Learning throughout working life: Interdependencies at work

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Recently the meaning of lifelong learning has been transformed by economic imperatives from a focus on securing personal development to individuals' maintenance of their vocational practice throughout their working lives. These imperatives aim to reshape the responsibilities and goals for adults' learning throughout their working lives. This paper proposes an account of learning at work as a component of individual's development across their lifespan. It argues that learning throughout working life is an inevitable product of everyday thinking and acting, shaped by the work practices in which individuals participate. However, the quality of learning is contingent on the kinds of activities individuals engage in and the guidance they can access. These contributions are referred to as the activities and interdependencies afforded by the workplace. Continuities and discontinuities in development through working life can be understood in part by patterns of participation in these social practices. Yet there is tension between individuals' interest in participation and the affordance of the work practices in which they act. It is proposed that, although able to regulate their participation, ultimately individuals' ability to maintain their vocational practice is constrained by the way workplaces afford opportunities for engagement and interactions.

1. Learning at and for work

Understanding how individuals learn at work throughout their working life is salient to discussions about life long learning, particularly as it is represented in recent governmental policy edicts. These propose that individuals need to play a central role in maintaining the continuity of their employment through maintaining the currency of their vocational knowledge (European Commission 1994). Accompanying this is a shift in the traditional relations between employers and workers that increasingly emphasise employees' responsibilities for their vocational currency (Carnoy 1999, Kempnich et al. 1999). Such changes make unreasonable and unfair demands upon individuals. Further, they simplify salient issues associated with learning throughout a working life. Therefore, a more considered view of adult learning and development is now required to counter the idea that adults can somehow be held responsible for the maintenance and currency of their vocational practice throughout their working lives. It needs to be more broadly acknowledged that the process of learning throughout life has social as well as personal dimensions. This is particularly true of learning for and in workplace, the site of most of the ongoing vocational development throughout working lives.

It is proposed from sociocultural (Cole 1998, Wertsch 1991) and anthropological (Lave & Wenger 1991, Wenger 1998) perspectives, that individuals' learning is a product of participation in social practices, such as work. Through engagement in goal-directed actions in these practices, individuals come to know or learn new knowledge, refine and reinforce what they have already learnt (Billett 1998). As the knowledge to be learnt has cultural and social geneses, there is a need for learners to engage in interactions with social partners and practices able to make accessible this knowledge. Accordingly, how individuals are able to interact with social partners will

influence learning throughout working life. Further, the kinds of goal-directed activities adults engage in and how the goals for those activities are determined and negotiated within the particular social practice of work in which they act. Therefore, learning is an ongoing and inevitable process arising from participation in work practice across working lives as individuals think and act in everyday activities at work. It follows that, not only are learning and everyday thinking and acting irreducible, but what individuals learn is shaped by the kinds of activities in which individuals engage, and also the interactions with social partners and sources that are afforded by the workplace.

Individuals' participation in and the guidance afforded by the workplace --- its invitational qualities --- influences how individuals come to learn and what they learn. These qualities comprise: (i) the type of activities individuals engage in (i.e. routine - non-routine); (ii) the direct and indirect guidance (proximal-distal) accessible in the practice; (iii) access to and standing in the community of work practice (peripheral to fuller participation); (iv) duration of participation; and (v) how the activities relate to individuals' existing knowledge base (including their interest); (Billett 1999b). Therefore, the kinds of work practice individuals engage in throughout their working life influences continuity and discontinuity in their development. That is, discontinuity in participation brought about by retrenchment, changes in activities (e.g. going from one vocational practice to another) or how individuals are able to participate in workplaces assists understanding how different kinds of participation leads to different kinds of outcomes for individuals. Nevertheless, participation is reciprocal. On the one hand are the affordances of the workplace: its invitational qualities. On the other, is the degree by which individuals elect to participate in the work practice. Hence, there is an interdependence between the social practice and the individual acting in that social practice.

This paper discusses these propositions. Specifically, it discusses those factors within work practice that either facilitate or constrain individuals' participation in work and consequently their learning. This is done in order to identify bases to conceptualise how learning proceeds throughout working life. Central to their participation is the relatedness (Valsiner 1994) between the individuals' beliefs and values, and the norms and culture of the work practice. Workplaces are contested terrain and access to activities and guidance are not uniformly distributed across those in the workplaces. Therefore, although learning at work is inevitable and ongoing, it is selective and contested. In elaborating upon and discussing these propositions the paper: (i) engages the debate about relations between social practice and individuals' thinking, acting and learning; (ii) outlines how activities and interdependencies shape learning and development; and (iii) considers the implications for adults' learning through their working lives.

2. Relating the mind and the social world

Having proposed that, rather than being separate, there are relations between human thought and action, and the social world (e.g. Scribner 1988/1997), the nature of these relations, the geneses of the knowledge to be learnt and how thinking and acting are influenced by social factors are just some issues now required to be understood more fully. Accordingly, the relations between the mind and the social world have become the focus for understanding both conceptions of human development and how learning proceeds. These concerns are central to understanding how adults learn throughout their working lives, with its dimensions of culturally-derived and historically transforming vocational practice and individuals' ontogenies or personal histories. Some bases for understanding these relations can be found in attempts to reconcile the cognitive and sociocultural theories of knowing and learning (e.g. Rogoff 1990, 1995, Billett 1996) which have sought to understand the reciprocal contributions from within the head with those from outside of it. Equally, convergent theories such as distributed cognition (Resnick, Pontecorvo, Saljo & Burge 1997, Suchman 1997) and situated cognition (Brown, Collins & Duguid 1989) propose that cognition is shared with others and artifacts. Vygotskian perspectives in emphasising the roles of interpersonal and semiotic contributions (tools) (Hutchins 1991, Scribner 1985, Wertsch 1985); and the sociocultural approach to activity and mind (Cole 1998, Scribner 1990/1997, Wertsch 1991, 1998) also accentuate the mediation between social sources and the mind as a means to understand thinking, acting and learning, such as that occurring through work.

