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Learning at working: Emerging perspectives and new challenges

Abstract:

Learning experiences in the circumstances of work (i.e. where work is undertaken) are becoming increasingly discussed, included in educational programs at all levels, and seen as a key means for addressing individuals' learning across working lives. These experiences are also now being directed to a widening range of personal, workplace, community and national purposes. These include: informing individuals about particular occupations, developing capacities for practicing those occupation, meeting specific workplace performance requirements, and sustaining occupational and workplace competence across lengthening working lives. These wide ranging purposes are now being informed by an expansive range of disciplines and advances within them. Developments within disciplines informing understandings of learning have emphasised the salience of engaging in authentic goal-directed work activities, and in settings where they are practiced and being guided by more expert partners. Yet, more needs to be understood so that practices associated with utilising learning experiences through work can be maximised. Consequently, some emerging conceptual advances that assist and inform these understandings are proposed here. In addition, procedural concerns associated with curriculum, pedagogic and personal learning practices are also identified.

Learning in the circumstances of work: new challenges and perspectives

Engagement in work activities that offer rich learning experiences are now increasingly being discussed, included in educational programs and seen as legitimate means of addressing individuals' learning across all stages of their working lives (Dochy, Gijbels, Segers, & van den Bossche, 2011). However, much more remains to be understood about learning in work settings and how these experiences can be enhanced for a range of purposes (Eraut, 2011). Certainly, contemporary workplace conditions require employees to sustain their employability throughout their working lives. This commences with processes that initially develop and later maintain their occupational capacities to respond to emerging challenges of work (i.e. work tasks), work requirements (i.e. codes and standards) and ways of working (i.e. systems and processes). In addition, expectations about learning in the circumstances of work (i.e. where work is undertaken) are now associated with achieving a broad set of personal, workplace, community and national outcomes, including now being an integral part of tertiary and higher educational programs. Typically, these purposes are aligned with gainful employment, developing and sustaining skilful occupational capacities, or performing in unpaid work (e.g. charity or community development) (Tynjala, 2008). Yet, this learning is largely directed towards what is needed for particular workplace requirements,

including being able to respond to transformations in occupational practices and specific workplace needs. However, some of these requirements are directed towards greater levels of affective responses to important social and economic challenges. These include learning to work effectively in intensive practice settings, such as in busy hospital wards, production plants with ever-shorter cycles of products, increasingly flexible scheduling etc. These kinds of complex, higher order and strategic kinds of learning necessitate effectively accessing and utilising whatever resources and support are available within the workplace. Hence, novices may need to engage with and learn from those whom can offer the requisite insights, procedures and dispositions. Moreover, these requirements for being effective now means that educational institutions are increasingly wanting their students to gain access to and integrate workplace experiences and be guided by workplace supervisors, preceptors, mentors, clinical supervisors etc. during their work placements. However, meeting the demand for these opportunities is becoming difficult. So, as purposes for and demands upon workplace learning experiences grow, a central concern is effectively managing how students and workers can effectively learn in workplace settings. Attempting to use concepts and practices from educational institutions alone is not a productive way forward as these apply to particular kinds of social and physical circumstances that are quite distinct from workplaces (Eteläpelto, 2008).

Moreover, whilst workplace learning experiences are becoming increasingly legitimised, in demand and seen as being able to address a range of learning related purposes, they are also subject to clear limitations, that needing redressing to meet the growing expectations. These limitations include the difficulty of accessing and learning conceptual and other forms of work-related knowledge not immediately accessible to worker-learners in workplaces settings. These include the conceptual and symbolic knowledge underpinning performance with modern technologically and electronically-driven work procedures. There are also procedural considerations about the efficacy of particular experiences for particular kinds of learning, and at different stages across their lengthening working lives. This includes the kinds of work-based learning provisions for the increasing portion of older workers who need to sustain their employability, yet whose needs may not be their employers' top priority (Dymock, Billett, Martin, & Johnson, 2009). Innovative responses to these emerging challenges are now needed. Hence, the need to focus on identifying, using and enhancing pedagogic and curriculum practices to enrich learning experiences in particular ways to meet specific cohorts of worker-learners' requirements.

