

Chapter 2

Developing Domains of Occupational Competence: Workplaces and Learner Agency

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2.1 Introduction

Competence is usually aligned with specific domains of activities which can be demonstrated through individuals' performances (Mulder 2014). The idea that human competence is related to particular domains of activities was emphasised and also strongly supported across three decades of research within cognitive psychology to understand what comprises human expertise and expert performance in fields such as work (Ericsson 2006; Stevenson 1994). In essence, what was found was that human performance whilst having some levels of generalisability (i.e. cleverness or ability to manipulate knowledge) is associated with abilities for performing effectively within particular domains of activities (Chi et al. 1982; Ericsson and Smith 1991; Glaser 1984; Lajoie 2009). For instance, the particular domain-specific skills, heuristics, organisation of knowledge and solution strategies were identified as being essential by expert chess players (Charness 1989). However, when, experimentally, the rules of chess were changed, expert chess players performed no better than novices (Wagner and Sternberg 1986). So, although games like chess are often associated with general capacities (i.e. ability to plan, think and act logically), performance was found to be related to the specific practices of chess playing, not general cleverness (i.e. the ability to manipulate what is known).

However, an emphasis on domains of activity is not restricted to cognitive psychological accounts of expertise. The socio-culturalist (Scribner 1984) refers to work activities as being sets of cultural practices 'involving socially organised domains of knowledge and technologies, including symbol systems' (p.13). Rogoff (1990), another social-culturalist, also refers to apprenticeship learning as being associated with particular domains of knowledge. Indeed, those concerned with

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developing specific capacities also refer to particular domains, such as when considering the learning within and for particular circumstances of practice (Brown et al. 1989), the learning of problem-solving skills in mathematics (Renkle 2002; Sweller 1989) and literacy (Sticht 1987). The same goes for those concerned with promoting effective learning through cognitive apprenticeships (Collins et al. 1989; Lajoie 2009), reciprocal teaching and learning (Palinscar and Brown 1984), worked examples (Renkle 2002) and other instructional processes (Schmidt and Rikers 2007; Sutherland 2002). More specifically, those who have focused on the development of occupational capacities similarly refer to learning domain-specific knowledge (e.g. Gott 1989; Groen and Patel 1988).

These perspectives are particularly helpful when considering occupational practices and what comprises competent performance at work. Occupational practices comprise quite specific sets of activities that have developed across human history arising from human, cultural and societal need (Scribner 1985b). Moreover, these practices have been delineated on the basis of their esteem, standing and practicalities associated with their enactment (Billett 2014c). As such, they represent particular sets of understandings, procedures and dispositional qualities (i.e. values associated with their enactment). Hence, occupations are usually identified as a specific field of activity that have particular societal and personal standing (Higgins 2005; Rehm 1990). The social connotations include identifiable occupations and occupational communities. Personal connotations include individuals' vocations that are held arise through association with particular occupations (Rehm 1989), that is, the degree by which individuals come to identify with the occupation they practise (Dewey 1916). Hence, whereas occupations are generated as an institutional fact (i.e. that of society) (Searle 1995), individuals have to assent to that occupation becoming their vocation (Higgins 2005). What these two distinct connotations suggest is that occupational competence needs to be considered on both the societal or social plane, and also the personal one, all of which extends to the formation of that knowledge.

It is proposed here that domains of occupational knowledge comprise at least three kinds. Firstly, there is the canonical domain of knowledge that exists as a societally generated entity. This is the collection of concepts, procedures and dispositions that capture what societies want from that occupation and what are demanded and expected from those practising occupation. In earlier times, as noted, occupations were delineated and valued in hierarchical ways. In contemporary times, this domain of knowledge is often captured in professional standards documents and prescriptions for developing occupational capacities (e.g. curriculum documents). These prescriptions are, in turn, used as bases for assessing those who would practise or are practising that profession.