Activity theory, which views cognitive and motivational processes as being embedded within the "larger activity structures whose goals they serve" (Martin & Scribner, 1991, p. 582), is particularly helpful in this undertaking. Within this theory, activity is seen as being transformational, mediating between individuals and social circumstances through reciprocal interactions and transformations (Cole 1998, Scribner & Beach, 1993; Leonteyev, 1981, Wertsch 1991, 1998). Consistent with this view, Scribner and Beach (1993) make three claims for the role of socially-derived activity on the relationship between knowledge and memory. First, rather than favouring one or the other, activity involves the mutual contribution of memory in the head and memory (stimuli) in the environment. Second, activities are goal-directed, with goals being shaped by particular settings and circumstances. Third, memory is viewed as being both social and cognitive, just as salt "can no more meaningfully be separated into sodium and chloride, while retaining its saltiness" (1993 p. 188). Beyond activities, interactions also link individual development with social sources. Engagement with social partners at work can provide access to direct interpersonal guidance and support (proximal guidance) (Vygotsky 1978), more indirect (distal) contributions of others and the physical world that together mediate individuals' knowledge (Scribner 1984, Lave 1990). In these ways, activities and interactions are proposed as links between social practice and individuals' learning.

From these bases, the forms of mediation for individuals' thinking and acting provided by social practice such as work can be seen as comprising: (a) activities that are the product of social

practice and through which doing and learning coalesce (Engestrom 1993, Luria 1976, Leonteyev 1981, Wertsch 1991, 1998); (b) close interpersonal interactions between social partners through which socially-generated knowledge is made accessible and its construction can be guided (Vygotsky 1978, Rogoff 1990); (c) more indirect (distal) influences of social and cultural practices upon individuals' thinking and acting, including tools and artefacts (Scribner 1985, Cole 1985, 1998); and (d) the influence of situational factors in which individuals engage in microgenetic development (Rogoff 1990) or moment-by moment learning (Cole 1998, Lave & Wenger 1991, Wenger 1998, Scribner 1984).

Therefore, in the terms of current theoretical perspectives, individuals' participation in their working lives of necessity includes engagement with socially determined activities, partners, tools and signs. These mediational means provide bases to understand the relations among individuals acting in the social practice of work and how they come to think, act and learn. Learning is held to be embedded in, and some propose, distributed (Resnick, et al 1997) or stretched (Lave 1991) across social systems that comprises others, tools and artifacts. Hence, interdependence among activities, engagement with others, the social world and its artifacts is now held as being central to how we come to learn through work. Accordingly, how and what individuals learn at work is socially mediated by the activities and guidance able to be accessed. These contributions are often not under the control of individuals. Instead, they are distributed by the workplace factors.

Nevertheless, the positioning of the individual in these relations remains uncertain and contentious. In embracing the social bases of thinking and acting and in being viewed as a mere element in the distributed bases of cognition, the individual may have been denied appropriate independence in acting within the social system. Cobb (1998), for example, cautions against assuming all thinking and acting is distributed across social systems, arguing that individuals need to be seen as acting in the social world rather than just being a part of it. He proposes that while it is necessary to review the individual and mentalistic --- internal to the mind --- emphasis found in mainstream cognitive accounts, that more circumspection is required in considering the individual's role in relations between the mind and the social world. Wertsch's (1998) distinction between mastery and appropriation illustrates this case by building upon precepts associated with learning as a reciprocal process negotiated by individuals (Valsiner 1994, Lawrence & Valsiner 1993). Therefore, it is necessary to offer an account of learning for work which acknowledges the independence of individuals acting within the interdependence of the social practice of work. These are salient precepts. As work practice inevitably includes dimensions of power and control, access to engagement is contested and non-problematic. Equally, as individuals' ontogenetic development will likely result in unique dispositions, ways of knowing and knowledge, how they engage in work activities and interactions will not be wholly determined by what the workplace affords them. These ideas are taken up in turn, in the next two sections.

3. Work practice: accessing activities and interdependencies

In order to identify what constitutes the requirements of particular work situations, what individuals will learn through participation and those factors that determine access to workplace experiences, a scheme comprising categories of activities and interdependencies has been synthesised from an analysis of recent accounts of work (Billett 1999a). The scheme is founded in activity theory, and is premised on and framed around factors that aim to identify and describe components of work practice comprising the *activities* conducted and the *interdependencies* required for work. They are as follows.