Fortunately, there are now emerging understandings, such as those referred to as grounded cognition (Barsalou, 2008), that potentially are helpful to understand further why experiences in the circumstances of work are so potent, and how individuals' cognition is enacted and learning shaped through these experiences. These conceptual developments assist in elaborating the efficacy of engaging in socially authentic activities (Evans, Waite & Kersh, 2011), including how they contribute to human cognition, for initial learning, recall and exercising adaptive capacities. So, whereas such factors have

consistently been reported as being central to learning through work (Billett, 2001), emerging contributions may help explain this efficacy. Hence, it is timely to consider current progress and reappraise established contributions to advance ways in which emerging challenges for learning at work might be redressed. Here, two sets of considerations are discussed: i) emerging conceptual accounts of learning and their potential to advance understandings about learning in circumstances of work and ii) procedural issues associated with enhancing such learning.

Key emerging concepts

There are three areas in which emerging concepts associated with human cognition, learning and development that are relevant to greater understandings about learning in circumstances of work. These are: i) changes in the requirements of work; ii) conceptual understandings about the processes of learning; and iii) elaborated views of relations between social and personal contributions to learning and development.

Firstly, changes in the requirements for work performance have become more complex and multi-fold (Billett, 2006). Hence, there is a need to understand these requirements more fully, as these comprise the goals for workplace learning efforts. There is a growing reliance upon conceptual and symbolic knowledge in many occupations, often premised upon the introduction of electronic technology for conducting work activities. These activities including electronically mediated work requiring understandings and ways of knowing and working that are quite distinct from mechanical processes (Lewis, 2005, 2011; Martin & Scribner, 1991). For instance, Lewis (2011) identified the demands that digital displays in contemporary trucks made upon drivers, and the difficulty they had understanding and maintaining confidence in such symbolic representation, compared with the sensory and visual indicators with which they were familiar. Hence, how these 'hard to learn' kinds of knowledge can be made accessible and learnt presents new challenges. This point was made much earlier by Scribner who suggested that:

... new cultural means are being elaborated at an accelerating rate in industrialised nations. Hardly have we approached the problem of understanding the intellectual impact of the printing press, than we are urged to confront the psychological implications of computerisation (Scribner, 1985: 138).

This suggestion has proven prescient given so much work is now mediated by electronic technology in occupations such as health care (Cook-Gumperez & Hanna, 1997), administrative work (Bresnahan, Brynjolsson, & Hitt, 2002; Cavanagh, 2008), and technical work (Whalley & Barley, 1997). Yet, changes in work extend beyond the conduct of technical tasks. Effective work practice now increasingly includes adherence to occupational standards and mandated workplace requirements. Whether referring hygiene standards for food processing, food service, health care, hotel settings or levels of care extended towards

clients, patients and customers, how work is now undertaken necessitate levels of understanding and repertoire of procedures distinct from those of earlier times. These ongoing changes appear ubiquitous and applicable to many occupations. Hence, a reliance on the learning acquired for entry to the working life is unlikely to be sufficient for a lifetime of employment, because even foundational occupational requirements change (Dymock et al., 2009).

These changes raise particular issues for learning in and for work. The most common forms of individuals' learning in the circumstances of work are likely to be through observation, mimesis (i.e. imitation) and practice (Jordan, 1989; Marchand, 2008). However, such processes alone cannot effectively support learning in and for contemporary workplaces because increasingly, workers are engaged in affective domains and are required to make informed judgements at work. These processes are largely premised upon individuals' efforts and capacities as observers, imitators and initiators when engaged in work activities and interactions. Yet, such processes may not be sufficient for accessing knowledge that is opaque and hidden from view and sensation. Moreover, learning for work includes tacit knowledge that is learnt through repeated engagement and practice until it becomes implicit, as is the case for the haptic (i.e. sense of touch) qualities needed wherever workers manipulate materials, bodies or other physical entities, usually with their hands. It also requires acquisition of explicit procedural and conceptual knowledge from within workplaces, especially when it is not necessarily made explicit through the circumstances of work. That is, certain knowledge is hidden (i.e. force, vectors, physiology) and not readily accessible and, therefore, cannot easily be engaged with and learnt. Consequently, as Scribner prompted, it is necessary to gauge the implications of changes of human progress on learning through practice (i.e. observation and mimesis) that have been central to learning through practice for many millennia (Billett, 2011b). Previous generations of workers have learnt through work and found ways of developing conceptual capacities. For instance, simple artefacts have been used to assist Micronesian fishers learn to recognise star patterns and their positioning in the night sky (Hutchins & Palen, 1997; Pelissier, 1991). It remains unclear whether current generation of workers are able to secure access to emerging forms of knowledge through individual effort alone, or whether like the Micronesian fishermen, they require access to experts, guides or instructional resources. So, a key concern for further research is to understand more about the kinds of workplace pedagogic practices that assist access to and the learning of knowledge that is not explicit nor able to be directly experienced through everyday work activities and interactions.

