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Personal epistemologies, work and learning: Learning through work

This paper elaborates the concept of personal epistemologies as they are developed through and enacted in working life. In order to advance a comprehensive account of the qualities, purposes, and character of these epistemologies, this elaboration draws upon explanatory propositions from psychology, sociology, and philosophy, and from empirical accounts of work. One aim here is to go beyond existing conceptions of epistemological beliefs (e.g., Brownlee & Berthlesen, 2006, Hofer & Printrich, 1997) and to position personal epistemologies as being active, intentional, and derived in person-particular ways through the unique set of socially derived experiences that comprise individuals' life histories or ontogenies. Given their active and constitutive character, the concern here is to place these epistemologies centre stage in the dual processes of human development (i.e., learning) and remaking of culturally derived practices. These propositions are illustrated by drawing upon instances of workers' learning through their paid work and their remaking of that work, in circumstances of greater and lesser proximal social guidance. Indeed, the explanatory effort here is to understand how these epistemologies are exercised in and developed through individuals' engagement with paid work, and to account for the interpsychological processes that comprise individuals' enactment of paid work, and their learning within and across working life. Ultimately, personal epistemologies are held to be the key bases for initiating, monitoring, and appraising the processes and outcomes of these enactments. Hence, elaborating personal epistemologies is central to understanding how individuals engage in and learn through their paid work (i.e., their ontogenic development or life long learning) and their remaking and transformation of their work activities in particular work situations and at particular moments in time.

Personal epistemologies are held to secure both the continuity and remaking of society, as well as individuals' development. Consequently, both individual and cultural changes can be understood through the quality and exercise of individuals' epistemological action. Personal epistemologies are defined as individuals' ways of knowing and acting arising from their capacities, earlier experiences, and ongoing negotiations with the social and brute world, that together shape how they engage with and learn through work activities and interactions. Hence, they are more than beliefs (Brownlee & Berthlesen, 2006) because they also shape individuals' construal and construction of what is experienced and, reciprocally, these epistemologies are shaped and are reshaped through what is experienced. Yet, like interpsychological processes more generally, these reciprocal processes occur in ways that are enacted individually albeit in a uniquely personal-social way (Valsiner, 2000). Therefore, these epistemologies shape how individuals identify as workers, how they construe and construct work activities and interactions, and in what ways they exercise their occupational capacities. Moreover, through their exercise, these epistemologies also act to refine, reinforce, and transform individuals' paid work. The procedural concern here is to

understand the ways in which both goals for and processes of learning throughout working life are enacted, in different kinds of workplace circumstances.

It follows that both conceptual and procedural salience is to be found in elaborating the character and role of personal epistemologies, and how they are exercised in individuals' engagement with paid work. These epistemologies also assist in understanding the relations between the personal and the social contributions to learning that are now arising in many accounts of human development (Edwards, 2005; Eteläpelto & Saarinen, 2006; Hodkinson, Biesta, & James, 2008). Workplaces are helpful sites from which to elaborate a view of epistemologies because paid work constitutes the enactment and negotiation between both individual (i.e., learning through and for work) and social processes and needs (i.e., the development of the working knowledge required by that workplace).

In elaborating these propositions, the paper first discusses the conception and centrality of personal epistemologies by drawing on contemporary accounts of learning and the sourcing of knowledge through four conceptual premises: (i) constructivist theories; (ii) the mediating role of individual subjectivities; (iii) personally negotiated ontogenies; and (iv) individuals' interests, agency, and reflexivity. To illuminate and discuss the character and role of personal epistemologies at work, the paper then discusses, in relation to two distinct work-related contexts, the central role of personal epistemologies for learning through and for work. These instances comprise the exercise of the personal epistemologies in work that is relatively socially isolated (i.e., small businesses) and work that occurs in a socially rich environment (i.e., workplaces that provide both close and more distal forms of expert guidance). The paper concludes by proposing that these epistemologies are exercised differently according to whether the workplace settings afford both stronger or weaker forms of social support and guidance. Finally, some procedural implications for learning throughout working life are discussed. These implications extend to considerations of older workers and those working in socially or physically isolated circumstances because these workers need to rely on their personal epistemologies.