Second is the situated domain of professional knowledge that includes how performance in professional practice is manifested in particular circumstances (i.e. workplaces, communities, etc.) (Gherardi 2009; Lave and Wenger 1991). Whereas the canonical domain of occupations exists as a societal entity, it is abstracted from actual practice, as it represents societal needs and expectations and an expression of the cultural origins and practices of that occupation. Situated competence is that

which is required for the practice of that occupation in a specific work or community setting, that is, how actual performance of the occupation is manifested in a particular situation as the requirements for the effective practice are not uniform but shaped by the circumstances where they will be practised and judged. Indeed, competence as expertise is manifested and enacted and can only be assessed situationally (Billett 2001; Tigelaar and van der Vleuten 2014). It is on these situational bases that comprise domains of occupational competence that judgements are made about individuals' performance. Hence, it is proposed that there is no such thing as occupational expertise *per se*, but only when the performance in particular circumstances equates to what is taken as expertise, that is, the ability to respond to routine and nonroutine problems within the domain (Stevenson 1994). No amount of credentials and certification can compensate for the inability to perform competently in specific situations and in tasks manifested in that situation.

Third is the personal domain of occupational knowledge that individuals construct and use within and across specific instances of their professional practice as they encounter and respond to it (Billett 2009b; Greeno 1989). Ultimately, expert performance comprises a set of personal capacities and qualities individuals have developed through engagement with the domain-specific knowledge of that occupation, often in particular circumstances (Ericsson 2006). Hence, performing effectively in responding to occupational tasks they encounter and electing to engage their effort and agency in exercising that competence and maintaining it as circumstances and work requirements change are all premised on individuals' personal domains of knowledge. So, it is this personal domain of occupational knowledge that needs to be accounted for, elaborated and included in considerations for what comprises competent occupational performance and how it is developed through educational provisions and workplace experiences.

Whereas the first two mentioned domains inform goals for what needs to be learnt and how the learning might best arise for competent performance, the personal domain is the central focus of individuals' constructive efforts and those that underpin both learning and performance in educational and workplace settings. This personal domain of occupational knowledge, albeit linked to the other two levels, is the central concern of this chapter, that is to give due consideration to how individuals come to develop their expertise including how they mediate what is experienced and develop their personal domains of occupational competence through experiences in educational institutions and practice settings. So, although currently much attention is given to the canonical through efforts to identify national standards, statements of professional competence, national curriculum provisions, etc., there is also a need to bring to centre stage both the situational requirements for performance (i.e. situated domains) and also, ultimately, the fact that competence is something individuals come to learn, exercise and sustain. Hence, without a consideration of both situational (Billett 2001; Greeno 1989) and the personal dimensions of competence (Billett 2009b), efforts to promote that competence will be ill-placed and incomplete. In making this case, the chapter first elaborates these three domains of competence and processes underpinning their construction. The first two are essentially institutional facts (i.e. those arising from social institutions) (Searle 1995),

whereas the latter comprises personal facts (i.e. those arising from personal interest, capacities and processes) (Billett 2009b). So, whilst outlining the canonical and the situational, particular emphasis is given here to occupational competence being a personal domain.

Drawing upon examples of professionals at work identified in earlier studies, this chapter elaborates this case. It commences with a discussion of the three levels of domains of professional knowledge and how these are rendered distinct. Then, the consideration of the centrality of personal domains of professional competence is advanced and key concepts explained and illustrated. Then, the central role of personal domains of knowledge and how they are generated and their role on how the personal mediation of knowledge and its construction shape these domains of knowledge are advanced. The chapter concludes with some considerations for practice, that is, how such a domain of knowledge might best be supported through actions and interactions within educational and practice settings.

2.2 Domains of Occupational Competence

Following from above, this section elaborates these three domains of occupational knowledge as (i) canonical, (ii) situational and (iii) personal through a process of description, illustration and argumentation.

