practice
Workplace performance
Remaking work
Changing requirements for competence

WORKPLACE COMPETENCE

Understanding what comprises competence at work needs to accommodate both socially derived and personally constituted perspectives of that competence. From the socially derived perspective, there is need to account for occupational requirements and situational factors that together constitute competent performance at work. This performance has occupational, cultural, and situational dimensions that collectively constitute what Searle(1995) refers to as institutional facts; those that are a product of the social world. Reflecting societal needs, cultural factors shape the need for and shape the kinds of tasks that comprise occupational roles. The need for and form of the services and goods that cultures want and require shapes the form of and delineation amongst occupations. For instance, while requiring healthcare most countries delineate doctors' and nurses' work. Yet, beyond the cultural manifestation of occupations, situational factors shape the particular form of workplace requirements and, in doing so, articulate the diversity of occupational performance requirements (Billett, 2001). For instance, nurses in remote communities have to perform a range of healthcare tasks that cross boundaries with medical (i.e., doctors') work in ways that are distinct from what occurs in metropolitan centres. So, although statements about occupational requirements can helpfully inform the efforts of governments, education systems, enterprises, and individuals, these accounts need to accommodate the diversity of the situational factors that shape what constitutes workplace competence.

However, these socially derived bases for understanding workplace performance requirements represent only one of the two dimensions of what constitutes workplace competence. There is also the more subjective and person-dependent bases by which individuals make sense of, interpret, and undertake their work. Yet, considerations of how individuals exercise their capacities in work activities and interactions are not usually

included in analyses of work requirements that typically focus on workplace tasks and activities as observable facts. However, ultimately work is something undertaken by individuals as they engage in and complete tasks and interactions by deploying their understandings, procedures, and valuing of those activities. That is, work is defined by how individuals construe and enact their work. Hence, human engagement in and conduct of work is an essential facet of all work and contributes to what constitutes workplace competence.

To elaborate this dual conception of workplace competence, this chapter first discusses what is often taken as the objective account of the requirements for performance at work, as an institutional fact, including is cultural and situational variations. Then, the subjective and personal dimension of workplace competence is discussed. These dimensions are then brought together and articulated through categories of activities and interactions that constitute a more comprehensive and relational account of workplace competence.

OCCUPATIONAL AND WORKPLACE REQUIREMENTS

Much of the requirements for performance in workplaces are expressions of the social world. Searle (1995) refers to these as facts that require human institutions for their existence. These facts include sets of human needs for survival, reproduction, order, and care that often find form as paid occupations. Occupations arise, decline, or are sustained through history and changing cultural needs (Billett, 2006). Characteristics of these constantly transforming requirements include: new products and technologies; short production cycles; changing production concepts, such as a high discretion workforce, and strategies of rationalisation (e.g. Darrah, 1996; Ellstrom, 1998). Bailey (1993), for instance, refers to accelerated production cycles, a proliferation of products, heightened levels of uncertainty, and changing work practices. Equally, the forms of available work can change. The shift to service industries, changes to the character of employment, down-sized workplaces, and non-standard forms of employment all serve to transform and make dynamic (and, therefore, more demanding) the requirements for performing work (Noon & Blyton, 1997). Some of the driving forces behind these changes are attempts to reorganise work. These changes include those intended to increase the outputs of paid labour and reduce cost. Then there are those changes that seek to enhance and fully utilise workers' skills to achieve greater competitiveness through improved performance. These changes to the kinds of work being undertaken, the requirements for work, and how individuals engage in work shape occupational practice, and this occurs in particular ways in the circumstances where those occupations are practiced.

Indeed, firm bases for understanding the requirements of particular workplaces are still elusive because of the diversity of occupational requirements across workplaces. Bernhardt (1999) found that more upscale retail work or selling products requiring degrees of expert advice, including building relationships with customers – led to retail work that is highly demanding and complex. Home Depot (a hardware chain store) workers earn more than the industry average, and enjoy extra benefits and experience a low level of staff turnover compared to workers in other retail workplaces. Moreover, distinctions amongst different kinds of workers, such as tradespeople, technicians, professionals or 'un-skilled' workers are often based on assumptions rather than evidence about the required competence. For instance, assumptions about the levels of competence required for kinds of work categorised as low skill are questioned by accounts of their actual requirements (e.g., Billett, 2000; Darrah, 1997). Indeed, the technology pervading many forms of contemporary and emerging work often requires symbolic knowledge that makes work tasks more demanding (e.g., Martin & Scribner, 1991; Zuboff, 1988) because workers across a range of occupational classifications are required to represent the structures and processes of their machines symbolically (Berryman, 1993). For instance, Martin and Scribner (1991) note that the requirements for operating a computer numerically controlled (CNC) lathe are now closer to the skill requirements of a computer operator than a manual lathe operator, thereby challenging existing (and unhelpful) distinctions between manual and mental labour. Consequently, and generally, for many categories of workers, the requirements for competent

work practice are probably greater than they have been credited, and perhaps for all they are growing, albeit shaped by the particular circumstances of their employment and their workplace.

These requirements for workplace competence can be found in the need to accommodate constant change, and the intellectual demands for work in terms of its conceptual (symbolic) requirements and procedural bases. Indeed, the need to accommodate for constant change can render work practice to be inherently nonroutine and demanding. Because of this constant transformation, changes to work include relinquishing past practices and the displacement of existing competence and confidence. In these ways, the requirements for competence are increasing in many forms of work. In sum, these changes are making the requirements for work more complex in their formation and more demanding in their enactment. Yet, the scope and form of these changing requirements are not uniform; they are shaped by societal and situational factors.

DIVERSITY IN WORK REQUIREMENTS

A complex of societal and local factors shapes the diversity of the requirements for competent performance across workplaces even for those enacting the same occupational practice. stated Darrah (1997, p. 249) claims "... jobs seem so diverse as to obviate the need for generalisations about how people perform work."

Rather than being uniform across occupations, the requirements for competence are quite diverse across workplaces (Billett, 2001). Although there are occupationally common concepts, values, and practices – the canonical knowledge of the occupation – across workplaces in a particular country, their application likely differs quite widely. This is because there are quite distinct performance requirements in specific work situations. Consequently, understanding what constitutes workplace competence cannot rely on occupational-level analyses. Instead, national, cultural, local, and enterprise-level factors all shape workplace performance requirements: the 'objective' account of workplace requirements. Therefore, it is helpful to understand something of the range of factors that make particular workplace requirements distinct.