Secondly, current understandings about learning through work are largely premised on accounts of social practices and settings. Whilst these are essential and helpful, they are insufficient to fully inform the process of learning in the circumstances of work. Contributions from anthropology and social constructivism have done much to assist understandings about social practices, and the historical, cultural and social sources of the knowledge required to effectively practice an occupation. Associated theories have offered accounts of how more informed social partners (i.e. experts) assist the development of

individuals' knowledge, for instance through joint problem-solving with a more experienced partner (Rogoff, 1995). Through collaborative acts and making explicit how more experienced workers conceptualise, appraise and then respond to particular tasks permits less experienced workers to extend their knowledge in ways that they could not achieve independently. This concept has most famously been presented as the Zone of Proximal Development, which is attributed to Vygotsky and refers to the extent that the potential (i.e. scope) of individuals' learning can be extended through guidance from a more expert counterpart (i.e. proximal) guidance)(Cole, 1985). Yet, beyond providing models and support in securing workplace performance, it remains unclear how such collaborative processes can best occur, what makes them effective, and what are the limits of their efficacy. Increasingly, the active roles of learners is being emphasised, yet elsewhere Vygotskian accounts suggest that the scope of potential learning is as much a product of learners' agency than a reliance on more expert partners (Valsiner & van der Veer, 2000). Hence, the kind of opportunities afforded to engage with more experienced workers is only one element of this learning process. The other is the degree by which workers are interested in, motivated by and able to intentionally learn through these engagements (Billett, 2011c).

Certainly, learners' agency has been shown to redress the weaknesses in the affordances of workplace settings, sometimes out of necessity (Smith, 2005) That is, workers may be driven and motivated to learn, as with small business operators who without direct guidance needed to understand how to administer the goods and service tax (Billett, Ehrich, & Hernon-Tinning, 2003). The importance of engaging in authentic work activities stands as a means of securing the knowledge required for that performance. However, enhanced understandings about exactly why these kinds of experiences are perceived to be so effective, and why activities in other kinds of environments (i.e. educational institutions) are deemed to be less helpful, need to be further understood. Helpfully, contemporary anthropological accounts are emphasising the embodiment of knowledge as arising through practice in ways that has implications for learning through work (Harris, 2007; Marchand, 2008). They emphasise non-propositional (i.e. qualities you can state) elements of both workplace performance and processes of learning through work, and the visual, auditory and somatic (i.e. of the body) contributions to both acting and learning (Pridham, O'Mallon, & Prain, 2012). Importantly, much of what anthropologists propose as being non-propositional bases for learning and doing is quite inconsistent with the premises upon which educational programs are enacted. In particular, their emphasis on declarative knowledge (i.e. storable facts, propositions and concepts) may suit institutional practices and purposes, but perhaps not performance in contexts beyond them. This finding was noted by Lave (1990) in her study of apprenticeship learning in which no direct teaching was identified as occurring. Instead, as with Marchand's account of apprenticeship learning in minaret building, this learning progressed on learners being active in their engagement and utilising experiences provided for them in the work setting. It is far more a learning process, than teaching (Billett, 2011b). That engagement is premised upon how novices come to know how to engage with others. Investigations of developmental

procedures between conspecifics (i.e. same species) have found that not only is the learning process active, but premised on learners understanding the intentionality and particular bases for progressing when electing how they need to engage with others to learn from them (Tomasello, 2004). Hence, as Tomasello proposes the realisation that the other:

... like oneself is crucial in human learning, most importantly because artefacts and practices -- exemplified prototypically by the use of tools and linguistic symbols -- invariably point beyond themselves to the phenomena for which they have been designed (2004: 52).