2.2.1 Canonical Domain of Occupational Knowledge

Occupations arise from and are transformed and their existence is dictated by the way they meet changing societal needs. As such, they are what Searle (1995) refers to as institutional facts. They exist because of and are exercised through human institutions (i.e. societies). Some are long-standing, such as those needed for the care of humans (e.g. doctors) and the provision of food (e.g. farmers), shelter (e.g. carpenters, masons and builders), human needs (e.g. hairdressers) and the need for orderly society (e.g. police, lawyers and judges). Yet, all occupations are subject to societal imperatives and their transformations, which variously see them emerge (e.g. information technologists, radiologists), become displaced (e.g. masons, fletchers, coopers) or change radically as needs and technologies transform (e.g. printers, clerical workers) (Billett 2011). So, occupations reflect societal needs and are subject to transformation as those needs change and transform. They comprise a dynamic set of activities premised upon occupational-specific concepts, procedures and values that are subject to change. Arising from society is the dimension of this occupational knowledge as canonical. That is, what comprises the occupation is societally constructed. For instance, there are societal expectations that doctors can diagnose sickness and make suggestions for remedies that are informed by current knowledge and careful diagnoses, and they are confidential and discreet about both

patients' sicknesses and treatments. Similarly, teachers are expected to be fair, consistent and discreet in working with and making judgements about students, as well as being able to plan and enact learning experiences, guide students' learning, provide support and make assessments of students' learning that are valid and reliable.

Occupations have always been societally delineated and valued in hierarchical ways. For instance, many occupations were deemed unworthy of freeborn men in Hellenic Greece (Lodge 1947) and imperial Rome. Then, some are seen as being of greater or lesser virtue (e.g. working for God or being a money lender) in the Middle Ages (Dawson 2005). In industrial and contemporary times, they have variously been classified as trades, paraprofessionals or professionals and attributed to particular class and status (Billett 2014c). Hence, occupations are delineated in socially ordered ways that are institutionally maintained. Moreover, they are embedded in society. Many individuals' surnames are associated with their occupations: Fletcher (i.e. arrow maker), Cooper (i.e. barrel maker), Smith (i.e. blacksmith), Miller (i.e. miller of grain), etc. Moreover, guilds, trade unions and professional associations are all institutions established to promote and advance the standing of particular occupations. Occupations are, therefore, richly embedded within society and carry societal expectations, address community needs and have bases for individuals to come to identify with and have expectations of them (Dawson 2005; Rehm 1990). Hence, they are a product of and exist as societal entities, albeit distributed in different ways across societies, and have distinct standing within particular societies. Thereby, canonical occupational knowledge comprises a societal account or expectation comprising particular sets of understandings, procedures and values.

In contemporary times, this canonical domain of occupational knowledge is often that which is presented in the form of professional standards and prescriptions for developing those capacities (i.e. curriculum documents) (Grealish 2015). These documents are used to evaluate the relative worth of that profession, the extent and kinds of preparation it deserves and the kinds of qualities required from those who would practise it (Billett 2011). These canonical accounts, consequently, have become artefacts used for the organisation, administration and appraisal of occupations. This includes decisions about the development of occupation-specific educational provisions, their enactment and means of evaluation and assessing student competence and for then to be licenced to practise (Mulder 2014). So, canonical occupational knowledge increasingly manifested as a set of ideals, goals and decision-making about their educational forms and outcomes and means for distributing access to them.

2.2.2 Situational Domain of Occupational Knowledge

However, the actual circumstances in which occupations are practised, requirements for enacting the occupation and how its enactment will be judged differ from situation to situation because the requirements for effective practice are shaped by

the circumstances in which they are practised (Billett 2001; Gherardi 2009). What the nurse or doctor does in a large metropolitan hospital can be quite distinct from those working in a regional hospital. Equally, what motor mechanics do in an inner-city dealership is different from their counterpart in a garage in a small town (Billett 1997). What pilots do when flying planes for military, crop-dusting, firefighting or passenger transport purposes comprise quite distinct conceptions of practice, how planes are flown and considerations associated with risk. Occupational performance is, therefore, manifested in a particular set of circumstances and demands for performance. Consequently, whilst the canonical domain of occupations exists as a societal entity, it is abstracted from the actual circumstances of practice, which can only be understood situationally. So, there will be particular arrays of concepts, procedures and values required for the occupational practice in specific work or community settings.