Across different countries and cultures there are particular premises for the requirements of work, thereby making analyses at the occupational level problematic. For instance, Japan has a highly automated and computerized car manufacturing industry, where that routinely uses robotics. Yet, clothing manufacture in Japan is often undertaken in the old-fashioned bundle production system (Bailey, 1993), where component parts are bundled together by machinists and then passed to another who first unbundles them and performs an operation and re-bundles and so on, thereby requiring high levels of handling and highly specific machining skills. So in the country that developed the 'Just -In-Time' approach to work processes and maintaining low work-in-progress inventories, there are garment factories where large amounts of stock are in production at any one time. The logic for the production processes in the Japanese garment industry is shaped by the limited working life of female Japanese garment workers, who are expected to give up work upon marriage. Hence, these workers are skilled only in specific operations that allow them to be replaced. Yet, in contrast to the Japanese approach, the German garment manufacturing industry is highly mechanised and uses automated equipment to construct the garments and move garment components through the manufacturing process to minimise handling time by relatively highly paid garment workers (Bailey, 1993). Hence, in distinct ways, technological developments and cultural mores, such as those referred to above, shape how the same work is organised in two distinct societal milieus, and what counts as competent work performance.

The national differences in work may also extend to the climate. For instance, the requirements for occupations are often played out differently in countries that have hot summers and frigid winters. Some of the mechanical tasks required of automotive engineers in northern Europe, Canada, and northern American states are unlikely to be undertaken by their counterparts in most places in Australia, southern American countries, or other warmer climates, and vice versa. So, occupational requirements may differ markedly across and with

countries as shaped by brute facts of climate. Yet, other differences shape occupational requirements within work in the same country. As noted, in America, some retail work is highly segmented and routinised, as is the case in pharmacy chain stores. Yet in hardware stores, retail workers' expertise is prized because they are expected to provide advice to customers about products (Bernhardt, 1999). Other workers who provide advice and regulate sales in the retail settings also attract higher levels of remuneration. For instance, pharmacists provide similar services, yet would not be labeled as retail workers – their knowledge is codified as professional, in contrast to that of hardware retail workers. Further, retail workers in exclusive fashion stores are often paid on a commission-only basis. Their workplace competence is directed towards making sales and selling the kinds of garment that offer good margins between wholesale and retail price, and sustaining all of this through establishing relations with clients. Yet, despite the prestigious place of employment, their remuneration can be perilous because it is on a commission-only basis. Consequently, in work categorised as comprising the same occupation, there are variations in occupational practices that necessitate particular forms of workplace competence.

Local factors also shape these workplace competencies. When investigating what comprised hairdressers' work, it was found that the goals for hairdressing had distinctive features across four salons, three in Australia and one in the United Kingdom (Billett, 2003). The characteristics of the hairdressing practice included each salon's requirements for performance that where identifiably local and clientele based. In a fashionable inner city salon, the key goals for performance were to transform the clients' appearance, and to offer new cuts and colours. The interactions between clients and hairdressers were a product of their particular interests and values. In a salon in a low socio-economic suburb, an important work requirement was to manage a precarious business with an absent owner, two part-time senior hairdressers, and a clientele that included those who demanded complex treatments, yet did not care for their hair. A key requirement here was to manage these 'awkward' customers, particularly when they complained about their treatments. In another salon, the clientele comprised elderly women who came to the salon fortnightly, perhaps as much for companionship as for haircuts. Here, the hairdressers' knowledge of clients' personal histories, knowing the names and circumstances of family and friends, was an important component of practice. The fourth salon was in a provincial town in a rural region that was enduring a three-year drought. The goals here included providing good value to maintain the clientele and managing the difficult balance between eliciting additional service (e.g., colours and perms) yet not causing clients to choose between the cost of a hair treatment and groceries for home. In this way, localised factors shaped what constituted workplace competence in quite distinct ways.

Similarly, across six open cut coalmines owned by the same mining company, different performance requirements were evident (Billett, 1994). Each mine site's work practices were premised on particular histories of industrial affiliations and demarcations. These had developed over time in each particular mine site, shaped by the age and production stage of the mine (e.g., the depth of the coal seam below the ground). The history of mine ownership had also led to particular workplace arrangements and union affiliations that also shaped the work practices. Moreover, beyond these institutional facts was the brute fact of the direction and angle of the coal seam that shaped the production costs and viability of the mining operation, and the timing of the shift from open cut to underground mining operations, which require quite different occupational skills. So again, the requirements for work performance differed across these work sites as did the kinds and extent of change, which are products of situational factors.

The analysis above has emphasised the objective socially derived view; that is, the observable and quantifiable changes to work requirements and their diversity are proposed as a set of objective requirements for participation in paid work. These are the institutional facts (Searle, 1995) that comprise paid work. It has been proposed that the requirements for performance – expertise if you like – are likely to be highly situated. Yet, these are also fleeting. This is because the circumstances that constitute the requirements for performance in particular workplace settings are subject to constant transformation. However, although there

are many variations in work requirements, even in the same industry sector or occupational practice, there are also requirements that are more or less common. These are the canonical knowledge of the occupation and trends in the changing character of work requirements that need to be understood.

Notwithstanding all this, there remains a significant gap in understanding the requirements for work and its diversity, that is, the subjective and person-dependent basis upon how individuals engage in work. Therefore, before proceeding to identify ways of understanding what constitutes workplace competence, it is important to include the person-dependent and subjective process that shapes individuals' engagement in and performance at work.

WORK REQUIREMENTS AS SUBJECTIVE AND PERSON DEPENDENT PHENOMENA

While the socially derived accounts of workplace requirements provided above offer one view, competence at work is something exercised by individuals and is premised on their capacities, interests, perspectives, and agency, that is, how individuals perform workplace activities and interactions. Ultimately, individuals engage in work, make sense of what is required, and deploy their capacities in workplace participation and the remake of work practice. Take, for instance, the above examples of how CNC lathes have transformed metal machining or nurses' work has been transformed by technology. The rich subjective experience of an experienced manual lathe operator is rendered largely ineffective by computer technology. Therefore, the understandings, nuanced bases of performance, and agency of the manual lathe operator and their sense of self may be challenged by changes to their work. Moreover, competence is likely to be person-dependent. Individuals do not bring to or engage in work tasks with a uniform base of experience, knowledge, and ways of knowing. Instead, they have diverse and personally distinct bases for conceptualising and construing what they experience in the workplace (Billett, 2003; Valsiner, 2000). Explanations from cognitive processes account for these differences by elaborating the bases by which engagement in tasks shapes the cognitive process and outcomes (Anderson, 1982, 1993). There are also likely to be quite diverse conceptions of what constitutes work practice across different kinds and categories of workers. This includes those who are contingent workers (i.e., contracted and casual workers), whose access to comprehensive workplace knowledge might be quite restricted; home-based workers who struggle to understand work goals; disabled workers, who are learning to manage their workplace performance in particular ways (Church, 2004); and older workers who have to confront turbulent work situations when applying their existing knowledge to changed circumstances (Tikkanen, Lahn, Ward, & Lyng, 2002), often in the absence of workplace support. These considerations prompt caution in claims about being able to identify the objective qualities of workplace competence. Ultimately, individuals' subjective processes shape their participation in work activities and interactions. Only through understanding the subjective experience of individuals can workplace competence be fully and comprehensively understood. For instance, in the clothing industry, a common task was 'rate setting' of clothing machinists performing specific operations. In many ways, this is emblematic of attempting to provide the objective account of what constitutes work. Methods personnel measure the time it takes a machinist to perform a sewing task and this time is used to set a rate for the job, and possible bonuses for working quicker. When being timed, machinists attempt to secure a generous time allowance for the operation, to secure a bonus. The standard approach is to work slowly when being timed, whilst giving the appearance of working at normal speed. The methods officer, of course, knows this and attempts to calculate at what level of potential performance the machinist is working. The machinist also knows how the methods officer operates and appears to be working very quickly, while foxing on the speed of task completion. The methods officer also knows that the machinist knows this to be case, and so it goes on. Ultimately, this 'objective' process of timing an operation is reduced to a judgement on the part of the rate setter. The point here is that the conduct of work is premised on work being