Activities within work practice are held to be described in terms of their:

- *Routineness* – the degree by which work practice activities are routine or non-routine thereby requiring robust knowledge.
- *Discretion* – the degree by which the scope of activities demands a broader or narrower range of decision-making and more or less autonomous practice.
- *Intensity* – the degree by which work task decision-making is complicated by compounding variables and the requirement for negotiation among those variables.
- *Multiplicity* – the range of activities expected to be undertaken as part of work practice
- *Complexity* - degree by which decision-making is complicated by compounding variables and resolution of tasks requiring negotiation among those variables; and
- *Accessibility* (opaqueness of knowledge) - the degree by which knowledge required for the work practice is either accessible or hidden. (Billett 1999a)

Interdependence within work practice are held to be describable under:

- *Working with others* (teams, clients) – the ways work activity is premised on interactions with others
- *Engagement* - basis of employment
 - Status of employment* - the standing of the work, its perceived value and whether it attracts support
 - Access to participation* - attributes that influence participation
 - Reciprocity of values* - the prospects for shared values
- *Homogeneity of tasks* - degree by which tasks in the work practice are homogenous. Similarities may provide for greater support (modelling etc) in development of the ability to perform
- *Artifacts/external tools* - physical artifacts used in work practice upon which performance is predicated. (Billett 1999a)

The categories of *activities* permit the kinds of goal-directed activities that individuals might engage in the workplace and the kinds of learning these activities might afford to be identified. For instance, participation in non-routine workplace tasks requires workers have highly developed knowledge of the vocation. Moreover, it is through engagement in these kinds of tasks that individuals extend what they already know. That is, they learn new knowledge and develop the vocational knowledge required for non-routine work activities. Accordingly, those individuals afforded access to non-routine activities are likely to have richer developmental opportunities, particularly when afforded support and guidance, than those individuals whose work is restricted

to only routine tasks. Similar affordances exist with knowledge that is difficult to learn (i.e. conceptual knowledge that is hidden). These kinds of conceptual and procedural knowledge are important for performing non-routine tasks. However, this kind of knowledge is unlikely to be learnt by discovery alone. It requires the guidance of more experienced social partners (e.g. experts, more experienced workers). Without access to that guidance, this knowledge may remain remote from the learner or be constructed in ways that are so idiosyncratic as to render it incommunicable or unsustainable in any shared context (Newman, Griffin & Cole 1989). Consequently, the activities and support individuals access influence what they learn through work activities. This access emphasises the significance of interdependencies afforded by the work practice, not only in the form of more experienced workers but also the array of socially-sourced contributions to thinking and acting located in paid work. Therefore, having briefly referred to *activities*, the principal focus from here on is on the *interdependencies* within the workplace that identify how access to the activities and guidance is mediated in workplace settings.

However, before proceeding to consider the central role of access to activities and guidance, a tension quickly emerges. It is difficult to avoid the conclusion that workplaces are highly contested terrain where access to the activities and guidance are not evenly distributed. It is necessary to identify the bases of this contestation in order to understand how it influences the distribution of access to practice and guidance. Conflictual relations between and among individuals, teams and key interest groups cannot be reduced to a mere footnote. Instead, they pervade work, conceptions of performance and importantly influence how individuals are able to act, and therefore learn through work. Whether the contestation is between ‘newcomers’ or ‘old-timers’ (Lave & Wenger 1991), full or part-time workers (Bernhardt 1999); teams with different roles and standing in the workplace (Darrah 1996, Hull 1997); between individuals’ personal and vocational goals (Darrah 1997) or among institutionalised arrangements such as those representing workers, supervisors or management (Danford 1998), contestation is an enduring feature of work practice and influences the affordance of the workplace setting. It would be quite derelict to view matters of engagement in workplace activities as only cognitive tasks and access to guidance as being benign, without trying to understand how access to these activities is distributed. Accordingly, using the categories of *interdependencies* referred to above, factors determining access and guidance provide a means to understand how the opportunities to learn as part of working life are distributed.

3.2 Interdependencies

(a) Working with others (teams, clients)

Engagement in work practice involves negotiating and interacting with others. These interactions can be premised on formalised hierarchies associated with the vocational practice (e.g. airline

crews, dental teams), forms of demarcation based on affiliations (e.g. a work site delineated around trade or professional practice) or collaborative work with peers, such as in self-managed teams. In addition to any 'formalised' structures associated with interactions, such as those mentioned above, how interactions proceed may be determined by workplace cliques, gender, affiliations of a historical kind etc that determine access to activities and guidance in workplaces. Interestingly, the high levels of discretion often claimed to be associated with 'new work' practices (e.g. see Rowden 1995, 1997, Carnevale 1995, Wall & Jackson 1995) offer the promise of broader opportunities for engagement in activities and interactions in the conduct of work. Typically, this kind of participation is contrasted with work practice where work is closely supervised and comprises mainly routine activities. Arguably, some work requires limits on discretion. Taking an example from dental work, there are tasks that are clearly delineated between dentists and their assistants, in a similar way to flight crews. Hence, in these circumstances individuals' participation in activities and encouragement (guidance and support) to succeed will, in part, likely be premised on the basis of their standing in hierarchical arrangements. In one study of a secondary processing plant (Billett 1994), in some work areas self-managed teams selected leaders based on their expertise. These workers enjoyed broad discretion in the planning and conduct of their work. However, in other work areas, supervisors intervened thereby eroding worker discretion and engagement in tasks (e.g. range of tasks, decision-making responsibilities, and possibilities for practice). Findings elsewhere note the concerns by supervisors of being made expendable by enhanced worker discretion have led to the dismantling of these arrangements (e.g. Danford 1998). So there are patterns of engagement with others that are deliberately structured by the work practice that determine the kinds of participation that is permissible and how it is distributed.