Personal epistemologies: individual, social, and brute factors

Both individual and social constructivist accounts of learning acknowledge a central role for individuals in making meaning (i.e., construing) from what is experienced and then constructing knowledge from that experience. However, each of these theories has a distinct starting premise. Gergen (1994) claims individual constructivism posits a mental world and then theorises its relation to the external world, whereas social constructivists tend to posit a social world and consider its relations with individuals (e.g., Rogoff, 2003). Yet, in both of these orientations, albeit perhaps more so in the former than the latter, there is an acceptance that individuals actively engage in and

contribute to the process of their knowledge construction. This active process is necessarily more than merely enacting what has been transmitted by the world beyond the individual, as both behaviourists and strongly social theorists suggest (Ratner, 2000). Instead, constructivist perspectives favour an individual orientation emphasising an active process of individuals seeking to secure equilibrium (Piaget, 1968a) or viability (Van Lehn, 1989) with what they encounter or experience. That is, they make sense of what they experience by relating it to what they already know (i.e., their existing cognitive structures), or, if the experience is novel for them, extending what they know to account for this new experience. These processes are seen, respectively, as identifying and securing a fittedness with individuals' existing cognitive structures, as in the Piagetian concept of assimilation, and developing new cognitive structures, as in the concept of accommodation within the Piagetian scheme (Piaget, 1968a).

Certainly, constructivist accounts tend to stress individuals' psychological construction of the experienced world. Valsiner and van de Veer (2000) refer to this construction as being based on individuals' cognitive experience: the capacities and bases through which they construe and construct their knowledge. Within Piaget's theory of genetic epistemology, which is frequently termed constructivist, his account of equilibrium is analogous to this conception. His account emphasises individuals' construction of reality, with reality being proposed as something assimilated into a child's existing system of understanding (Piaget, 1968b). Yet, at the same time, through accommodation the cognitive system is held to adapt itself to the structure of the world. Individuals' active role in developing, exercising, and developing further their epistemology is central to their ongoing quest for equilibrium, as Piaget (1968a) conceptualises it. Von Glasersfeld (1987) claims that this conception led Piaget to conclude that the function of intelligence was not, as traditional epistemology held, to provide cognitive organisms with 'true' representations of an objective environment. Rather, as Gergen (1994) states, Piaget began to see cognition as a generator of intelligent tools that enable organisms to construct a relative fit with the world as they experience it. Others (e.g., Van Lehn, 1989; von Glasersfeld, 1987) refer to this process as seeking viability in what is experienced. Hence, both these constructivist conceptions posit individuals as actively employing their epistemology in seeking a fit between what they know and experience, and in generating tools (cognitive structures – or as later cognitive experiences) with which to understand and engage with the social and physical world. Kelly's (1955) reference to constructive alternativism, through which individuals privately construe, cognise, or interpret the world that they experience, seems to be elaborating much the same process. Kelly also proposes that this process reflects a healthy respect for "the world as it is" (p 67). This conception is analogous to accommodation, and suggests this constructive process is not an 'anything goes' personally idiosyncratic one. Instead, it is shaped through interaction and constraints with what Searle (1995)

refers to as institutional and brute facts (i.e., the social and natural world beyond the skin) that can have persuasive forms and suggestions, and cannot be simply wished away.

From these premises, assimilation comprises individuals' cognitive experience engaging and negotiating with the social world, as in the sociocultural termed process of appropriation (Luria, 1978), whereas accommodation is the social world shaping the cognitive experience, as in mastery (Wertsch, 1998). Such claims also suggest that distinct kinds of interpsychological processes (i.e., those between the personal and social) and intrapsychological outcomes are enacted through these constructive processes. All of this suggests that more nuanced accounts of interpsychological processes are required to explain these processes and advance and perhaps reconcile theories that emphasise either the personal or social contributions to individuals' construction of knowledge. These theories and their implications emphasise a central role for personal epistemologies in the generative processes, including the construction of individuals' cognitive tools, as Piaget (1968a) would claim. Certainly, the social constructivist perspective emphasises the role of mediating tools of different kinds in interactions between individuals and the social world as comprising interpsychological processes that lead to an intrapsychological legacy (i.e., change in the individual or learning). However, in social constructivist theories, much of that mediation is held to be premised in specific forms of socially derived tools (i.e., language, discourse, artefacts), and much less emphasis is given to the individuals' cognitive tools and their deployment. Indeed, because social contributions such as tools and artefacts cannot be projected without ambiguity or effectively (Newman, Griffin, & Cole, 1989), individuals are required to actively construct meaning based on what they know and experience. This requirement positions epistemology as something that is of necessity, is personally exercised and constituted, and is socially shaped, albeit in the unique ways that comprise the particular set of experiences constituting individuals' life histories. This position is analogous to what Luke and Gore (1992) propose for a post structuralist feminist epistemology, in that it "accepts that knowledge is always provisional, open-ended and relational" (p 7), and is aligned with their cautioning against deemphasising the subject (i.e., the personal). They refer, specifically, to the consequences this might have for those who are marginalised, thereby emphasising the premise that individuals contribute to the direction and form, not only of their development, but also of the social practices and societal mores. These concerns have carriage here in terms of those who might be marginalised in and because of workplace norms and practices (e.g., older workers and those with disabilities).