enacted by individuals, and that conduct includes their experience, capabilities, and intentions, and also the judgement of the observer. So even in a situation when a deliberate process is being enacted to capture the objective character and qualities of work, it needs to be mediated between the observer and the actor. The actual performance of work is ultimately a subjective process.

So, more than workplace requirements, what constitutes competence includes workers' existing capacities and conceptions. Therefore, although having some 'objective' basis to understand work requirements is essential, on its own it is incomplete in capturing workplace competence. The enactment of work is a lived process; it is more than a statement of work requirements. It represents the actualities of enactment of work, 'what is', not just statements of intents or ideals, 'what should be'. Therefore, it is necessary to account for the objective and observable facets of change and those who are enacting workplace performance. To consider one without the other is to deny the actualities of what constitutes workplace competence.

The following sections attempt to identify some bases of workplace performance that capture both these objective and subjective dimensions. They do so by drawing upon accounts of work, work requirements, and individuals' engagement with work from disciplines associated with the sociology of work, anthropology, cognitive studies of work, and human resource development. The key elements of this analysis comprise a consideration of activities and interactions.

WORK ACTIVITIES AND INTERACTIONS: DUAL BASES OF WORKPLACE COMPETENCE

In the following sections, some of the socially derived and personally constituted premises are drawn together to offer an account of workplace competence. Taking Darrah's (1997) advice about the diversity of work practice, the concern is not to articulate a set of generalisations, but to identify bases that in different ways (i.e., to greater or lesser extent) can be used to identify workplace competence. It is proposed that the competence required for a particular occupational practice and in a specific workplace can be elaborated through categories of work activities and interactions. Work activities can be apprehended through understanding the quality and degree of their: (i) routineness; (ii) specialisation; (iii) intensity; (iv) conceptual requirements; (v) discretionary qualities; and (vi) complexity. Interactions in workplaces are premised on enhanced engagement with tools and artefacts, and with others.

Work activities

Routineness of work activities

A key factor in determining the demands of workplace competence is the degree by which work tasks that individuals undertake are routine or nonroutine. The frequency of nonroutine activities indicates the level of demand for higher orders of thinking. As noted, a characteristic of contemporary work is short production or service cycles. Shorter cycles result in work being less routine, and thereby require workers to have higher orders of knowledge and the capacities to analyse, understand, and respond more frequently to new work requirements. Workers more frequently are required to engage in and learn new tasks and processes. This includes the requirement for learning new techniques and ways of working, and extends to the formation of new identities. For instance, fire fighters' work has increasingly become associated with rescue and retrieval, particularly from automobile and other kinds of accidents, and the prevention of fires. These changes in roles require a range of new skills and approaches to that work.

Bartel and Lichtenberg (1987) claim the educational requirements for work in America have risen in response to the demands of new technologies because they are increasingly nonroutine. Skill requirements change as the technology moves through its life cycle stages of introduction, growth, stability, and decline (Bartels & Lichtenberg, 1987,

1991; Flynn, 1988; Mincer, 1989). Life cycles of technology become shorter and overlap such that the desirable 'stability' stage is barely reached before it declines, causing uncertainty and accommodation of more change. A component of workplace competency might be associated with a technology at a particular period of its life cycle. This conception of technical life cycles also suggests that skill requirements are not a given or objective fact. Individuals' interactions with technology are premised on a negotiation between the life cycle of the technology and the workers' knowledge and experience with that technology. For instance, a mechanic reports developing nuanced knowledge of particular models of cars (Billett & Somerville, 2004). This nuanced knowledge develops over time from working on specific models of cars. However, when that model was no longer being serviced by the mechanic the knowledge became redundant. The more frequently the models of cars change, the more frequently nuanced knowledge has to be developed and then discarded.

This concept of transitory knowledge was made particularly apparent in a study of information technology helpdesk workers (Billett, Smith, & Barker, 2005). These workers have long since abandoned manuals and help facilities within software applications in their workplace tasks. Instead, they use web sites to access information about the latest applications and updates, and then share this information with coworkers. For these workers, valuable knowledge is configured as being ever-changing and ephemeral. The permanency of knowledge is associated with the helpfulness of particular web sites and recent histories of particular interventions in the operating system in which they work. Aligned with the concept of novelty in work activities is the capacity to adapt to nonroutine situations and not necessarily being constrained by past practices. Worker flexibility has been identified as the most prominent source of workplace reorganisation measures (Waddington & Whitson, 1996) with teamwork, for instance, being seen as having lower utility. This suggests that workers' capacity and interest to engage in novel ways with workplace tasks is more important for their performance than is their need for collective effort. However, again the relational argument arises. What comprises novelty is likely to be person dependent in some ways. So, the advent of a new technology, ways of working, workplace procedure, or being flexible has particular impacts and implications for those whom it affects, not only if it is entirely 'new' to the workplace.

A study of how small business operators implemented the goods and services tax (GST) in Australia provided evidence of the diverse processes and impact of having to undertake novel work tasks (Billett, Ehrich, & Hernon-Tinning, 2003). For those familiar and confident with computers and business administration software, the requirements to administer the GST were considerably less demanding than for those who were not. One small business operator administered his business from the 'green' book carried in his pocket. For him, the requirement to move to an electronically based business administration system was hugely novel and disconcerting. Consequently, beyond the change in work requirements and technologies as an objective fact, there is also the subjective experience of these changes in the degree of novelty for the particular individual.

In sum, the degree by which work is routine or is attempted to be rendered routine is central to understanding workplace competence. To respond effectively to the new tasks and performance requirements involved in nonroutine activities, workers are likely to require higher levels of work-related capacities. Work comprising routine activities implies a reduced demand for higher levels of workplace competence. However, what constitutes routineness has both socially derived and personal dimensions.