Views about individuals, their standing and whether they are worth or should be interacted with also determine the basis of interactions or whether those interactions occur at all. For instance, members of a work team may find their participation is premised on the acceptability of their gender, ethnicity or language. Workplace cliques and interpersonal relations also determine how individuals are treated and afforded tasks, and also how their performance is perceived. Such relations seem common to most workplaces. These factors influence access to activities and support afforded to individuals. Individuals who are denied opportunities to participate or access to information required for their work may be less likely to perform as well as those more centrally involved and 'in the know' as the goals for performance may not be made known to all workers. Also, values about how work should proceed within the workplace influences the conduct of activities. For instance, an enterprise may well adopt a team-based approach to work organisation. Yet, there can be no confidence that the team members will either wish to or be able to interact in the way intended (Darrah 1997). There is also the fear of displacement by more experienced workers by those whom they are guiding (Lave & Wenger

1991). Other kinds of interactions with co-workers, such as peer pressure can also influence engagement. For instance Bailey (1993) reports novice or slow workers, continuing to work through meal breaks in order to keep up with team-based performance demands.

So there are structures associated with working with others that are premised on work hierarchies, workplace values, mores and beliefs, concerns about displacement and interpersonal relations influencing individuals' participation at work. Given that rich learning is viewed as an outcome of interactions with others and less direct social sources (e.g. tools, artefacts, the workplace, observation of coworkers), the degree of inclusiveness afforded learners is crucial to their learning. However, this inclusion is often determined by others, and premised on factors that are outside of the control of individuals themselves. These include how individuals are able to engage in the workplace.

(b) Engagement (Employment basis, Status of employment, Access to participation)

How individuals engage with work also influences their access to activities and guidance. This is perhaps no more evident than when workers' participation is rendered peripheral. Those workers whose employment is part-time, contingent or contractual, or whose language and literacy skills or whose gender presents barriers, may find participation more difficult than those who are full-time and whose standing and acceptance in the workplace is core. In addition to these, home-based or isolated workers experience difficulties engaging in workplace discourses in ways required for full participation or advancement (Hull 1997). Part-time work diminishes women's lifetime career prospects (Tam 1997). Also, most part-time and contingent work is involuntary (Lipsig-Mumme 1996, Grubb 1996) making the kind of engagement experienced not something desired by the individuals themselves. The few exceptions includes women from comparatively privileged groups who voluntarily work part-time in order to also participate in non-paid work activities such as parenting or community activities (Shima 1998). However, other women (e.g. migrants, non-English speakers, low paid) view part-time work as a desirable alternative to their full-time employment. They are often forced to work a number of jobs and relinquish preferred non-paid work roles such as child care in order to fulfil economic needs (Hull 1997). Again, participation here is contentious. Consequently, the basis of individuals' employment and engagement in work has consequences for their participation and learning in the workplace.

The status of individuals' employment and their standing also determines access to activities and support. Darrah (1997) describes how work tasks undertaken by production workers in a computer manufacturing company were taken for granted. These workers were denied opportunities for structured learning, despite the complexity of their work, whereas those in the design area were the focus of attention, praise and support. Accordingly, discretion, opportunities and support were apportioned asymmetrically across workers depending on perceptions of standing (Milkman 1997). Claimed as a legacy of Taylorism, Barley and Orr (1997) report similar

asymmetry of opportunities being premised on perceptions of work being categorised as either manual or professional. Standing in workplaces also influences the discretion afforded to workers. In a study of hairdressers, it was the owner/managers of hairdressing of salons who were able to contravene the rules of practice and provide treatments that would have drawn reproaches if provided by junior hairdressers (Billett 1995a). That is, junior hairdressers were only able to exercise discretion in the boundaries of what was taken as the accepted practice of the salon. Part-time workers, as peripheral participants, are also more likely to engage in routine tasks than their full-time counterparts (Forrester, Payne & Ward 1995) thereby limiting opportunities for their development. Individuals with low literacy levels, and non-English speakers' literacy and language skills are likely to inhibit their participation. Hull's (1997) study of a manufacturing plant noted that there were no Korean supervisors resulting in the workers of this nationality having difficulty with handling and avoiding being held responsible for workplace problems. Language and writing skills can also become the basis for social regulation and control (Whalley & Barley 1997), with those whose skills are perceived as deficient or who are unable to negotiate in mainstream discourses being marginalised. Together, individuals' status, the bases of their employment, the standing of their work is influenced by structures within the work practice that have the potential to either invite or inhibit their participation in work activities.

(c) Reciprocity of values

The values of a workplace may be more or less consistent with those of the individuals who work within them. For instance, not all educators feel sympathetic towards changing policy and goals of educational systems, particularly when they are perceived as compromising their professional practice. The relatedness (Valsiner 1994) between the workplace goals and individuals' values will influence how individuals interpret and adapt or adopt changes to work practice. Some human resource management commentators give primacy to the congruence and reciprocity of values between employers and employees being associated with the company's survival and development. They propose that in an era of high levels of competitiveness, employees and employers have never needed each more (Rowden 1995). Similarly, the requirement of 'new workplaces' are characterised by the involvement of workers in decision-making within the enterprise (Davis 1995) which aims to capture their enthusiasm, commitment and loyalty. However, other views question whether the reciprocity of values are likely to be realised. For instance, part-time bank workers are reported as quitting because they cannot see prospects of promotion in the new structuring of the banking work practice (Hughes & Bernhardt 1999). They perceived a growing disjuncture between the bank's corporate strategy of individual commitment and the bank's procedures for securing that commitment. Workers also react with understandable cynicism when high discretionary and team-based approaches to work are dismantled by management concerned that these approaches are eroding their control (Danford 1998). So

whereas it might be seen as desirable for there to be reciprocity of values, between individuals' and the enterprise's desired work practice, this may be quite difficult to achieve. Even if the whole historically grounded mess of differences in values between the perspectives of employees and employers, between those of supervisors and those supervised, between old-timers and new comers, and between part-time and full-timers were resolvable, other aspects of the relatedness of values would need to be reconcilable. Also, the cultural values of employees may not always be consistent with values within the workplace social practice. For instance, Vietnamese workers in a manufacturing plant rejected teamwork as it valued their collective contribution ahead of them as individuals (Darrah 1996). These workers claimed to have escaped Vietnam only to find this system of work, that they thought analogous to communism had followed them to the United States. So concurrence between values of the social practice and the individuals who are to act in that social practice are likely to influence how they engage in, commit their loyalty and energy to a particular social practice --- their relatedness.