It is also necessary to consider brute, as well as social, facts and forms (Searle, 1995) within discussion of constructivist accounts. This is necessary because in Vygotskian-inspired social constructivism interpsychological processes are usually seen as being primarily those between the personal and social world. Yet, the negotiations between individuals and the brute world need to be

considered as part of personal epistemologies, as in the Piagetian view of genetic epistemology. Importantly, for considerations of learning throughout working life, such factors as maturity (e.g., aging) are salient as they shape how individuals construe meaning, including mediating how they engage with the world beyond them. The work tasks that seemed effortless earlier might become more difficult and engaged in more guardedly, and as visual acuity weakens and hearing becomes less precise with age, perceptions are transformed in some ways; all of these changes shape how individuals construe, construct, and engage in the world beyond them. Although often neglected, except as processes of maturity in developmental psychology, brute facts such as strength, reaction times, visual perception, and touch all contribute to how individuals perceive, construct, and engage with the physical and social world beyond the skin. Yet, there are personal-brute dimensions to this mediation. Searle's example suggests that, for one person, a particular mountain is construed as being foreboding, for another it is beautiful, and for others it has to be climbed or exploited in some way. Therefore, although not able to wish away the social and brute worlds (Searle, 1995), we construct our meaning of them through premises likely based on earlier experiences.

All of these premises are important for explaining learning for and remaking of work, because it is through immediate and situated contributions of workplaces that have both physical and social dimensions that the active and person-specific process of meaning making is exercised. Hence, situational contributions constitute a salient component of personal epistemologies. For instance, workplaces comprise situated settings that offer instances and variations of occupational practice that occur in a particular circumstance and include particular social partners and artefacts, as well as brute facts of physicality, space, and distance. Yet, the dual processes of learning and remaking these practices are shaped by how individuals engage with and construe and construct what is suggested by the brute and social worlds.

It follows, therefore, that this active and potentially personally differentiated process of meaning making is shaped by individuals' subjectivities that furnish the cognitive experience from and through which the active process of meaning making arises (Valsiner, 2000). The basis and exercise of this subjectivity includes the gaze that individuals project (Weedon, 1997); how they believe the world is gazing at them (Fenwick, 1998); the discourses to which they have access (Davies, 2000); their knowledge, knowing, and procedures; and the brute facts (Searle, 1995) of how their nervous and sensory systems permit them to engage with what they experience. As noted, this experiencing of the immediate world is shaped by the legacies of premediate experiences (i.e., those that came earlier) (Valsiner, 2000). This epistemological activity includes in what ways and the degree by which individuals negotiate with the social suggestion (i.e., norms, practices, discourses) as it is exercised and its qualities and how these align with suggestions with which individuals elect to engage. So, in addition to all of the uniquely social-personal dimensions of this

epistemological action (Kelly, 1955), individuals' brute qualities which includes their strength and sensory systems, and how these attributes shape meaning making as they participate in those negotiations,. However, although individuals are not being able to wish away brute processes such as aging, the demands of time et cetera, and institutional facts such as the enactment of power and privilege, these factors can by degree be individually negotiated. As Foucault (1986) suggests, no amount of surveillance or control can extinguish desire, for instance. Therefore, these facts cannot wholly control or eradicate human intentionality, such as subjective epistemological action.

In these ways, individuals' cognitive experience and its exercise is shaped through the individuals' ontogenetic development (Scribner, 1985) or life histories. Indeed, individuals' ontogenies are personally particular as they arise through the set of socially derived experiences that are unique to individuals' life histories. The microgenetic development or moment-by-moment learning (Rogoff, 1990) that comprises the enactment of individuals' cognitive experience is ongoing and construes, constructs, and negotiates with what is experienced. Yet, as no two humans have exactly the same set of experiences or can ever construe meaning in a uniform way, they are unlikely ever to be able to construct knowledge on a moment-by-moment basis in the same way, even if they wanted to.

It follows that the focus, direction, and intensity of individuals' meaning making is shaped by their interest and agency: intentionality. Hence, engagement with what is encountered and/or the purposes with which individuals elect to engage in the world beyond the skin are not merely in response to exigencies of the brute world and the press of the social. Instead, they are also shaped, at times highly agentially, by individuals' desires, needs, and requirements. Agency connotes volitional, purposive nature of human activity (Giddens, 1984) as opposed to activity being constrained and determined by something else. Indeed, Taylor (1985) refers to the human capacity of being reflexive and reflective as our species' distinct quality that uniquely shapes our engagement with the world individuals encounter and experience and to which they respond. Hence, the deployment of individuals' cognitive experience is selective and focussed in particular ways that are shaped in ways that are necessarily person-dependent, because they reflect personal social and brute facts. It is on these premises that individuals engage in an active and negotiated way with their workplace, work activities, and interactions. As noted, there are two key outcomes or changes arising from these interactions: (i) individual change or learning, and (ii) the remaking and transformation of individuals' work (Billett, 2006).