Situational requirements stand, therefore, as a particular manifestation of canonical occupational knowledge, but with particular kinds of emphases and requirements that cannot be understood at the societal level. That manifestation is in response to localised requirements including what constitutes effective performance and what kinds of routine and nonroutine problem-solving are the hallmarks of expertise (Chi et al. 1982; Ericsson 2006). It is at the situational level where what actually comprises occupational expertise is, therefore, manifested and will be adjudged (Billett 2001). Hence, there is no such thing as occupational expertise *per se*, but only such capacities that permit the ability to respond to domain-specific routine and nonroutine problems within such situated domains.

Ultimately, credentials and certification of the kind generated by occupational standards and national curriculum may not be adequate to capture situated performance. All this suggests that consideration of what comprises occupational competence can only be understood in terms of its enactment. Hence, occupational capacities that might be deemed effective and worthwhile in one work situation may be unhelpful and inappropriate in another. So, actions judged as being effective in one circumstance might be seen to be inept and poorly considered responses in another (Billett 2001). Consequently, beyond having and adhering to national standards and curriculum intents, there is a need to account for and address particular sets of situational requirements. Globally, the adequacy of vocational and higher education provisions is being premised on the degree by which their graduates are job ready (OECD 2010; Universities Australia 2008). If this is to occur, there is a need for greater understanding by those institutions about the diverse requirements of the workplaces in which graduates will be expected to enact their occupation and systematic efforts organised to ensure that these students are 'job ready' on graduation. But such expectations are particularly difficult to fulfil, not just because it is usually unknown in which workplaces graduates will find employment upon graduation, with their particular requirements for occupational practice (Kennedy et al. 2015). Hence, it may be necessary to provide a range of experiences exposing tertiary education students to different kinds of occupational and workplace requirements. In this way, the significant educational challenges that tertiary education

faces cannot be wholly guided by statements founded alone on canonical accounts of occupational knowledge. Instead, there needs to be a focus upon the situated domain of occupational competence. This also seems essential for learning those occupations.

2.2.3 Personal Domains of Occupational Knowledge

Ultimately, occupational competence is something learnt and subsequently enacted and demonstrated by individuals. It is the particular combination of what individuals know (i.e. understandings), can do (i.e. procedural capacities) and value (i.e. dispositions) that comprises their personal domain of occupational knowledge. That domain is a product of what individuals have constructed through experiences across their life histories (Billett 2009b; Gergen 1994) and will always be, by degree, person-dependent (Valsiner 2000). What individuals construct from what they experience will not be a mere replica of the textbook read or procedures modelled by more experienced workers, which are then faithfully appropriated by learners. Instead, these domains are the inevitable legacy of their particular experiences and processes of experiencing, including the work-related activities they engage with and the kinds of interactions they have with others (Billett 2003; Hodgkinson et al. 2004). So, ultimately, expert performance is a personal characteristic in so far as it is premised upon the development of personal domains of occupational-specific knowledge. The character of those domains shapes how individuals' competence and preferences are deployed in and extended through responding to occupational tasks they encounter and elect to engage their effort and agency in exercising that competence.

For instance, in a study of hairdressers, it was evident that apprentices had diverse experiences to become hairdressers. These differences shaped not only their views of what constituted hairdressing but also how they practised that occupation (Billett 2003). For example, one apprentice worked for a hairdresser who had difficulty in discerning colour shades (i.e. colour blindness). So, far earlier in her career than was the case for the others, this apprentice needed to develop the ability to colour hair and it became a part of her preferences and expertise and also how she saw herself as a hairdresser. To take another example, one hairdresser had had an allergic reaction to one of the chemicals used to shape client's hair. Such was his reaction that he ceased using that kind of treatment which he saw as being toxic and dangerous for clients and himself and bad for the environment. Consequently, his repertoire of hairdressing procedures and options avoided the use of perming solutions to shape hair. One apprentice worked in a hairdressing salon where style and contemporary fashion was paramount for an inner-city clientele. Hence, the focus for her practice was based around such haircuts and also developing her own clientele. Another apprentice worked in a hairdressing salon where the style of hairdressing was conservative and acceptable in a small rural township. A third apprentice

worked in a hairdressing salon in which she was the only permanent employee and a feature of this salon was dealing with clients who would return to the salon and complain about their haircuts. Hence, this novice hairdresser developed strategies to manage both the senior hairdressers and also to negotiate with clients who would habitually complain about their haircuts. The evidence from across these hairdressers' responses to a set of standard hairdressing problems was that the particular experiences they had shaped their responses to those problems and that personal preferences, competence and values were evident, albeit in relation to the situational requirements (i.e. 'what we do here is ...') of the hairdressing salon (Billett 2003).