(d) Homogeneity of work task

The homogeneity of workplace tasks or activities will influence individuals' ability to source guidance. For example, in Lave's (1990) study of tailoring apprenticeships in Angola, the apprentices learnt through participation in workshops that were inhabited by tailors and tailors' apprentices performing the tailoring tasks that the novices were learning. There was abundant direct and indirect guidance resulting from the easy access to these activities. Moreover, the apprentices lived in the master tailors' houses and these houses and the workshops were set in a street that was full of tailors houses and workshops. Consequently, the apprentices were immersed in tailoring practice, providing a rich environment to learn not only the techniques but also the norms of what it meant to be a tailor. Conversely, individuals could find themselves as the only person practicing their occupation within the workplace. For instance, within local government in Australia, workers are often the sole or one a few practitioners in fields of practice such as health regulation, bridge repair, road grading and word processing. Therefore, the prospects for access, guidance and support for these workers are likely to be quite different than, for instance, the tailors' apprentices referred to above. Consequently, the degree by which the activities in the workplace practice are of a similar kind will determine not only the range of activities individuals can engage in, the nature of the practice itself and the kinds of support and guidance available to participate in fully and transform the practice.

(e) Artifacts/external tools

Interactions with technologies, equipment, tools and the work environment also influences the participation within the work practice. Learning to perform at work may well be bound to these artifacts. For instance, it is not possible to conceptualise hairdressing without considering together

hairdressers and their hairdressing tool (e.g. combs, scissors): a relationship which Wertsch (1998) describes as being irreducible. Performance (knowing and acting) can only be premised on hairdressers and their tools working together. However, more than this, they can shape the practice itself and engagement in that practice. For instance, there are clearly discernable differences in the use of hairdressing tools between barbers and hairdressers. But there are also difference in tool use between those hairdressing salons that specialise in perm and sets and those that specialise in colour and cuts, for instance. Similarly, technologies of different kinds are seen as: (i) reconfiguring workplace tasks, (ii) reconfiguring the division of labour; (iii) providing unanticipated asymmetry to communications (Heath & Nicholls 1997). Take, for instance, the introduction of information technology to workpractice. 'Old-timers' might find their expertise superceded and displaced by new understandings and 'new-comers' who are competent with these new tasks and their conceptual bases. The 'command and control' organisational practice of police, fire fighters and armed forces is discomfited by junior ranks having to guide senior officers through computer-based work applications. Equally, electronic means may open channels of visual, voice and text-based telecommunication that provide instantaneous access to information that cannot readily be controlled by supervisors. Heath and Nicholls (1997) illustrate how real-time interactions mediated by technology (video shots of aircraft docking facilities) in airport work, provides simultaneous visual access to a number of workers whose performance needs to be co-ordinated. Not only does this technology assist performance, but it makes decision-making public and interactive. Technology can also provide broader discretion, enhance work roles and improve access to workplace knowledge. Bedside computers in hospitals, for instance, centre the care of patients at the bedside, rather than away from it and provide access to records that enhance nurses' discretion and empowers patients thereby transforming nursing practice (Cook-Gumperez & Hanna 1997). However, technology can also separate workers from means of production (Zuboff 1988, Martin & Scribner 1991, Heath & Nicholls 1997), thereby potentially restricting their access, de-skilling or, conversely, requiring high levels of symbolic knowledge. So artifacts and tools, such as those above, can be essential for participation, can enhance or restrict access or change significantly the relations within practice.

In the ways illustrated above, the mediation of engaging in the social practice of work is varied and problematic. Factors associated with interactions with others, the mode of engagement, reciprocity of values, homogeneity of work tasks, will influence individuals access to participation, how and what activities they participate in, and the kinds of guidance and support likely to be encountered in their work practice. The structures that determine access are formalised by organisational structures, values, prejudices, concerns about displacement etc. These structures not only establish rules for practice (e.g. who has access and who does not) but also who is able to violate these norms and whose transgressions are not tolerated. So, on the one hand, there are sets of related interdependencies in work practices that are important for performance, thinking, acting

and learning. They also afford access to opportunities to learn and develop. Given that work practice is contested and the site of the enactment of power and social relations it follows that access to social practice will not be uniform or uniformly available. However, and importantly, much of this interdependency is mediated by factors that are beyond the individual. Individual workers are subject to much of these interdependencies. Nevertheless, they are able to exercise discretion in how they participate and what they learn from what is afforded to them.

4. Individuals' engagement in work practice

Although working life is just one component of adults' engagement with the social world, it is likely to be important given that paid work can provide identity, status and the means for individuals' economic options. Individuals are unlikely to participate in different kinds of social practice with uniform interest or levels of engagement. There are likely to be consequences of the kinds of participation in which individuals elect to engage in workplaces. Perhaps the most salient are learning and the associated formation of identity with the social practice.