An account of personal epistemology

As a means of capturing these active and directed meaning-making processes, they are termed as personal epistemologies. This labelling aims to go beyond what others have referred to as

epistemological beliefs (Brownlee & Berthelsen, 2006; Hofer & Pintrich, 1997) and to propose a more comprehensive and agentic conception of personal epistemology. Epistemological beliefs are proposed as approaches to the practice of learning comprising individuals' views about what knowledge is, how knowledge is gained, and the degree of certainty with which knowledge can be held (Brownlee & Berthelsen, 2006). Here, personal epistemologies are seen as including how individuals' ways of knowing and acting arise from their capacities, earlier experiences, and negotiations with the social and brute world across their life histories (Billett, 2006). This conception accommodates the negotiated and personal process of constructing these epistemologies, in contrast to the view of epistemologies as having a given quality premised on particular social positioning (e.g., Belenky, Clinchy, Goldberger, & Tarule, 1986), although it accommodates how social forms and norms contribute to these epistemologies, as Kelly (1955) advises.

However, given the conceptual emphases, it is necessary to make some explicit qualifications about the concept of personal epistemologies being advanced here. This epistemology is not the kind of overly mentalised conception as found within some cognitive theorising. Nor is it positioned as being distinct from or antagonistic to the social world, as some believe that the use of such terms as individual or personal connotes (e.g., Ratner, 2000). Instead, it is a socially grounded concept, but represents the interpsychological outcome of a lifetime of personally particular processes of construing, constructing, and practicing and, as a consequence, learning through encounters with the social and brute world. For instance, despite the role of the subjective, there is much that is epistemologically objective in this account. Searle (1995) states that "it isn't just my opinion or evaluation that it is a screwdriver. It is a matter of objectively ascertainable fact that it is a screwdriver" (p.10), thereby being respectful of the world as is, as Kelly (1955) proposes. Hence, this conception of personal epistemologies is not an 'anything goes' form of relativism, but instead suggests that personal epistemologies arise ontogenetically through the press and mediation of the social and brute worlds, and individuals' engagement with and taking up of those forms.

Procedurally, elaborating the character and role of personal epistemologies and their subjective underpinnings is central to understanding how individuals engage in such activities as paid work, how they learn through those experiences (Smith, 2005), and how they go on to remake their work activities (Smith & Billett, 2006). Personal epistemologies can also assist understanding how best curriculum and pedagogy might be conceived and enacted. For instance, mandates about lifelong learning and the mobilisation of workers to learn throughout their working life (Field, 2000) suggest the importance of understanding on what bases that mobilisation should occur. What is it that will direct individuals' learning through and throughout their working life? In terms of curriculum, this conception suggests that it is an understanding of what kinds of goals, processes, and enactments might best secure individuals' engagement in the kinds of work life learning that

they and others (e.g., employers, government etc.) want them to do. Also, what kind of pedagogic practices might be most appropriate for learning through and for work? Moreover, as not all workers enjoy extensive support within their workplaces (Bernhardt, 1999; Shima, 1998) they may need to exercise their personal epistemologies in particular and agentic ways, in order overcome the limitations of what is afforded them from other sources (Smith, 2005). This need may be particularly true of older workers (Billett & van Woerkom, 2008) and those employed in socially or geographically isolated circumstances, such as those with disabilities (Church & Luciano, 2005). Here, the concerns about women, part-time and older workers, and others who are marginalised by a lack of access to the kinds of workplace that support their goals, come to the fore.

Personal epistemologies: Work and learning

To elaborate the character of these epistemologies, and how they shape learning through working life in different ways, it is helpful to draw on investigations of learning through work. The particular instances discussed here are from studies of two different kinds of workplaces. The key distinctions exercised here are the differences in the degree by which the workplaces afford close social (i.e., proximal) guidance, such as immediate access to more expert or experienced partners. This seems a useful distinction because it is important to understand how personal epistemologies assist individuals to construct socially sourced knowledge in circumstances where there is an absence of such close guidance, as well as in those where it is available. That is, the interpsychological processes are likely to be premised upon quite different contributions between the individual and social worlds in which they engage. The examples used here are the proprietors of small businesses, who work either alone or with a small number of other workers (Billett, Ehrich, & Hernon-Tinning, 2003), yet have the responsibility to make decisions about the business and its operation. So, unlike workplaces where there are more experienced or expert others with whom to engage, discuss, and evaluate, and from whom to otherwise learn, the workplaces of small-business proprietors often lack such close sources of knowledge and guidance. Consequently, there arises a question about whether these workers will have to be more personally agentic and directed in their thinking, acting, and learning, and whether, as a result, their personal epistemologies are likely to have particular qualities (e.g., be more agentic) (Smith, 2005).