Understanding others' intentionality is a key basis of learning with others, referred to as ontogenetic ritualisation (Tomasello 2004) - a process whereby two partners negotiate a mode of engagement and communication through social interaction. This concept is helpful for understanding processes that workers negotiate when working together and learning from each other, developing the intersubjectivity (i.e. shared understanding) essential for that collaboration and also their learning. This consideration of active engagement for learning goes beyond merely being proactive in understanding how to engage with interlocutors central to learning through work. Hence, not surprisingly Filliettaz, de Saint-Georges and Duc, (2010), illuminate the process of workplace interactions using video-images and dialogues, and how the amalgam of the personal and social environment shapes workplace learning.

Recent developments within cognitive science also provide potentially helpful advances of how engagement in authentic practice settings contributes richly to individuals' learning. Adding to understandings of cognitive processes comprising perception (e.g. a vision, audition), action (e.g. movement, proprioception), and introspection (e.g. mental states, affect), comes the claim that human cognition is premised upon multimodal forms of representation (Barsalou, 2008). Such a view holds that human cognition is not premised on amodal functions of semantic memory that are separate from the brain's modal system. Instead, cognitive processes engage a range of human cognitive processes acting together in multimodal ways (Barsalou, 2009). Hence, rather than experience being narrowly codified into propositional amodal semantic systems it is engaged multi-modally. Through these various sensory means the process of simulation comprises "a re-enactment of perceptual, motor, and introspective states acquired during experience with the world, body and mind" (618). This conception potentially reifies and extends the significance and scope of what constitutes experience as a form of cognition and its contributions to learning. This conception may well explain why workers consistently report the importance of engaging in authentic work activities and in the circumstances of those practices – 'just doing it' and 'just being there' (Billett, 1994, 2001). It also assists in explaining difficulties individuals encounter when attempting to transfer knowledge learnt in one situation (e.g. schools, colleges or universities) to another (e.g. current and future workplaces), because of its multi-modal embeddedness in particular circumstances. These developments suggest that, whilst understanding learning through work needs to account for the

mediating contributions of the workplace, it also needs to accommodate the multitudinous and individually constructed bases for simulations or cognitive experiences. Hence, a considered appraisal of these contributions to human cognition through both sensory means and ways of knowing can assist understanding learning through work and maybe explain why adaptability or transfer of knowledge might be so limited.

In considering a broader conceptual engagement to understand learning through work, Gardner(2004) makes a general point. Referring to the continual changes individuals have to deal with in contemporary times, he urges theorists to embrace the contributions of other disciplines.

Little in our science of learning addresses issues of this scale; our cultural, historical and literary sciences do not make much contact with our scientific approaches; an interdisciplinary span across these broad disciplinary traits still eludes us (Gardner, 2004: 11).

Certainly, the task of understanding learning through work and across working life is far too big to be dealt with by one explanatory set of concepts, except in the most abstract of ways. There is a need to draw upon a range of disciplines to advance these understandings.

Thirdly, the relationships between the personal and social contributions to learning through and for work warrant further elaboration. Although learning is a process in which individuals engage, the mediating factors of situation, society and culture are central to understanding, learning and advancing the knowledge and skills required for work. In essence, human learning is about cultural learning (Tomasello, 2004). Two emergent terms broaden an understanding of these relations: practice of communities (Gherardi, 2009) and bounded agency (Shanahan & Hood, 2000). The 'practice of community' is advanced by Gherardi (2009) to describe the practices of working communities. From this perspective, the enactment of these practices and how people participate in particular workplace settings is salient. This concept seems helpful as it emphasis on the circumstances of work practice (Jordan, 2011) where occupational activities and learning co-occur. The concept of 'bounded agency' also captures the means by which individuals engage with, negotiate and learn in the space between what they are able to do and how they exercise agency in engaging with those boundaries. Within what constitutes workplaces' accepted practice (e.g. their normative practices, work demarcations within workplaces) individuals can exercise discretion and agency by degree, but within these constraints. This negotiation may play out differently across worksites and for different workers, yet, suggests that individual agency is not without parameters or boundaries and that violating them could lead to sanctions (Smith, 2011). Inevitably boundaries within work tasks, organisation of work and interactions shape the nature of work practices and processes of learning through and about them. These boundaries may be set by others, more experienced workers or the regulated requirement of work. However, the process of boundary violation and shifting may be an inevitable part of engagement and development. In particular, individuals exercising agency within boundaries created by