Firstly, learning is an effortful activity. Individuals usually only engage in effortful activities when there is strong motivation or interest to do so. Indeed, some argue that dispositions (values, attitudes and beliefs) underpin every cognitive activity (Perkins, Jay & Tishman 1993). Rather, than being a process of internalisation of externally derived knowledge, individuals construct knowledge through conscious adaptive and interpretative processes. Consequently, it is necessary to consider how individuals elect to participate in work activities and engage with what the affordances of the workplace. Importantly, individual's learning is not merely internalising externally sourced knowledge (Lawrence & Valsiner 1993, Valsiner 1994). Instead, it is about appropriating – or making it one's own from what one experiences, to use Luria's (1976) phrase. Even when subject to close monitoring, individuals will make sense of and arrive at judgements in their own way. Wertsch (1998) uses the terms 'appropriation' and 'mastery' to make the distinction between individuals' interpretative construction of meaning and those in which external sources are strongly enculturating and result in learning which is unconvincing and superficial. He refers to people in Kazakhstan who can recite the soviet view of the history of their country with feigned enthusiasm, while holding a quite different view of that history themselves. The former is referred to as 'mastery' and the latter 'appropriation' in the way Luria (1976) suggests – to make it one's own. Consider supermarket workers offering customers the standard salutation demanded by their employer ("How are you today?"). These individuals may have mastered the requirement to perform this salutation, but rarely offer evidence that they have appropriated its value.

There are clear consequences for the kinds of learning likely to arise when the learners are skeptical about the knowledge to be learnt. Darrah's (1997) workers of Vietnamese heritage were clearly not going to be engaging effortfully in learning how to perform in teams. Coal miners were

understandably reluctant to engage in safety training when they perceive it to be focussed on mine-site management's attempts to transfer the responsibility onto themselves (Billett 1995b). So individuals do not simply internalise the knowledge they encounter in the social practice in which they engage. They are active, discerning and interpretative participants in construction of meaning – coming to know -- even when strongly enculturating circumstances prevail.

Secondly, identity formation is seen as arising as an outcome of participation in social practice such as work. Some argue that identification is an inevitable component of practice (Lave & Wenger 1991). Yet, while identity formation proceeds in some circumstances it will be contested in others. Dis-identification might also be an outcome if the individual does not appropriate the values of social practice or experiences a conflict between personal dispositions and the norms and values of the community. Hodges (1998) detailed how her participation in a teacher education program resulted in her dis-identification with learning the profession of teaching as she came to engage with it and challenge its norms, assumptions and practices.

In sum, the associations between the interpsychological (between social partners) and the intrapsychological (internal and conscious thinking) processes, to use Vygotsky's (1978) terms, are not the simple passage of external sources internally. Rather, the intrapsychological outcome is mediated not only by social sources such as activities, tools, signs and interpersonal interactions, but also by individuals' existing knowledge which includes their dispositions. Individuals think, act and learn independently within social practice, even when enculturating pressures are present. So while individual learning might be constrained by workplace factors, they are active agents in what they learn and how they proceed.

5. Implication and summary

It has been proposed in this paper that although learning is an inevitable outcome of participation at work, the kinds of activities that individuals are able to engage in, and the support and guidance they are able to access will influence the nature of that learning. These factors have been referred to as the affordances of the workplace. However, there can be no guarantee that what others determine an individual should learn or what the individual desires to learn will be necessarily realisable. The invitational qualities of the workplaces and individuals' engagement are not deterministic as there are complex relations between them. Nevertheless, although policy goals may aim to make individuals responsible for the currency of their vocational skills through reconstructed policies of life long learning, it is unreasonable to hold individuals responsible for being able to realise this outcome given the constraints associated with their participation at work. Often, the most prized knowledge is that which is most inaccessible without the guidance of others. Fear of displacement of those with that knowledge makes securing this access precarious and contested. Working with others is an almost inevitable part of the social practice of work. Yet there can be no guarantee that mere engagement in particular social practice, a workplace or a

vocational course will result in interactions that invite and support learning the knowledge required for maintain the continuity of vocational practice. The complexities of work practice, the values within that practice and their relatedness to the individuals who are to engage with and appropriate these values are all important in the construction of this knowledge.

As participation in social practice influences knowing and development throughout a working life, the nature and changes in work practice need to be accounted for in deliberations about learning for work. Rather than regarding learning throughout working life as being centred on individual workers, a broader consideration of the consequences of access to and changes in participation in work activities is required. Adults' continuing development has been viewed in terms of movement through phases of life which feature stability and the decrement in terms of cognitive and physical development. However, probably for most, learning throughout a working life brings challenges that require significant transformations in knowledge. Changes to individuals' career pathways through retrenchment, career shifts or periods of parenting will likely have significant consequences through the activities and mediational means they provide. Many individuals' working lives are also characterised by discontinuity in location, occupation and family events. Equally, adults' experiences in different types of cultures and communities must influence the transformations required to operate with effect in different types of cultures (e.g. migrants, indigenes). Accordingly, lifelong learning needs to be seen as being more than the maintaining the continuity of employment through a working life. Yet, learning through working life itself needs to be conceptualised in terms of participation in work practice, which are contested and where opportunities to participate in and develop further individuals' vocational practice are distributed asymmetrically. The potential for maintaining vocational currency throughout a working life is distributed across the work practices that individuals engage in. Therefore, it is inappropriate to place this responsibility upon individuals alone. The vocational development occurring throughout a working life has to be negotiated and reciprocally constructed as the learning process itself.