Degrees of work specialisation
Both occupationally specific and more general capacities are required in different measures in particular work situations. Being a good technician or skilled practitioner alone may no longer suffice. Instead, being able to communicate this to others, consider how innovative practices might proceed, and ensure safe and environmentally friendly work might be essential. For instance, automotive manufacturers' extended warranty is changing the relationship between car dealerships and those who purchase cars. A 4- or 5-year warranty on a new automobile weds dealerships to their clients. If relationships can be maintained these clients may

subsequently purchase another car from the dealership. Consequently, mechanics may have to become more skilled in communicating with customers. A mechanic who had previously worked as a roadside emergency repair mechanic and possessed interpersonal skills and an interest in addressing clients' needs became highly valued in one such dealership (Billett & Pavlova, 2005). He was able to work across the mechanical and sales departments. His broad-based skills permitted him to establish a crucial role as the relationship between the dealership and its relationship with its customers changed. Similarly, as work forces become smaller or leaner there is a likelihood of workers having to perform a more diverse range of tasks. Cabin crews on budget airlines are required to clean toilets, handle luggage, and undertake tasks that their counterparts in major airlines would not be expected to perform, for instance.

Yet in many work situations, highly specialized skills still remain valued. Airframe and engine mechanics might be licensed to work only on particular models of airplanes, and pilots are certified to fly only particular routes because of the specific requirements for that work. Equally, an information technology worker enjoyed enhanced work status and job security because of his specialist knowledge (Billett, Barker, & Hernon-Tinning, 2004). His knowledge of the education department's standard operating system made him indispensable across the five primary schools in which he worked. Earlier, his computer skills had failed to secure him permanent employment in the schools. However, when a computerized administration system was implemented, his work became more specialized and his role was transformed from assisting teachers and administrative staff to being indispensable to the five schools' administration. His specialist knowledge led to pay increases and permanency.

There will also be requirements for workers to be both highly specialized and broadly skilled. Consequently, the breadth of the domain of knowledge and the depth of the requirements stand as being central to competent performance. However, the kinds of experiences workers have had may be central to how they are able to operate across different kinds of workplace specializations.

Intensity of work activities
The intensification of work practice likely arises from a requirement for exacting quality standards and greater workplace efficiency, yet often with fewer workers (Noon & Blyton, 1997). For instance, nurses' work has become increasingly intense. Hospital patients are now recuperating at home or elsewhere. Consequently, most patients in hospital wards are likely to require higher levels of care. In the banking sector, computerisation is said to have brought about a reduction in routinised activity, thereby also making this work more intensive (Bertrand & Noyelle, 1988). Consequently, for nurses, bank workers, and others, work has come to include the management of more intense activities. The intensity of work tasks generates particular demands. This includes undertaking and managing a number of tasks simultaneously. Consequently, the capacity to work at higher levels through completion of nonroutine activities and with increased accountability may be required. However, this change is unlikely to be uniform, with the intensity of work varying across and within workplaces.

In summary, a dimension of workplace competence is the degree of work intensity requiring the capacity to monitor and prioritise activities, and engage in nonroutine and creative thinking, rather than deploying standardised procedures. Also, the need to possess a wider range of capabilities and apply knowledge across a broader range of tasks is often required. Yet, how individuals respond effectively to the demands of the intensification of work will be dependent upon their personal capacities, dispositions, and prior experiences. So, again what constitutes intense work and its impact on those participating in it is, in part, person dependent.

Work requirements are becoming more conceptual
As noted, increasingly, work requirements are requiring higher levels of conceptual knowledge. Computers can have a profound impact upon work because they: (i) reconfigure work tasks; (ii) transform the division of labour; and (iii) introduce unanticipated asymmetries to communications (Heath & Nicholls, 1997). (Cook-Gumperez & Hanna, 1997) study of the

impact of technology on nursing illustrates the reconfiguration of working tasks, brought about by the introduction of technology that monitors patients' health and progress. The introduction of bedside computers to monitor, document, and chart patients' conditions reshapes nurses' work through, among others, changes to the representation of the requirements for nursing knowledge. Nurses' competence becomes premised on technology that represents patient data symbolically and in ways often unfamiliar to experienced nurses. As nursing work requires interpretation of several sources of data, some nurses claimed their professional competence was challenged by technology that was presumed to be presenting correct data. Nurses also reported the loss of personal and professional identity associated with nursing work because of this technology. Yet, the nurses also identified positive dimensions to the introduction of the bedside technology. They claimed the computers undertook the generation and recording of routine and accurate patient information that otherwise represented a labour-intensive activity. This, it is claimed, provided an opportunity to advocate for the whole patient-approach to nursing with nurses coordinating information provided by the technology and their nursing knowledge. Moreover, bedside computers facilitated more democratic patient-nurse interactions. The screen served as a visible and accessible domain through which patients can access their records, which were previously inaccessible, and provided a platform for elaboration of the patient's condition. Furthermore, the nurse's place at the bedside was emphasised through this technology, as they did not have to go elsewhere to record information. Therefore, the bed became even more the focus for the nursing activity because of the bedside computer (Cook-Gumperez & Hanna, 1997). In this way, technology has the potential to transform work, making nurses closer to what (Barley & Orr, 1997) claim is the increasing technologising of work.

Yet, this technology can make invisible the knowledge required to understand its operation (Zuboff, 1988). Consequently, this knowledge is more difficult to learn and deploy because it is difficult to access. (Bresnahan, Brynjolsson, & Hitt, 2002) also concluded that there are both positive and negative aspects of information technology's impact on workplace. So, while technology has the potential to reconfigure work, these changes need to be understood in terms of their overall impact on work and individuals' identities as workers.

Nevertheless, many technologies can make performance at work more rather than less demanding. Perhaps most spectacularly, this was demonstrated by the incidents at the American nuclear power station at Three Mile Island. A malfunction in the nuclear power plant resulted in incomplete or inaccurate information being provided to the power plant operators. Then, even though the operators sensed something was amiss with the power plant's operation they were largely reliant on the (incorrect) information provided by its electronic reporting systems. This allowed the power plant's malfunction to go on longer than if the correct information had been available to and acted upon by the operators. The President's Inquiry into the Three Mile Island Incident (US Department of Manpower, 1964) concluded that the plant operators lacked a conceptual understanding of the operation of the power plant. They were reliant for their understandings on the displays provided in the control room, rather than an understanding the power plant's operation. Moreover, even when they realized there was a problem, the operators lacked the skills to quickly respond to the malfunction. The point here is that the operators' understanding of the plant was premised on the displays of information, rather than the actual operation of the plant. Hence, they did not know how to respond to the nonroutine situation of a failure within the plant.

Again, there is a personal dimension to this development of competence. In a study of a secondary processing plant (Billett, 2000), the plant operators were initially hired to assist in the construction of the new plant, with their employment continuing through the commissioning phase to them becoming the operators of the plant. This process of engagement provided these workers with a nuanced understanding of the plant's operations. As a consequence of their experiences in the construction phase, the workers developed a comprehensive understanding of the plant and its operation. In contrast, workers who came later did not have these sets of experience and their understanding of the plant's operation was premised on very different bases (e.g., drawings and videos of what was occurring within the

kilns). So, the previous experiences of each group of workers generated particular sets of understandings and capacities to comprehend the technology that was being deployed.