The important point here is that the personal domains of occupational knowledge constructed by these apprentices were not uniform. They were shaped by their particular array and kinds of experiences (i.e. their ontogenetic development) and also the circumstances in which they practised hairdressing and also their preferences (Billett 2003). Yet, more than situational factors, there were particular qualities that apprentices and hairdressers brought to the task of hairdressing. Each had their own ways of identifying hairdressing goals, preferences for particular procedures and treatments and premises about how they practised hairdressing. So, there was also individual mediation of what was being encountered that led to particular kinds of learning that shaped what and how they went about practising hairdressing (Billett 2014a). Yet, these hairdressers' personal domains of occupational knowledge were not just the sum of a set of experiences; they also comprise how they had come to mediate those experiences across life histories. Should, for instance, workers, such as the hairdressers in that study, not believe that particular practice is worthwhile, good for the client, fashionable, etc., they may not seek engagement with it and include it in their repertoire of preferred procedures. So, individuals' personal domains of occupational knowledge are not just versions of canonical or situational occupational knowledge; it is also underpinned by personal factors, including histories (Billett 2009b). This is not to suggest that these individuals' personal domains of knowledge are highly idiosyncratic and are incomprehensible to others. However, it would be wrong to believe that the process of individuals at auction of occupational knowledge is merely a process of transmission leading to a common set of subjectivities. Instead, it is something constructed by individuals based iteratively on what they know, can do and value and how this is continually reshaped by their particular experiences.

So, this personal dimension of occupational domain-specific knowledge needs to be included in considerations of competent occupational performance and how it might be developed through educational provisions and workplace experiences. It is, therefore, necessary to account for dimensions or domains of knowledge associated with the following:

Canonical occupational knowledge

Situational requirements for the effective performance of that occupation

Individual's personal domain of occupational knowledge

The first two are institutional facts (Searle 1995) and can be seen as being the objects for educational and other efforts associated with becoming occupationally competent. As noted, much of current considerations of vocational and higher education curriculum are directed towards national provisions, standards and documents that often reflect occupational canonical knowledge (Billett 2011). However, these considerations tend to exclude or ignore the variations that comprise the situational requirements for occupational performance. Consequently, the consideration of situational factors is necessary because these are the circumstances in which individuals (i) need to apply their knowledge in undertaking work tasks, (ii) are judged as being competent or not, (iii) move smoothly into upon graduation from educational programmes and (iv) then come to learn more about and develop further their occupational competence across lengthening working lives (Billett 2001). Then, there is the salience of individuals' domains of occupational competence that brings together these elements in person-dependent ways as just discussed. Hence, considerations of securing and sustaining occupational competence need to account for how these arise through individuals' activities and interactions. This focus then becomes the key emphasis of the remainder of this chapter.

2.3 Constituting and Securing Personal Domains of Occupational Competence

Individuals' construction of personal domains of occupational knowledge is central to what constitutes competent performance and how that can be adapted to changing circumstances and sustained across working lives (Gergen 1994). All of this emphasises learning and development processes centred on individuals, with the goals for these processes being shaped by the canonical and situational requirements for occupational performance. In the following sections, the generation of personal domains of knowledge that arises is discussed first. Emphasised here is the personal mediation of knowledge, which is often underplayed or ignored in contemporary accounts of learning (Billett 2014a). Then, the role played by individuals' mimetic learning processes is emphasised to understand how the domain of individuals' occupational knowledge is central to their learning and development (Billett 2014b). Underpinning these activities are individuals' personal epistemologies. These include how they construe, construct and direct their energy and intentionality in processes of learning and promoting ongoing development (Malle et al. 2001). This account emphasises the person as a constructor of what is experienced and meaning maker from that process of experiencing. So, whilst in recent times much has been made of the social contributions to knowledge and knowing, including its mediation and the importance of social suggestion, norms and practices, the emphasis here is on how individuals come to interact with these suggestions and construct what they know, can do and value in person-dependent ways.