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References

- Bailey, T. (1993). Organizational Innovation in the Apparel Industry, *Industrial Relations*, Vol 32 (1) pp. 30-48.
- Barley, S. R. & Orr, J. E. (1997). Introduction: The Neglected Workforce. In S R Barley & J E Orr *Between Craft and Science: Technical work in U.S. settings*. (pp1-19). Cornell University Press. Ithaca NY
- Berhardt, A. (1999). *The future of low-wage jobs: Case Studies in the retail industry*. Institute on Education and the Economy Working paper No 10 March 1999.
- Billett, S. (1999a). *Changing work, practices and engagement: Understanding performance at work*. Faculty of Education, Griffith University.
- Billett, S. (1999b). Guided learning in the workplace. In D Boud & J Garrick (eds) *Understanding Learning at Work*. London: Routledge
- Billett, S. R. (1998). Situation, Social systems and learning. *Journal of Education and Work*, Vol 11 No 3 pp. 255-274.

- Billett, S. (1996). Situated learning: Bridging sociocultural and cognitive theorising. *Learning and Instruction*, 6 (3) 263-280.
- Billett, S. (1995a). Structuring knowledge through authentic activities. Unpublished PhD dissertation, Griffith University, Australia.
- Billett, S. (1995b). *Skill formation in three central Queensland coalmines: Reflections on implementation and prospects for the future*, Centre for Research into Employment and Work, Griffith University Brisbane, Australia
- Billett, S. (1994). Authenticity in workplace learning settings. In J. C. Stevenson (Ed) *Cognition at work: the development of vocational expertise*. (pp. 36-75). Adelaide: National Centre for Vocational Education Research.
- Brown, J. S., Collins, A., & Duguid P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*, 18 (1), 32-34.
- Carnevale, A. P. (1995). 'Enhancing skills in the new economy,' in Howard, A (ed), *The Changing Nature of Work*, Jossey-Bass Publishers, San Francisco.
- Carnoy, M. (1999). The great work dilemma. In J Ahier & G Esland (Eds) *Education, Training and the Future of Work I*. Routledge, London
- Cobb, P. (1998). Learning from distributed theories of intelligence. *Mind, Culture, and Activity* 5 (3) 187-204.
- Cole, M (1998) Can cultural psychology help us think about diversity? *Mind, Culture and Activity*, 5 (4) 291-304.
- Cole, M. (1985). The zone of proximal development where culture and cognition create each other. In J.V. Wertsch (ed). *Culture, communication and cognition: Vygotskian perspectives*. (pp. 146-161). Cambridge: CUP.
- 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*. New York, State University of New York Press. (pp. 316-334)
- Danford, A. (1998). Teamworking and labour regulation in the autocomponents industry. *Work, Employment & Society* vol 12, no 3 pp.409-431.
- Darrah, C. (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, State University of New York Press.
- Darrah, C. N. (1996). *Learning and work: An exploration in Industrial Ethnography*. Garland Publishing, New York:
- Davis, D. D. (1995). 'Form, function and strategy in boundaryless organisations,' in Howard, A (ed) *The Changing Nature of Work*, Jossey-Bass Publishers, San Francisco.
- Engestrom, Y. (1993). Development studies of work as a testbench of activity theory: The case of primary care medical practice. In S. Chaiklin & J. Lave (eds). *Understanding Practice: perspectives on activity and context*. (pp. 64-103). Cambridge, U.K.: Cambridge University Press.
- European Commission. (1994). *Growth, Competitiveness, Employment: the Challenges and Ways Forward into the 21st Century. White Paper*, Brussels, European Commission.
- Forrester, K. Payne, J., & Ward, K. (1995). 'Lifelong education and the workplace: A critical analysis,' *International Journal of Lifelong Education*, Vol.14, no.4, pp.292-305.
- Grubb, W.N. (1996). *Working in the middle: Strengthening education and training for the mid-skilled labor force*. San Francisco: Jossey Bass.
- Heath, C., & Nicholls, G. (1997). Animated Texts: Selective Renditions of News Stories. In LB Resnick, C Pontecorvo, R. Saljo & Burge B (eds) *Discourse, tools and reasoning: Essays on Situated Cognition*. Springer, Berlin (p63-86).
- Hodges, D. C. (1998). Participation as dis-identification with/in a Community of practice. *Mind, Culture and Activity*, 5(4) 272-290.
- Hughes, K., & Bernhardt, A. (1999). *Market segmentation and the restructuring of banking jobs*. IEE Brief number 24 February 1999, Institute on Education and the Economy, New York.
- Hull, G. (1997). Preface and Introduction In (G. Hull (ed) *Changing work, Changing workers: Critical perspectives on language, literacy and skills*. State University of New York Press, New York.
- Hutchins, E. (1991). The Social Organization of Distributed Cognition. In L B Resnick, J M Levine & S D Teasley (eds) *Perspectives on socially shared cognition*. American Psychological Association. Washington DC. (pp.283-307)
- Kempnich, B., Butler, E. & Billett, S. (1999). *Irreconcilable differences: Women in small business*. National Centre for Vocational Education Research, Adelaide
- Lave, J. (1991). Situated learning in communities of practice. In L B Resnick, J M Levine & S D Teasley (eds) *Perspectives on socially shared cognition*. (Pp.63 –82). APA. Washington DC.