Then, there were workers who were employed in workplaces that had rigid employment practices that extended to monitoring of workers' behaviour and activities, often by the close or proximal presence of more experienced practitioners. In contrast to the small-business operators, these workers were immersed in socially rich circumstances that provided extensive close guidance and access to expert others (Billett, Smith, & Barker 2005). The questions here include whether these workers are able to exercise and extend their personal epistemologies and beliefs, or whether

they are constrained by the immediate social press, including proximal guidance, as in surveillance. The role of personal epistemologies in these contrasting kinds of workplace setting is discussed below.

Small-business operators' personal epistemologies

The accounts of the enactment of personal epistemologies in situations of limited opportunities for proximal guidance are derived from a study of how small-business operators learnt to implement the goods and service tax during its introduction in Australia (Billett et al., 2003). The study aimed to understand how small business operators acquire new knowledge and respond to innovation given their well reported reluctance to participate in vocational education programs. However, in addition, the study identified important conceptual considerations for workers' learning when engaged in work situations that lacked direct access to more informed social partners (i.e., proximal guidance) who elsewhere are available to provide guidance and joint problem-solving for workers engaging in new activities. Key procedural concerns come together here with conceptual development. Many workers, and perhaps the majority, are employed in circumstances of relative social or geographical isolation. This includes those who work in small business, on shift work, have specific expertise, work away from others, are older, or have disabilities et cetera. Yet, investigations of learning socially derived knowledge have most typically occurred in circumstances providing strong direct social guidance and often through an examination of dyads (e.g., parent-child, expert-novice, teacher-students) (e.g. Brown & Palinscar, 1989; Collins, Brown & Newman, 1989; Lave & Wenger, 1991; Palinscar & Brown, 1984; Rogoff, 1990, 1995). Therefore, current understanding about learning through work situations is largely premised on richly social affordances, including the availability of more informed social partners (Tynjälä 2008). Less is known about learning through work in the absence of these kinds of dyads and other forms of social partnerships.

The study referred to here used interviews and case studies of small business to identify processes through which small-business operators learnt about how best to implement the goods and service tax in their businesses. Some small businesses had access to different kinds of assistance outside of their business. These included business consultants and accountants who were employed to manage the acquisition of this new knowledge, or to do it for the business operators. Others used their bookkeepers to manage this task, thereby avoiding doing it themselves. For others still, however, the learning process had to include developing the capacities to be free of such support, which was a financial burden on their businesses. There was a range of more distant forms of support provided by the government, and also industry groups and local chambers of commerce et cetera to help small-business operators understand the principles, processes, and obligations associated with the goods and service tax. Importantly, this process had to be implemented by all

businesses, except the very smallest, by a particular deadline: the beginning of the new financial year. Consequently, learning about this tax and the processes supporting it were being widely discussed in many forums and by business operators who had to learn its principles and practices to meet their legislated obligations and maintain the viability of their businesses.

The investigation comprised developing over 20 case studies of the processes of learning that occurred within small businesses and by these operators, and included having these accounts verified by informants. These cases identified available forms of support outside of operators' workplaces, and these were reported as being of different degrees of helpfulness. In particular, support was most helpful when the source of that support understood the nature of the business and particular implications for the goods and service tax upon that business. Support was least valued when it offered principles without being able to advise how the tax would impact on the particular business. Significantly, though, in terms of outside support, trust was identified as being an essential quality in judging the support as valued. So, there was an active consideration by these learners (i.e., business operators) of the bases on which information was being provided. Importantly, judgements about the worth of the forms of support with which individuals engaged arose from their engagement with and critical considerations of these forms of support. That is, beliefs about trust in and the worth of informants were generated through a process of engagement and critical reflection of the part of these operatives. The small business operators claimed to be engaged in not only seeking and accessing advice, but also making decisions about the veracity of that advice. For instance, when attending meetings sponsored by local commerce groups they reported actively listening to speakers talk about the goods and service tax, in order to assess the worth of what was being stated, and in order to assess and test their own knowledge of these schemes. Hence, these operators were not passive recipients of such information, rather testing out its applicability, standing, and value. So, even when engaging with other sources of information, these workers reported being agentic, critical, and comparative. That is, they were engaged in a highly active learning process that was characterised by the exercise of an agentic personal epistemology (Edwards, 2005, Smith, 2005).