The extent of the use of technology, and its criticality, will differ across workplaces and have greater meaning in some workplaces than others, and for some workers. The ability to use technology effectively is shaped by the workers' previous experience and ways of knowing. Therefore, beyond objective accounts of what constitutes highly conceptual work are the subjective bases for understanding symbolic and abstract knowledge. So here, despite the fact of technology, the capacity to engage with it was, at least in part, subjective.

Discretionary qualities of work

The capacity to exercise discretion within paid work is a defining characteristic of its standing for many commentators (Carnevale, 1995; Davis, 1995; Howard, 1995). That is, the scope of workers' capacity to be able to make decisions and organise their work is important to their sense of self. Certainly, what distinguishes work that is termed 'professional' from other kinds of work is the degree of discretion afforded to the practitioner. McGovern (1996), for instance, claims that professional engineers were distinguished from crafts workers and lower level technical staff by the trust and discretion afforded them. Noon and Blyton (1997) suggest that a key attribute of so-called new work is workers' ability to exercise significant discretion in their work and workplace activities. There are at least two dimensions to worker discretion. There is the degree of responsibility that individuals are required to demonstrate in their work role. Junior workers are often constrained in the execution of their work. For instance, in a hairdressing salon, there will always be tasks that are the preserve of senior staff (Billett, 2003). The other dimension of discretion is the space individuals make for themselves in their work. For instance, in a study of five workers engaged in different kinds of work, some of which were closely supervised, each was able to exercise some degree of discretion (Billett and Pavlova, 2005). Yet, even in workplaces where workers' activities are closely monitored they can still exercise discretion. One of the hairdressing salons had a strict work regime. Yet, despite efforts to secure consistency and adherence to the salon's norms and practices, hairdressers still were able to exercise their discretion in their negotiations with their hairdressing clients about the kinds of cuts and treatments they gave. This included the hairdressers exercising their preferences for particular treatments and cuts.

However, employers are sometimes quite ambiguous in their approach to workplace discretion of both these kinds. On the one hand, they want workers to exercise their capacities fully and engage effectively in their work and work activities, and exercise their energy, creativity, and intellect. In this way, workers' discretion is most welcome. However, this discretion may be less welcome if it is seen as challenging managers', owners', and other workers' control of or workplace standing. Indeed, new lean workplaces now present in many western economies were expected to deliver dividends in the form of increased professionalism brought about by the flattening of hierarchical relationships, the management of integrated work areas, budget responsibilities, and the advent of continuous improvement (Bonazzi, 1998). However, Lowe (1993) found that although workers might have greater responsibilities, the content of their work remained largely unchanged. Similarly, their distance from management remained unchanged and there was claimed to be widespread uncertainty due to their scant preparation for the new tasks. So, these work requirements demand higher levels and broader scope of decision-making than do more restricted forms of employment, yet the preparation for these roles and their benefits may not be apparent to workers.

Yet, sometimes work is intended by employers to be low discretion. Hughes and Bernhardt (1999) suggest that some retail work is deliberately down-skilled in order to secure low levels of pay and maximize the opportunities of using part-time and contingent workers. Yet, these changes have been driven by technological and process innovation – not on the basis of a human resource model. Although these are not high performance workplaces, the company's performance is highly profitable:

It is hard to see the advantages of taking the 'high road' in the retail industry.

> What would convince McDonald's to shift its production-line system to one based on skilled workers, given the enormous start-up costs and the amount of capital it has already sunk into designing its kitchen around low-skill labour? How would Macy's go about creating work teams that are productive enough to support higher wages, given its sales staff makes money by interacting with customers and the cash register, not with other workers? (Bernhardt, 1999; p. 16)

So, whereas teamwork and smaller work teams, and even the opportunity to work from home, may require and emphasise the importance of workers' discretion in particular ways, this is not likely to be deployed universally. However, it is also important to acknowledge that discretion is not something that is purely a workplace affordance. Just as Braverman's (1974) deskilling thesis has been criticised for failing to take into account worker resistance against management attempts to deskill and marginalise them, it seems this principle is applicable far wider. In detailed studies of workers' lives (Billett, Barker & Hernon-Tinning, 2004, Billett & Pavlova, 2005, Billett, Smith & Barker, 2005) there is clear evidence of workers being able to exercise their agency and creating discretionary practices for themselves, in changing workplace circumstances. All this suggests that the discretion that constitutes workplace competence is negotiated between the individual and the workplace. Again, there are interplays between the objective requirements for work and the subjective needs of individual workers that shape how they experience and engage in work.

Complexity of work activities

Complexity of work activities refers to the number of compounding factors that need or potentially need to be taken into consideration when enacting work tasks. High levels of complexity are involved not only in planning and enacting an integrated form of work (e.g., catering arrangements, medical care, building project), but also in seemingly simpler daily tasks such as driving a truck. Barley and Orr (1997) conclude that technology brings about complexities for work practice. Lewis (2005) notes how truck driving has been transformed into the management of a transportation device. This management includes complying with environmental regulations (e.g., regarding levels of emissions and noise), operating in ways that maximize fuel efficiency, and monitoring potentially hundreds of functions to ensure the truck's effective and safe operation. This includes the requirement to move easily from an automatic gearbox to manual controls based on the driver's assessment of load factors and the capacity to maintain speed around corners and up inclines. So, more than managing traffic and locating destinations, the truck driver's job has become one of managing an expensive transportation asset, with that management being mediated through symbolic representations on the truck's dashboard.

In addition, modes of work organization can lead to greater complexity in the conduct of work. For example, when enterprises reduce the size of their work force, they tend to expect workers to perform a wider range of tasks than previously required. However, more than simply having more skills, downsizing can also require the judicious use of skills, and this can require a greater understanding of different areas of work, and relationships among different areas of work requirements.

> … the production workers simultaneously performed multiple tasks, which management described as flexibility, also a desired skill. The workers indicated that this minimized the value of planning and reduced the opportunities to demonstrate initiative, since their workload was largely imposed upon them. Thus planning, initiative and flexibility existed in an uneasy tension, and workers were hard pressed to demonstrate each. (Darrah, 1997; p. 264)

The important point here is that work that might otherwise be categorised as relatively low skilled is revealed to be highly complex. This may be because of the demands brought about by work expansion, or even activities aimed to more closely supervise and

monitor workers' practices. Even so, the assessment of the complexity of the work situation will still be, in part, a product of individuals' perceptions and capacities. For those workers who regularly engage in expansive work and broad discretionary roles (as often occurs in small businesses, for instance), changes to work practices that expand job roles may not constitute such a challenge.