- Lave, J. (1990). The culture of acquisition and the practice of understanding. In J. W. Stigler, R. A. Shweder & G. Herdt (eds). *Cultural psychology* (pp. 259-86). Cambridge. U.K: Cambridge University Press.
- Lave, J., & Wenger, E. (1991). *Situated learning - legitimate peripheral participation*. Cambridge University Press, Cambridge.
- Lawrence, J. A., & Valsiner, J. (1993). Conceptual roots of internalization: From transmission to transformation. *Human Development* 36, pp150-167.
- Leonteyev, A.N. (1981). *Problems of the development of the mind*. Moscow: Progress Publishers.
- Lipsig-Mumme, C. (1996). Bridging the solitudes: Canadian perspectives on Research Partnerships in the New Work Order. Keynote Address. ANTARAC Annual Conference, Melbourne October 31-1 November 1996.
- Luria, A. R. (1976). *Cognitive development: its cultural and social foundations*. Cambridge: Harvard University Press.
- 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.
- Milkman, R. (1997). *Farewell to the factory: Auto Workers in the Late Twentieth Century*, Berkeley: University of California Press.
- Newman, D., Griffin, P. & Cole, M. (1989). *The construction zone: Working for cognitive change in schools*. Cambridge: Cambridge University Press.
- Perkins, D., Jay, E. & Tishman, S. (1993). Beyond abilities: A dispositional theory of thinking. *Merrill-Palmer Quarterly*, 39 (1), 1-21.
- Resnick L. B. Pontecorvo, C. Saljo, R., & Burge, B. (1997). Introduction – In LB Resnick, C Pontecorvo & R. Saljo (eds) *Discourse, tools and reasoning: Essays on Situated Cognition*. Springer, Berlin (pp. 1-20).
- Rogoff, B. (1995). Observing sociocultural activities on three planes: participatory appropriation, guided appropriation and apprenticeship. In J. V. Wertsch, P. Del Rio & A. Alvarez (Eds.), *Sociocultural studies of the mind* (pp. 139-164). Cambridge: Cambridge University Press.
- Rogoff, B. (1990). *Apprenticeship in thinking - cognitive development in social context*. New York: Oxford University Press.
- Rowden, R. (1997). How attention to employee satisfaction through training and development helps small business maintain a competitive edge: A comparative case study. *Australian Vocational Education Review*, vol 4 no 2.
- Rowden, R. (1995). The role of human resources development in successful small to mid-sized manufacturing businesses: A comparative case study. *Human Resource Development Quarterly*, vol 6, no.4 pp 335-373
- Scribner, S. (1990/1997). A sociocultural approach to the study of mind. In Tobah E, Falmagne, R J, Parlee, M B, Martin LM & Kapelman A S (Eds) *Mind and social practice: Selected writings of Sylvia Scribner*. (pp. 266-280) Cambridge University Press.
- Scribner, S. (1988/1997). Mental and manual work: An activity theory orientation. In Tobah E, Falmagne, R J, Parlee, M B, Martin LM & Kapelman A S (eds) 1997 *Mind and Social Practice: selected writings of Sylvia Scribner*. Cambridge. UK. Cambridge University Press (pp 367-374).
- Scribner, S. (1985). Vygotsky's use of history. In J. V. Wertsch (ed). *Culture, communication and cognition: Vygotskian perspectives* (pp. 119-145). Cambridge University Press, Cambridge
- Scribner, S. (1984). Studying working intelligence. In B. Rogoff & J. Lave (eds). *Everyday cognition: Its development in social context* (pp. 9-40). Cambridge, Mass: Harvard University Press.
- Scribner, S., & Beach, K. (1993). An activity theory approach to memory. *Applied Cognitive Psychology*, 7, 185-190.
- Shima, S. (1998). Reconceptualizing Part-time Employment. *Work, Employment & Society* vol 12, No 2, pp. 375-378.
- Suchman, L (1997). Centers of coordination: A case and some themes. In LB Resnick, C Pontecorvo, R. Saljo & B Burge (eds) *Discourse, tools and reasoning: Essays on Situated Cognition*. Springer, Berlin. (p.41-62).
- Tam, M. (1997). *Part-time Employment: A bridge or a trap?* Aldershot: Brookfield, USA
- Valsiner, J. (1994). Bi-directional cultural transmission and constructive sociogenesis. In W.de Graaf & R. Maier (Eds.), *Sociogenesis re-examined* (pp. 101-134). New York: Springer.
- Vygotsky, L. S. (1978). *Mind in society - the development of higher psychological processes*. Cambridge: Harvard University Press.
- Wall, T. D., & Jackson, P. R. (1995). 'New manufacturing initiatives and shopfloor job design,' in Howard, A (ed) *The Changing Nature of Work*, Jossey-Bass Publishers, San Francisco.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge Cambridge University Press.

- Wertsch, J.W. (1998). *Mind as action*. Oxford University Press. New York.
- Wertsch, J. W. (1991). A sociocultural approach to socially shared cognition. In L B Resnick, J M Levine & S D Teasley (eds) *Perspectives on socially shared cognition* (pp 85-100). American Psychological Association. Washington DC.
- Wertsch, J. V. (ed) (1985). *Culture, communication and cognition: Vygotskian perspectives*. Cambridge: Cambridge University Press.
- Whalley P., & Barley S. R. (1997) Technical work in the division of labor: Stalking the wily anomaly. In S R Barley & J E Orr (eds). *Between Craft and Science: Technical work in U.S. settings*. Ithaca NY Cornell University Press. (pp.24-52)
- Zuboff, S. (1988). *In the age of the smart machine: The future of work and power*. New York: Basic Books.