However, beyond engaging with others, the small-business operators were often quite focused, pragmatic, and selective in their efforts at conscious learning. Most often they tried to identify what they needed to know and then direct their energies in a very selective, but active, way to learn what they needed to know. For instance, one proactive learner was an entrepreneur, who owned a number of businesses of different kinds. For him, the business and profitability, not the kind of business or professional practice, were the key motivations. This individual directed his interests, approach, and focus for learning to these ends. In contrast, two of the small businesses comprised professional practices (i.e., a veterinarian surgery and an optometrist). Both of these

professionals indicated that they found the processes of business administration and, in particular, the accounting components and requirements of the business, quite uninteresting. They were more interested in their professional practice and hired bookkeepers to do their administrative and accountancy work. Hence, their approach to goals for learning and efforts were commensurate with their interests. In short, they delegated the majority of the responsibility to their paid bookkeepers. They only wanted to know what had to be understood about the principles under which the goods and service tax operated. So, their focus on, approach to, and engagement in learning this task was relative and quite distinct from those of the entrepreneur, for instance. Important here is the selective nature of the workers' epistemology (e.g., Baldwin, 1894).

Then, there were small-business operatives who were keen to learn how to administer the goods and service tax in order to avoid the expense of accountants and bookkeepers that had arisen during the implementation phase. These individuals, like the entrepreneur, were often proactive, engaged, and eager to learn the processes of administering this tax. For them, the intention for learning was about reducing the cost of running their business and assisting in its financial viability. Then, there was one business owner (a bookshop owner) who had few local sources of advice (proximal guidance). Instead, he actively and selectively sought advice from and engaged in reciprocal learning with another bookshop owner in another state. They communicated electronically in sharing information about what the goods and service tax meant to their businesses, and how best they could implement it with little or no impact on their businesses. In all, these examples demonstrate the ways in which personal epistemologies were engaged by workers who had to acquire new knowledge in the absence of immediate expertise and guidance (Billett et al., 2003).

However, it would be wrong to see the exercise of personal epistemologies as being necessarily effective. One small-business owner was quite socially and geographically isolated, albeit in a large country town, and had relied upon his own resources and expertise which used fairly rudimentary, albeit effective, business aids. In this case, a manual entry system had been used to note sales and manage stock. Yet, the advent of the goods and service tax required all small-business operators to administer their business electronically, and use a software package to manage their business and their taxation obligations. This particular business operator had never used a computer, had no experience with business management software, and did not know how to translate his current business management strategy into an electronic format. However, his individual and self-directed approach to learning concepts and procedures (epistemological adventures, if you like) led to a range of difficulties, embarrassment, and, ultimately, high levels of anxiety. In all, his capacities and approach (i.e., personal epistemology) were inadequate for the task to be learnt, as was the degree by which he engaged with others who could assist and help him

implement his business management systems. Essentially, the gaps in his knowledge were too great to be closed by discovery alone. It seems also that his beliefs and values, and perhaps social competence, rendered him reluctant to engage with others to secure sources of advice and assistance with learning new concepts and procedures. So, the inadequacy of his personal epistemology, including not working to overcome his isolation, was limiting the process and scope of what was, for him, necessary learning.

These examples provide illustrative instances of agentic learning for particular purposes and the consequences of reliance upon personal epistemologies. However, these epistemologies are not of unqualified effectiveness. Instead, they need to be seen as being used selectively, and in ways that depend upon the particular qualities of the learner in terms of engagement with others, critical appraisal of other sources of information, and means of monitoring and evaluating their own performance. It is as if the personal epistemology was both driving and guiding the process of trying to make sense of this new business requirement in ways consonant with accounts of securing equilibrium and viability. These workers were trying to understand what was required of them in an active way, and were guided by desires to be clear about the process and its requirements and were deploying their way of seeing the world, engaging with it, making sense, and responding to the social world in a highly active way. Yet, there can be no guarantee that the scope of the task can be negotiated by individual efforts alone. There is a point at which the limits of the personal are understood and guidance by others is essential. In these ways, personal epistemologies were exercised to understand the knowledge required for these work tasks, and the boundaries (e.g., scope, limitations, strengths, and weaknesses) of what the individuals know.

Personal epistemologies in socially rich environments

In contrast to the small-business operatives' need to use personal epistemologies for overcoming their relative isolation (i.e., lack of proximal guidance) are the distinct kinds of approaches to learning and the monitoring of the learning that occur in workplaces that afford close guidance by more expert partners. An instance used here is that of three workers who were employed doing similar work using processes that were supposed to be quite standard and shared (Billett et al, 2005). Their work as technicians supporting the use of a university computer infrastructure included directly working with clients from a help-desk telephone service. The technicians usually worked in an open and shared work area, except when rostered to take calls on the helpline. The workplace had imposed a standard operating system for all of its personal computer functions across the organisation and these were applied uniformly onto each computer, and updated regularly either locally or automatically. Many of the issues with which the technicians deal had specific sources and remedies. Consequently, this information was often shared among these staff as part of the ongoing work tasks within the work area. In this open work area, the presence of banter and joking

gave the appearance of a team working together collegiately and contentedly. This camaraderie was extended by some members of the team to activities outside the workplace (i.e., social events). So, from external appearances, the team appeared to be functioning well together and have shared objectives and processes.