2.3.1 The Generation of Personal Domains of Knowledge

There are two broad perspectives on how human learning and development proceeds: the nativist and the empiricist (Gardner 2004). The nativist view is founded on precepts of humans being born with a range of capacities that are the foundations for their ongoing learning and development (Barsalou 2005; Chomsky 1966; Silvén 2002). The empiricist account is that individuals learn everything through processes of experiencing (Bruner 2001; Vosniadou et al. 2002). Central to empiricist and most constructivist accounts is that human's learning is an active process of experiencing and responding to what is experienced with legacies arising from what is referred to as learning. So, rather than simply being a process of accepting what is experienced, the active process of experiencing includes how the individual construes (i.e. make sense of) and constructs (i.e. appropriates) what has been experienced. That is, the process of construction is bidirectional (Lawrence and Valsiner 1993; Rogoff 1995; Valsiner 1994) or relationally interdependent (Billett 2006; Gergen 1994), rather than being a one-way transmission of knowledge from sources outside of individuals. Such claims may seem obvious and orthodox, but much of contemporary theorising gives particular emphasis to social contributions to knowledge and sometimes positions these as being non-problematic. Taking up that knowledge by individuals is often seen as being a process akin to the unproblematic transmission of knowledge, rather than negotiated (Lawrence and Valsiner 1993). In such a scenario, the domain of occupational knowledge that individuals develop and deploy would be a mere replica of what is suggested to them through observation and the social norms forms and practices with which they engage. It is as if the knowledge is merely transmitted and accepted by individuals. However, contradictorily, the evidence suggests that individuals mediate what they experienced by what individuals already know, can do and value (Billett 2003, 2009a). The nativist perspective also provides a basis to consider domains as it is claimed that humans are born with categorical orderings and structures for developing language and numeracy. In these ways, albeit in a more general sense, domains play out in this developmental perspective, as a means for mediating what is subsequently experienced and from which individuals learn.

2.3.2 Personal Mediation of Meaning: Learning and Development

Individuals' mediation of knowledge – that is how it is experienced and negotiated with – is central to their learning and development (Billett 2014a). Individuals' learning and development are separate, yet interdependent processes. Learning is something arising in the immediacy of the experience or one that is being recalled and considered. It occurs continuously as micro-genesis – the moment-by-moment process of engaging with (Rogoff 1990; Scribner 1985b) and making sense of what

is experienced (Valsiner 2000). That is, – experiencing – how individuals construe and construct what from what they experience. Development is the accumulation of those legacies that have arisen incrementally across individuals' life histories (i.e. ontogenetically) (Scribner 1985b) through micro-genesis (Rogoff 1990). These two processes are, however, separate and distinct because ontogenetic development, in turn, shapes that moment-by-moment learning. When we experience something, how we engage with what we are experiencing and change as a result of what is experienced (i.e. our construal and construction) are premised upon what we have experienced previously (i.e. pre-mediately) and come to construct what we know, do and value from that and what we have known from before (Valsiner and van der Veer 2000). So, in this way, learning is the immediate response to what is experienced – experiencing, whereas development contributes to and is reshaped by the responses to that immediate experience.

The ongoing development across life is referred to as ontogenetic development or ontogeny. It is individuals' ontogenetic development (i.e. that arising through particular personal histories) (Scribner 1985b) that mediates what they experience, construe and construct. For instance, the degree by which each experience is novel or familiar to individuals is shaped by their ontogenies. The 'same' experience will be construed and constructed in person-particular ways by individuals depending upon what they know, can do and value. In this way, the mediation of what is experienced is strongly aligned to micro-genetic development, whereas ontogeny shapes that actual mimetic process (Billett 2003).