The complexity of a work role might be embraced as being personally significant and important by one individual, yet rejected by another. One hairdresser discovered he was partially colour blind and so the organisation of work and management of clients involved working closely with a junior hairdresser who particularly enjoyed working with colours. Later, this same junior hairdresser became a sole operator and despite having to learn new skills about managing a small business, reports enjoying the added complexity of her work because it suits her needs as a worker and her identity as a hairdresser. Conversely, some workers might actively reject the expansion of their work roles, even when others propose enriching it for these workers' betterment. A group of production workers in a German factory rejected an offer to expand their work roles. Although a member of the management team had assumed that these workers would welcome greater variety and richer forms of work activities, the workers, who were largely engaged in highly routinised activities, stated they preferred such activities as they could also listen to the radio and talk to their friends while they worked. So, there will be subjective bases for how changes to the complexity of work are likely to be engaged with by those who are subject to them.

Work and Work Activities

The listing of the characteristics of work activities provided above establishes the scope of workplace competence. It includes the degree by which work activities are routine or novel, the requirement for specialisation and diversification, the likely intensification of work activities, the increasingly conceptual or symbolic knowledge underpinning contemporary work, and prospects for enhanced discretion and complexity. These qualities are generated by the social world, what Searle (1995) refers to as institutional facts. However, there are also personally subjective constructions of workplace performance. Depending upon the individuals' previous experience, tasks will be more or less novel, and specialisation or diversity will represent a greater or lesser challenge to individuals as will changing patterns of discretion and complexity. So, although these characteristics are presented as institutional facts, the degree to which these characteristics shape individuals' construal of them still remains a subjective event. In the next section, the kinds of interactions that shape and organise work are discussed. Because these emphasise interactions, which necessarily mean some form of exchange (with others or with artefacts), they are two-way processes which of necessity include individuals' subjective construals. So, as with the characteristics of work activities laid out above, the subjective experience of the workers comes to the fore, albeit in particular ways.

WORKPLACE INTERACTIONS

Beyond the categories of activities referred to above, are interactions that comprise elements of workplace competence. Some claim these interactions are increasingly becoming a part of contemporary and emerging work practices and others that interactions are underestimated, misunderstood, and not always considered within conceptions of work. (Resnick, Pontecorvo, Säljö, & Burge, 1997, p. 6) state that "…efforts to understand the nature of the skills required in the technological workplace … often fail to honour the extent to which people function as part of a system in which knowledge and competent action are distributed."

Workplace interactions are central to much workplace performance, albeit by different degrees and forms across particular forms of work and workplaces. Increased levels of interpersonal skills and decision-making are required to be effective in many contemporary forms of work (Berryman, 1993). Less hierarchical approaches to work organisation (e.g.,

self-managed teams, 'green field' work sites) are premised upon high degrees of work interactions. There are also greater demands arising from team-based or collective forms of work favoured in some workplaces. Similarly, for some workers, innovations in technology and the demands of responsiveness and flexibility in the production of goods and services (Wall & Jackson, 1995) are heightened not only through face-to-face interactions, but also those that are technologically mediated.

However, it is premature to view these changes as being universal shifts in patterns of work and the means by which work has to be undertaken. For instance, small enterprises (particularly those managed by owners) are unlikely to fit into simple patterns of workplace transformations with flatter organisational structures or with the technology mediating interactions that may occasionally be found in larger enterprises (Kempnich, Butler, & Billett, 1999). In other circumstances, these transformations will be patterned differently according to the requirements of the particular workplace or work situation. For instance, in the study of the four hairdressing salons (Billett, 2003) quite distinct patterns of workplace interactions were identified for each salon. In one salon, the hairdressers were to conduct the hairdressing process as a production line with a number of hairdressers working with a client throughout their haircut. There were a complex set of rules that allocated work to the most skilled worker who became available at any point in time. However, all of this was to be conducted without any oral communication being permitted among the hairdressers. Interactions in this salon had to be organised through gestures because of the owner's preference for there to be 'no yapping' (i.e., talk by the hairdressers). The hairdressers found ways of operating around these particular work requirements. In this way, they developed approaches to interacting that did not breach the performance requirements in the salon.

Taking another similar instance, the armed forces and emergency services will likely want to maintain a 'command culture' which is 'top down' and hierarchical, rather than one that aims to be open and democratic. Interactions in these forms of employment, therefore, are based on set rules premised on rank and command. Yet, there may also be differences across these forms of work. For instance, although fire fighters are under the command of an officer at an emergency incident, the bases for their interactions may be quite distinct. A specialist fire fighter, such as a ladder operator, has greater discretion and interacts in a different way with the senior officer than those working with hoses on the ground (Billett, Smith, & Barker, 2005). In this instance, enhanced discretion arising from particular expertise led to a particular kind of workplace interaction albeit within a highly regulated work environment. This suggests that interactions in the workplace are central, subject to change, and not easily categorisable on the basis of existing conceptions of workplace hierarchies. Undoubtedly more experienced and expert workers exercise interactions more strongly than novices, but there are always spaces for negotiation. So these conditions may lead to more relational interactions in workplaces.

In the following two sections, the requirements for workplace interactions are elaborated in terms of interactions with others, and also with tools and artefacts.

Working with others
There seems to be a growing expectation that employees need to be competent in 'working with others'. Discussion of workplace skills necessarily tends to focus on individuals and how they accommodate each other at work. Yet, workers need to do more than this; they typically participate in interpersonal networks that generate, retain, and transmit crucial work-related knowledge. Working within such networks may require more than simply getting along with co-workers as they form a social practice that is central to the enactment of work (Darrah, 1997). Employers identify the capacity for workers to engage in collective and shared workplace processes and interactions to complete their work tasks (even if they are not always exercised) as a key quality for performance in contemporary workplaces. Sometimes, the requirement to work with others is shaped by a pressing need to operate as a team, for instances in fire fighting, underground coal mining, and flight attendant work. In other instances, this need arises out of a belief that collective efforts are inevitably superior to

individual efforts. In modular or team-based work, supervisors and engineers, Bailey (1993, p. 41) suggests:

> … can no longer focus on workers in isolation, but must consider the effect of the action of each worker and the design of each task on the functioning of the group. Workers must become involved with the quality and pace of production of their co-workers.

One effect of teamwork is that some workers perform a variety of tasks and become multi-skilled. This often accompanies the reduction of the number of workers in a workplace and the concentration of work tasks on the remaining workers. Moreover, there are requirements not only to interact with the immediate team, but also to interact across other teams when the work process is shared. These now constitute elements of workplace competence.

> … the conversation process creates an implied social relationships through shift work on the various operational levels. The two labourers working on a machine in 3 eight hour shifts must exchange information and share their respective actions. They are required to construct a common history regarding their relationship with the machine, which is not too far removed from reality. The intricacy of the textual and logical processes of this operative conversation is thus also the overall accomplishment of their work, this time, however, on a social and economic level. It is a social and global process. (Trogon & Grusenmeyer, 1997, p. 107)

Such processes are required where jobs are shared. However, requirements for working together and a greater emphasis on communication and interactions in workplace settings, while generally seen as being desirable for individuals and offering benefits to employers, can also serve to disempower and reinforce disadvantage. Hull (1997) :p. xiv) reports how the lack of English language skills disempowers workers in contemporary American workplaces:

> Not being able to speak English means not being able to defend yourself in the workplace when you are accused of a mistake, …reduced chances of promotion, even when you do your current job very well. There are no Korean supervisors in this high technology workplace where international certification standards require that manufacturing processes be written, read and communicated in English.