However, each of these workers referred to quite different bases by which they came to know in the workplace and make judgements about how they worked, and they saw different work goals as being important. In some ways, these distinct premises are inevitable as each worker had quite different work histories and interests, which furnished them with distinct approaches to their work. One was, by training, an electronics technician who had a long working life working with electronic equipment and had worked with and experienced the development of computers, software, operating systems, and networks over a relatively long period of time. However, he also had interests and expertise in other kinds of electronic equipment, such as cameras and sound recording equipment. He disliked being part of a team largely engaged in standardised work tasks that did not fully utilise his expertise. Consequently, he wanted opportunities for exercising some of his specialist skills, and to undertake work tasks beyond the constraints of the standard operating system. Another of the team members also had a long work history with computers working in a large public sector organisation. His expertise, interest, and knowledge were closely associated with the kinds of tasks with which the work team were involved in this workplace. He was a computer, not an electronics, expert. Moreover, this worker was keen to maintain workplace engagement through initiating banter, humour, and social events. The third worker had only recently become a computer technician and helpdesk operative following a long career in the building industry. A workplace injury required him to change occupations and this position comprised his first employment in his new occupation, following completion of a computer course. However, he had particular ambitions that saw him seeking other kinds of employment elsewhere in the same organisation. In these ways, although engaging in the same work activities, in a work situation that is socially rich, each subject had distinctive bases for their workplace engagement and provided evidence of the exercise of their agency in learning (Billett et al., 2005).

A way in which different conceptions of work, responses to problems, and bases for conducting work manifested themselves was the duration and the thoroughness of the service and advice which these workers provided to their clientele. All the workers in this area were subject to an automatic client report of their work, which also provided information to management about the length of time they spent talking or working with clients in completing service calls. For some of these workers, completing jobs quickly and then moving down the queue to stop clients having long waits was a quality of their work performance as essential as providing immediate solutions. These workers performed well on quantitative measures of performance, such as the length of the average

service call and, importantly, the number of calls per day. However, the first named worker (i.e., the long-term electronics technician) thought it more important to take time and address the problem thoroughly, and was highly sceptical of a job evaluation system based on speed and the number and brevity of service calls made. This worker complained that the job evaluation system was pressing him into making brief service calls and privileged quick-fix type solutions. In contrast, the third worker was keen to demonstrate high levels of productivity and, therefore, welcomed the evaluation system as a basis by which to demonstrate his conscientiousness.

These three workers responded to client requests through a system of work that monitored length of service calls and number of service calls taken in one day, and worked within a standard operating system in a workplace in which knowledge sharing was important. Yet, they each had quite different bases by which they enacted their work, came to value the kinds of work they did, and came to see themselves as workers; and each had different ends to which they intentionally directed their work activities. These bases and goals were all shaped by the workers' subjective accounts of work and exercised through their personal epistemologies. Hence, the workers' means of knowing, ways of engagement, and methods of construing and constructing knowledge were likely to be quite distinct, regardless that that they were working within a set of circumstances, including the very visible monitoring of work activities, that provided a strong social press to engage in work tasks in a uniform way. It was through the exercise of workers' personal epistemologies, developed from particular kinds of experiences, that these apparent variations in work activities arose and were exercised. Given a relatively strong social suggestion in the form of a close working environment, a standard operating system, the need to work with others to understand and share means of addressing new problems, and the active process of engaging individuals in camaraderie-building activities, it might be anticipated that the exercise and agency of these workers' personal epistemologies might be restricted. However, this was not the case. Instead, individuals' personally derived experience shaped how they construed, constructed, and responded to the work tasks (Valsiner, 2000).

The findings here were similar to those of another site in the same study (Billett et al., 2005). That site comprised a fire station in which shifts of fire fighters worked and ate together, slept in the same accommodation over long shifts, and in tightly organised teams trained for and engaged in emergency work. There were routines for working in a consistent way, and group debriefs after incidents to discuss and reflect on responses to the incidents. Again, there were quite distinct ways of knowing, engaging, and learning, as directed by personal goals and purposes. It follows from these two instances that although socially rich learning environments afford particular kinds of social suggestions in the form of both distal and proximal guidance, and have capacities to monitor progress, individuals participate, learn, and enact their work activities in ways shaped by

their personal epistemologies. Here, the concept of bounded agency (Evans, 2007) is helpful to explain the discretion within a bounded work environment. But regardless, within the scope of the discretion afforded by the particular work situation, the workers in this study sought to exercise their agency in ways different than those used by individuals working in relatively weak social environments. Yet, qualitatively, the process was premised on the epistemological process of identifying the scope of what was possible within the socially constraint environment. In this way, the development and exercise of personal epistemologies was premised upon in some instances a key emphasis on ontological security (Giddens, 1991), which workers achieve when they exercise their personal epistemologies to secure their sense of self and worth, in situations that are seeking to undermine that sense of self. For others, the exercise of that epistemology is directed towards undertaking work, learning about new aspects of that work and remaking that work.