others and their engagement to transcend and extend those boundaries are helpful in understanding the contested nature of learning through work. There are ways in which contested workspaces restrict others by creating boundaries that constrain and limit the trajectories and contributions of those who are perceived as threats or rivals. However, consideration of boundaries and boundary crossing need to accommodate that these are entities that must be construed and acted upon by individuals. They are not just institutional facts (Searle, 1995) alone: they include personal facts as well. Indeed, more experienced co-workers can facilitate or inhibit access to those learning processes that are constrained by such boundaries (Fuller & Unwin, 2002). So, although the concept of bounded agency is yet to be fully elaborated, it can assist understand factors that even for legitimate purposes (e.g. the scope of occupational expertise), can serve to constrain or support learning opportunities in particular ways. Yet, at the same time, the nature of learning and development is about expanding boundaries and transforming practices and overcoming the constraints that limit individuals because of others' conceptions of their competence.

In sum, these emerging conceptual challenges and contributions offer bases to further understand the process of learning through and for work. Yet, this field also demands procedural contributions: how the processes of learning through and for work can be enhanced. It follows then, that the next section addresses emerging procedural issues and challenges.

Procedural development

Key procedural challenges to assisting these forms of development need to be understood more fully and addressed through pedagogic, curriculum and personal initiatives. In the following sections, challenges in improving learning for occupations are posed and discussed, and then sustaining learning for employment is elaborated.

Improving learning for occupations

Many countries are currently facing high levels of non-completions in initial occupational programs such as apprenticeships often because workplace experiences are unsatisfactory, too confronting and lack appropriate support (Stalder & Nägele, 2008). Yet, programs previously wholly based with education institutions are now engaging students in work-based experiences to learn their selected occupation and enjoy a smooth transition to practice upon graduation. Just providing experiences for students in practice settings may not achieve the kind of goals which are intended by such initiatives (Billett, 2011a). Unless students can secure adequate experiences and support in workplaces and access opportunities to integrate them with content in their educational programs, these goals and expectations will not be met adequately. Consequently, for initial occupational preparation, whether based in workplaces or in educational institutions, curriculum and pedagogic interventions are necessary. This need applies equally to existing

workers seeking to sustain their employability through ongoing development across working lives. It seems two kinds of procedural responses are required. The first is a more structured approach to managing learners (e.g. apprentices and students) and their experiences in workplace settings. The second is to enrich experiences in workplaces.

To enhance the quality of learners' engagement and learning in workplaces and to assist the development of capacities required for effective work practice, there is a need to support that learning before, during, and after learners engage in practice-based experiences (Billett, 2011a). Both tertiary education students and worker-learners need to be effective learners in workplace settings, be aware of expectations, engage effectively and develop the required capacities in those settings. From a study comprising 20 work-based learning projects the following five pedagogic practices were identified as important activities prior to engaging in workplaces. Firstly, students need orientating to any requirements for effectively engaging in workplaces, and being aware of expectations, what they are to learn and the means of that learning. Making these requirements explicit can assist them establish parameters for their engagement and learning in these settings. Secondly, before engaging in workplaces students need to possess capacities to undertake activities reasonably expected of them. Therefore, establishing what they need to do and, if necessary, developing capacities to do so may be helpful before they engage in those settings. For instance, if journalism or nursing students might be expected to perform particular task, then basic skills should be developed prior to those placements. Thirdly, clarifying expectations about purposes of, support in and responsibilities of parties in workplaces is important. Students may need to be informed about what they can and cannot do including how to interact with others when demands are made of them. So, if students believe they are not competent to engage in a particular activity they should be aware of their rights and ways of declining that request and in a way which does not jeopardize their or the workplace practices. Fourthly, as students (and most other learners) will largely be independent or interdependent learners in workplaces, they need to understand their roles and responsibilities in being self-directed. This includes understanding the importance of observations, engagement and interactions as contributing to their learning. Furthermore, self-directed learning needs to be promoted as an on-going activity so an awareness of opportunities to engage and support self-directed learning is helpful. Fifthly, as some students will encounter unpleasant, confronting and unhelpful experiences they need to be prepared for such experiences for their own well-being and sense of self, and to manage these types of learning in circumstances of work. Here, close partnerships between educational institutions and workplaces may facilitate developing understandings and inter-subjectivities to realise shared outcomes. Although the references above are for students, they are equally relevant to new workers, apprentices and existing workers.