All of this emphasizes the personal dimensions of the capacity to be competent. It also broadens the concept of required skills, which might extend to managing working relations with others, which can occur on unequal bases. Workplace cliques, for instance, may deploy strategies of judging individuals by how the strategies suit their purposes. Such behaviour might be used to isolate and diminish the achievements of those outside the clique. Conscientious and diligent workers might be dismissed as being workaholics or overambitious or not working for the collective good, and marginalised. Such cliques may be more powerful and necessary for their own purposes in workplaces where views of workers are held to be central to their achievements. Here, as above, the issue of the relational nature of interactions becomes apparent. The basis upon which workplace interactions occur, whether initiated and intended by employers for productivity purposes, or by supervisors for engaging or maintaining control, or by workers or cliques of workers to include or exclude other workers, there is a relational basis to these interactions. In this way, the interactions required for working with others stand to make some aspects of work more complex, and accentuate the importance of workplace interactions. Yet, these interactions are inevitably based on subjective construals and bases for their enactment.

Moreover, interactions within workplaces are not only between humans, they are also among workers, artefacts, and technologies.

Interactions with tools and artefacts

There is an increased reliance on access to work and work processes being mediated through interactions with technology and tools. Workers have always used tools and artefacts to shape products of the natural, physical, and social worlds. However, over time, interactions with cultural tools and artefacts have potentially become more important as these tools now perform a greater array of functions and through developing and meeting a requirement for greater consistency and effectiveness. The evolution of nurses' work provides an instance of this. Nightingale (1859) noted that, early in the development of nurses' practice that "informed observation comprising patient's physical appearance, activities of daily living (i.e. eating, sleeping, elimination, physical mobility) and other basic needs both physiological and psychological". (Cook-Gumperez & Hanna, 1997, p. 322) is an element of effective nursing practice.

In the century after Nightingale, a shift towards written forms of documentation occurred (Cook-Gumperez and Hanna, 1997). This shift essentially alters the representation of nurses' knowledge base and the practices that are premised on the knowledge base. Earlier, observational skills were primarily made through the senses (i.e., sight, sound, touch, and smell); and from a technological perspective, monitoring of the vital signs (i.e. temperature, pulse, respiration, and blood pressure) was the extent to which mechanical devices were used. Now, observations are documented with notes and on charts for the vital signs. However, it seems now electronic devices that collapse the interactions between the senses and the technology from which decisions about the patients' health are made mediate nurses' work. The depth of diagnostic and observational information is now required in a systematised form as the professional accountability of nursing work grows.

Yet, there is also the issue of separation between the individual and the function of their work by mediating technologies. This suggests the need for workers' capacities to interact with technology to overcome the isolation that technological, specifically electronic, artefacts might create. For instance, changes in technological systems associated with paper milling suggests that rather than working directly with the equipment, workers are located in glass booths and their work is mediated by algorithms and digital symbols, a computer interface, and reams of data (Zuboff 1988). However, with human-machine interactions Suchman (1997) suggests "The point is not to have the price of recognizing the agency of artefacts be the denial of our own. Agency - and associated accountabilities - reside neither in us or in our artefacts, but in our inter-actions."

Thus, individuals not only exercise their agency in their interactions with technology, but that such interactions are necessary in order to engage with and use this technology purposefully. These all constitute elements of workplace competence that have both observable and personally premised bases.

So the requirement to engage with artefacts and tools, and to overcome the limitations that these technologies might generate, may well be becoming an increasing component of work performance, and therefore competence. As other commentators (e.g. Barely & Orr) suggest, with the wholesale take up of electronic technology into work generally, the issue of mediated interactions between humans and technologies may increasingly come to the forefront of workplace competence. If this is the case, the inevitable changes to technology will bring about the ongoing demands for responding to new practices in ways that are abstracted from the realm of observable practice. So, in these ways, interactions with tools and artefacts are, ultimately, a personally subjective process.

ELABORATING WORPLACE COMPETENCE

This chapter has identified and elaborated a way in which workplace competence can be comprehended and apprehended. Principally, it has proposed that there are a range of institutional facts that shape the requirements for workplace performance. These include historical, cultural and situational factors that prescribe the requirements for an occupation,

yet also shape how occupational practice, and therefore performance, is made distinct by local requirements. The requirements for work and work practice are being transformed by these changes, albeit in different ways, degrees of intensity, and scope of change across workplaces. These changes are brought about and rendered diverse by combinations of transformations in cultural need and situational factors. In combination, then, requirements for work within a particular occupation, how that work is manifested in a particular workplace, and individuals' capacities as workers need accounting for in elaborating the requirements for work. Yet, there is a need to go beyond so-called objective or observable accounts of what constitutes workplace competence, and include the personally subjective and capacity based conception. This is because beyond what workplaces require in terms of work performance, ultimately work activities are premised upon individuals' construals, capacities, and enactments. The bases for describing, elaborating, and appraising that work advanced here -- work activities and interactions -- provide bases to engage, illuminate and appraise both the objective observable character of work as well as workers' subjective experience. It is perhaps only in accounting for both of these kinds of experiences that work and working life can be comprehensively and effectively apprehended.

References

Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review, 89*(4), 369-406.

Anderson, J. R. (1993). Problem solving and learning. *American Psychologist, 48*(1), 35-44.

Bailey, T. (1993). Organizational Innovation in the Apparel Industry. *Industrial Relations, 32*(1), 30-48.

Barley, S. R., & Orr, J. E. (1997). Introduction: The Neglected Workforce. In B. S. R & O. J. E (Eds.), *Between Craft and Science: Technical Work in US settings* (pp. 1-19). Ithaca N Y: Cornell University Press.

Bartels, A. P., & Lichtenberg, F. R. (1987). The comparative advantage of educated workers in implementing new technology. *Review of Economics and Statistics, 65*, 1-11.

Bartels, A. P., & Lichtenberg, F. R. (1991). The age of technology and its impact on employee wages. In *Economics of Innovation and New Technology* (Vol. 1, pp. 215-231). Cher, United Kingdom: Harwood Academic Publishers.

Bernhardt, A. (1999). The future of low-wage jobs: Case Studies in the retail industry. *Institute on Education and the Economy Working Paper, 10*(March 1999).

Berryman, S. (1993). Learning for the workplace. *Review of Research in Education, 19*, 343-401.

Bertrand, O., & Noyelle, T. (1988). *Human resources and corporate strategy: Technological change in banks and insurance companies in five OECD countries*. Paris: Organisation for Economic Co-operation and Development.