Learning and change through the exercise of personal epistemologies

It is suggested here that whether in situations of relative social isolation, where individuals' agency will be directed to be selective and critical, or in shared workplace situations, or where other kinds of negotiation are required, individuals' personal epistemologies play essential roles in construing and constructing what was experienced and shaping their responses to the task. This is regardless of whether individuals' actions are directed towards reproducing the desired work or about realising ontological security. As Kelly (1955) proposed, the choice of constructs favours the alternative that seems to provide the best basis for addressing particular needs. However, this basis is a personal and subjective one. Hence, what individuals learn and how they go about their work and learning is shaped by their epistemologies. Of course, there is probably nothing very new here; this has likely always been the case, as Piaget (1968b) captured in his accounts of equilibrium, albeit in consideration of children's learning. Certainly, what has been proposed and elaborated above is that interpsychological processes need to be conceptualised as being those between individuals and the physical and social world with which they engage (Billett, 2009). In particular, it seems that these processes are far from being equal in part (i.e., shared equally among personal, social, and brute factors). Instead, these processes are relational, with the exercise of the personal, social, and the brute being exercised differently within them. Although it is suggested above that in situations with relatively weak sociality there is a need for the exercise of greater personal agency, this exercise will be relative to the particular circumstances and, not least, its construction by individuals. In all, it seems that the process of learning is shaped in particular ways by distinct exercise of personal, social, or brute factors. Moreover, the process of remaking cultural practices such as work is also shaped in different ways through interpsychological processes, and individuals' personal epistemologies play a key role in mediating this ongoing process of remaking these practices. All

this suggests that personal epistemologies are central to both the process of individual learning and also the remaking and transformation of culture.

The centrality of personal epistemologies indicates that the consideration of learning through work or throughout working life needs to address the contributions of those who are participating in the work. Or, as Field (2000) proposes, there is a need to understand how best these individuals might be marshalled to achieve the kinds of goals that governments and employers want from them. Often, provisions for vocational and professional education fail to take sufficient account of those who engage with initiatives that attempt to motivate or direct their learning in particular ways. Here, it is suggested that consideration needs to be given to the kinds of conceptions and constructions learners will make, rather than that learning ought to follow the course intended by governments and employers, as they seem to assume will occur. Such assumptions deny the personal interest, subjectivity, and agency that also constitute personal epistemologies. Importantly, considerations here include how particular kinds of epistemological qualities or capacities are likely to be required depending upon the kinds of circumstances in which these learners find themselves. Being relatively socially isolated might mean the need to be proactive in not just the exercise of personal agency, but also the capacity to identify the limits of being generative of new knowledge without seeking information and advice from others.

Yet, there is also the expression and extending of the scope of learning through, firstly, engaging with others, and then interrogating those others to extend learning. In some ways, this reverses roles traditionally advanced within the concept of the zone of proximal development, because it is agentic learners who secure their own advice, and engage with and make judgements about the worth of what they are being afforded. It is the expansiveness and agency of these learners, and not 'the others' (e.g. social partners), that comprises the scope of the zone of their learning. Vygotsky also perhaps suggested something similar when considering the agency and epistemological adventures of children at play (see Vygotsky, 1966, cited in Valsiner, 2000).

Then, there are also the kinds of negotiations and sense making that are required in more socially rich environments, where the rebuffing of the social suggestion might also be essential in maintaining equilibrium for the self (Hodges, 1998). Again, these negotiations emphasise an agency within a personal epistemology that is both projective yet critical, and guarded yet needing to be exercised in ways that maintain not only the sense of self but also the kinds of collaborative working relationships and activities that comprise forms of knowing. It is this sense making and these judgements that sit within negotiations that comprise the ongoing processes of lifelong learning. Hence, initiatives attempting to harness and guide that lifelong learning are likely to be rebuffed either explicitly or negotiated with in more socially shaped circumstances.

In sum, the attempt here has been to advance and illustrate a conception of personal epistemologies. These are held to arise in personal particular social ways through individuals' ontogenesis and brought together through the mediation of brute and social contributions.

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