So, whilst much of the knowledge individuals need to learn for practising their selected occupation arises through norms, practices and forms as manifested in history and culture and shaped by situational factors, individuals' personal domains of knowledge are premised upon the ontogenetic development. Consequently, although this knowledge needs to be accessed by individuals through engagement with the social world beyond them, it is constructed inter-psychologically (i.e. between individuals and the social and physical world), and mediation plays a key role in that construction.

Certainly, how individuals come to know, use and extend their occupational knowledge is subject, in part, to the suggestion of the activities and interactions in which they engage in educational settings and workplaces. These suggestions include the support of social partners (e.g. teachers, other students, workers, workplace experts, supervisors) and extend to access to norms, practices and artefacts that are central to the performance of occupational practice and how it is enacted in particular instances of practice (e.g. workplace). So these suggestions comprise opportunities to experience, mediate and construct knowledge from what is afforded inter-psychologically. Indeed, the suggestions of the social world are currently popular, privileged and, potentially, overly emphasised within contemporary accounts of learning, such as communities of practice (Lave and Wenger 1991), activity systems (Engestrom 1999), practice of communities (Gherardi 2009) and socio-material perspectives (Barad 2003). Within Vygotskian-inspired social constructivism, for instance, the term mediation is used to describe how societally generated suggestions and forms of support (i.e. social norms, forms and practices)

comprise the mediums (i.e. meditational means) through which socially generated knowledge is rendered accessible to and taken up or appropriated by individuals (Wertsch 1993). Yet, despite the essential qualities and salience of these social contributions, including mediums through which occupational knowledge is suggested (i.e. norms, forms and practices), they tend to be overtly privileged in two ways. These are blind to the importance of natural or brute factors which seem not to be accommodated within social theoretical accounts, and similarly, the mediation of knowledge is inevitably shaped by person-dependent factors.

Brute factors also influence how individuals come to construe and construct their domains of knowledge. These exist both within and beyond the person, just like societal ones. The human sensory, neural and cognitive systems mediate what we experience (Barsalou 2005; Damasio 2010; Iacoboni 2005; Iacoboni et al. 1999), and these likely change over time for humans through the inevitable brute fact of ageing. A way of working which might seem a possibility for a younger worker might well be avoided by somebody older or more experienced or undertaken in a way which doesn't require as much direct physical effort. As was the case with the hairdresser mentioned above, a physical reaction to a perming solution led to strong preferences for how he would generate goals for haircuts and go about hairdressing tasks. In this way, the physical world and how it projects its suggestions influence what individuals know, can do and value. In addition, and as proposed here, the mediation of knowledge includes how mediating factors (i.e. both brute and social) are construed, engaged with and acted upon by individuals that include their preferences, as well as sensory and cognitive capacities. Hence, individuals' domains of occupational knowledge are shaped by and enacted through both intra-mentally (i.e. within the person) and inter-mentally (i.e. between external suggestions and individuals), as Vygotsky is held to have favoured (Wertsch and Tulviste 1992), or as is referred to here, respectively, as intra-psychological and inter-psychological contributions and processes.

In all, the mediation of what is experienced is central to the generation and utilisation of personal domains of knowledge and needs to be understood through a consideration of both (i) mediating factors (i.e. brute and social) and (ii) the personal process of mediation undertaken by those who think, act and learn. These mediating factors beyond the person comprise what Searle (1995) refers to as institutional and brute facts. These facts include the contributions of history, culture, society and social institutions, such as schools and workplaces, including how they project their social suggestion to individuals through social forms, norms, practices and artefacts. Importantly, these accounts emphasise that individuals' cognition, learning and development are not restricted to what can be achieved by individuals' memory and processing capacity alone. Indeed, more than acting as an external memory and providing clues and cues for how to proceed (Lave et al. 1984), these artefacts, symbols and forms (e.g. language) constitute mediums through which human cognition is both enabled and augmented (Scribner 1985a). So these institutional factors are essential for understanding individuals' learning at and through work. However, although these suggestions are held by social constructivists as the central medium through which the social world shapes and directs human learning

and development, there is interdependence between those suggestions and how individuals mediate them. These mediational processes are held to develop individuals' capacities in ways that set humans apart as a species. Such propositions are now broadly accepted as premises for explicating human cognition and development, and deservedly so.