After completing their workplace experiences, it is important for students to consider and reconcile with what is intended by their educational program. So, having completed their practicum experiences it is

important to provide experiences for effectively sharing and integrating what they have experienced. This sharing and reconciliation can be achieved through meetings, forums or symposia where students can engage with teachers and peers when articulating and sharing their experiences and learning. Given students will have experienced different kinds of work activities, settings and occupational practices, being made aware of these variations may be helpful in developing robust occupational knowledge. Here, it may be important for educators to assist students make explicit links to, and reconciliations between, what is taught (learnt) in educational settings and what they experience in workplaces. Finally, it may be necessary to re-emphasise the importance of active and selective qualities of students' learning in circumstances of work. Students may need to be reminded that this approach to learning will be central to their learning across working lives. Part of this effort is to remind students to either generate or manage effectively their critical perspectives on work and learning processes. Rather than accepting what is taught in educational institutions or learnt in circumstances of work, a productive and critical stance by students as learners is potentially helpful.

Sustaining learning for employability and working life

Although workers learn all of the time through participation at work, learning through everyday practice alone may be insufficient to maintain currency of knowledge and sustain employability. Slotte, Tynjälä and Hytönen (2004) offer three explanations for this. First, this kind of learning involves efforts that are not necessarily conscious, generate tacit knowledge, and may result in learning undesirable attributes and practices. Second, rapid generation of new knowledge in a field cannot be learnt through everyday practice alone. Third, 'formal education and planned learning situations make it possible to exploit everyday learning effectively, turn tacit knowledge into explicit knowledge and integrate conceptual knowledge and practical experience, which is the foundation for the development of expertise' (Tynjala, 2008, p. 140). Consequently, a key concern is how to identify curriculum and pedagogic practices that are sustainable for workplaces to support learning for both novices and experienced workers. These activities need to be undertaken within a context of authentic work practice which seems to enrich and assist learning these capacities. Moreover, as occupations are increasingly understood to be shaped by the requirements of the particular workplace setting and the kinds of service and production goals it achieves, the securing of situational goals emerges as key and worthwhile focus for learning. This extends to understanding the particular bases for these situational requirements. Consequently, one key curriculum task is to identify the sequencing and organisation of learning experiences suited to specific occupational practices. Here, practices identified from anthropology about the curriculum, pedagogies and epistemologies of practice appear to be particularly helpful. Identifying sustainable pedagogic practices that are appropriate for: i) work intensive environments; ii) developing understanding through everyday practice; and iii) engaging in simulations, where authentic activities are unavailable or difficult to access are important. Guided learning

at work is one way of achieving these kinds of outcomes. That is, the use by a more experienced worker, of strategies that develop procedural (i.e. from demonstrating, modelling, coaching), conceptual (i.e. by questioning, explaining, analogies) and dispositional (i.e. by modelling, coaching, practice) knowledge through engagement with those they work. In addition, the scope of pedagogic activities needs to go beyond those that resemble teacherly activities. For instance, it is important to identify particular workplace activities which have rich learning potential. Such rich tasks have long been understood within healthcare where patient discussions, and in particular, handovers can provide rich learning experiences.

In summary, current conceptual and procedural understandings of learning in the workplace, informed by fields of cognitive science, and learning and development are limited because now it is realised that learning in the workplace is multimodal and complex, considering the socio-cultural nature and boundaries that influence learning in multiple ways. For that reason, it is imperative, as Gardener (2004) advises that we extend the bounds of current disciplines and reach out to different disciplines such as anthropology and neurological science to broaden our understandings about the potential of the workplace as a learning environment for novice as well as experienced workers. This will assist those responsible for organising learning in the workplace with ways to prepare and facilitate the types of learning to initiate and accommodate transformations in work practices and changing performance requirements.

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