Billett, S. (1994). Situated Learning - a workplace experience. *Australian Journal of Adult and Community Education, 34*(2), 112-130.

Billett, S. (2000). Performance at work: Identifying the smart workforce. In R Gerber & C Lankshear (Eds.), *Training for a smart workforce* (pp. 123-150). London: Routledge.

Billett, S. (2001). Knowing in practice: Re-conceptualising vocational expertise. *Learning and Instruction, 11*(6), 431-452.

Billett, S. (2003). Sociogeneses, Activity and Ontogeny. *culture and psychology, 9*(2), 133-169.

Billett, S. (2006). *Work, Change and Workers*. Dordrecht: Springer.

Billett, S., Barker, M., & Hernon-Tinning, B. (2004). Participatory practices at work. *Pedagogy, culture and society, 12*(2), 233-257.

Billett, S., Ehrich, L., & Hernon-Tinning, B. (2003). Small business pedagogic practices. *Journal of Vocational Education and Training., 55*(2), 149-167.

Billett, S., & Pavlova, M. (2005). Learning through working life: self and individuals' agentic action. *International Journal of Lifelong Education., 24*(3), 195-211.

Billett, S., Smith, R., & Barker, M. (2005). Understanding work, learning and the remaking of cultural practices. *Studies in Continuing Education, 27*(3), 219-237.

Billett, S., & Somerville, M. (2004). Transformations at work: Identity and learning. *Studies in Continuing Education, 26*(2), 309-326.

Bonazzi, G. (1998). Between shock absorbtion and continous improvement: Supervisors and technicians in Fiat 'integrated factory',. *Work, Employment & Society, 12* .(2), 219-243.

Braverman, H. (1974). *Labour and monopoly capital: the degradation of work in the twentieth century.* New York: Monthly Review Press.

Bresnahan, T. F., Brynjolsson, E., & Hitt, L. (2002). Information technology, workplace organisation and the demand for labor: Firm-level evidence. *Quarterly Journal of Economics, 117*(1), 339-376.

Carnevale, A. P. (1995). Enhancing skills in the new economy. In A. Howard (Ed.), *The Changing Nature of Work*. San Francisco: Jossey-Bass Publishers.

Church, K. (2004). *Dancing Lessons: A Choreography of Disability in Corporate Culture.* Paper presented at the WALL Annual Meeting, Toronto.

Cook-Gumperez, J., & Hanna, K. (1997). Some recent issues of professional literacy and practice. In G. Hull (Ed.), *Changing work, Changing workers: Critical perspectives on language, literacy and skills* (pp. 316-334). New York: State University of New York Press.

Darrah, C. N. (1996). *Learning and Work: An Exploration in Industrial Ethnography.* New York: Garland Publishing.

Darrah, C. N. (1997). Complicating the concept of skill requirements: Scenes from a workplace. In G. Hull (Ed.), *Changing work, Changing workers: Critical perspectives on language, literacy and skills* (pp. 249-272). New York: CUNY Press.

Davis, D. D. (1995). Form, function and strategy in boundaryless organisations. In A. Howard (Ed.), *The Changing Nature of Work*. San Francisco: Jossey-Bass Publishers.

Ellstrom, P. E. (1998). The meaning of occupational competence and qualification. In W. J. Nijhof & J. N. Streumer (Eds.), *Key qualifications in Work and Education*. Dordrecht: Kluwer Academic Publishers.

Flynn, P. (1988). *Facilitating technological change: The human resource challenge*. Cambridge, Mass: Ballinger.

Heath, C., & Nicholls, G. (1997). Animated Texts:Selective Renditions of News Stories. In L. Resnick, R. Saljo, C. Pontecorvo & B. Burge (Eds.), *Discourse, tools and reasoning: Essays on Situated Cognition.* (Vol. 63-86). Berlin: Springer Verlag.

Howard, A., (ed). (1995). *The Changing Nature of Work, *. San Francisco.: Jossey-Bass Publishers.

Hughes, K., & Bernhardt, A. (1999). *Market segmentation and the restructuring of banking jobs* (No. IEE Brief number 24). New York: Institute on Education and the Economy.

Hull, G. (1997). Preface and Introduction. In G. Hull (Ed.), *Changing work, Changing workers: Critical perspectives on language, literacy and skills.* (pp. 3-39). New York: State University of New York Press.

Kempnich, B., Butler, E., & Billett, S. (1999). *(Ir)reconcilable differences? Women and small business and the vocational education and training system*. Adelaide, Australia: National Centre for Vocational Education Research.

Martin, L. M. W., & Scribner, S. (1991). Laboratory for cognitive studies of work: A case study of the intellectual implications of a new technology. *Teachers College Record, 92*(4), 582-602.

McGovern P. (1996). Trust, discretion and responsibility: The division of technical labour. *Work, Employment and Society., 10*(1), 85-103.

Mincer, J. (1989). Human capital and the labor market: A review of current research. *Educational Researcher., 18*(4), 27-34.

Noon, M., & Blyton, P. (1997). *The realities of work*. Basingstoke, Hants: Macmillan.

Resnick, L. B., Pontecorvo, C., Säljö, R., & Burge, B. (1997). Introduction. In L. B. Resnick, C. Pontecorvo, R. Säljö & B. Burge (Eds.), *Discourse, tools and reasoning: Essays on Situated Cognition* (pp. 1-20). Berlin: Springer.

Searle, J. R. (1995). *The Construction of Social Reality*. London: Penguin.

Suchman, L. (1997, 16 July 1997). *from Interactions to Integrations: A reflection on the future of HCI, Key note Address.* Paper presented at the Interact 97 - Discovering New Worlds of HCI, www.acs.org.au/president/1997/intrct97/suchman.htm.

Tikkanen, T., Lahn, L., Ward, P., & Lyng, K. (2002). *Working life changes and training of older workers*. Trondheim: Vox.

Trogon, A., & Grusenmeyer, C. (1997). To Resolve a Technical Problem Through Conversation. In L. Resnick, R. Saljo, C. Pontecorvo & B. Burge (Eds.), *Discourse, tools and Reasoning: Essays on Situated Cognition* (pp. 87-110). Berlin: Springer-Verlag.

US Department of Manpower. (1964). Manpower Report of the President. In US Department of Manpower (Ed.): Washington: Government Printing Office.

Valsiner, J. (2000). *Culture and Human Development*. London: Sage Publications.

Waddington, J., & Whitson, C. (1996). Empowerment and intensification: union perspectives of change at the workplace, . In P. Ackers, Smith, C., Smith, P. (Ed.), *The New Workplace and Trade Unionism,* (pp. 149-177). Routledge, London.

Wall, T. D., & Jackson, P. R. (1995). New manufacturing initiatives and shopfloor job design. In A. Howard (Ed.), *The changing nature of work*. San Francisco: Jossey-Bass.

Zuboff, S. (1988). *In the age of the smart machine: The future of work and power*. New York: Basic Books.