2.3.3 Role of Mimetic Learning

It is useful to consider mimetic learning when elaborating the personal processes of the mediation of knowledge and its relationship to the learning and development. The process of mimesis comprises the process of observation, imitation and rehearsal (Downey 2010) and constitutes innate and foundational bases for how humans construe and construct what they experience. This includes how individuals act, particularly when seeking to achieve specific goals (Meltzoff and Decety 2003) such as engaging in work-related activities and deciding the ways in which they might most effectively be enacted. Mimesis, therefore, comprises much of the everyday moment-by-moment learning (i.e. micro-genetic) processes enacted as individuals engage in their activities in work settings and elsewhere. Yet, in contemporary usage, the word imitation is often seen as being mere copying or mimicking. However, there are a number of levels and kinds of imitation (Byrne and Russon 1998; Iacoboni 2005) and that even the most seemingly lower level of innovative action actually requires higher cognitive functioning. Byrne and Russon (1998) claim that fundamentally there are two different kinds of imitation. These are, firstly, copying the organisational structure of behaviour and, secondly, copying the surface form of behaviour. With the former, the organism (i.e. individual) needs to develop hierarchical structures of actions, whereas the latter is more aligned with what is referred to as mimicry.

Whilst useful for describing the process of observation, imitation and practice, the term mimesis is, however, inadequate to comprehensively account for, describe and elaborate the development of personal domain-specific knowledge of the kind required for occupations. Regardless of whether a person is seeking to reproduce an action (i.e. the second kind of activity) or seeking to understand the underlying bases of what has been observed, higher orders of thinking are necessitated to act upon what is being experienced and remake it (Brass and Heyes 2005). These reproductions go beyond the immediate experience and mere reaction to what has been experienced. Instead, it is an active process of experiencing that draws upon a range of contributions from within and beyond the person and also one which can accommodate not only observational learning and modelling (Wolcott 1982) but the linking of observation with other sensory, neural or mental processes. So, although imagery and visual observation are key elements of mimesis, the sensory processes through which it is enacted are not limited to vision (Iacoboni 2005). Haptic qualities (i.e. those associated with touch or feel), for instance, are central to many of the procedural aspects of work performance, as are sounds (i.e. aural), not to mention smell.

Consequently, if the mediation of knowledge is restricted to observation and imitation and rehearsal, it fails to include individuals' intra-psychological processes (i.e. the internal processes of the mind and body, much of which are unobservable) (Wertsch and Tulviste 1992). Iacoboni (2005) and Iacoboni et al. (1999) go so far to suggest that the processes of enacting imitation extend beyond sensory systems and pictorial or kinaesthetic representations right to the level of neural processes. Gattis et al. (1998) also emphasise the need to explain the nature of imitative action, including the difficulty of copying an act performed from another individual's perspective and then building the complex behaviours that need to be performed for its reproduction. Consequently, the inter-psychological processes (i.e. between the person and the world beyond them) also need to be understood and accommodated for in accounts of learning. The term *mimetic learning* is used to capture these broad sets of contributions to how individuals' processes of thinking and acting are enacted in occupational task and come to be understood (Billett 2014b). The important point here is that these very processes of engaging with the world from which we learn but also in which we act are founded on such contributions and are what constitutes individuals' personal domains of knowledge. That is, the organisation, utilisation and exercising of those domains as well as the development over time is shaped by this broad array of factors and not just by declarative and propositional forms of knowledge (i.e. those that can be stated).

These processes of experiencing are inevitably shaped by individuals' personal domains of knowledge.

2.4 Conclusions

There are implications for the development of competence, albeit in education institutions or workplaces, about the kinds of experiences individuals have and how they are ordered, organised and enacted, arising from what has been discussed above. There are kinds of pedagogic practices that can be used to assist individuals in identifying differences between the canonical and situational and those that can potentially promote individuals' domain-specific knowledge in ways that are not limited to the circumstances in which they have experienced it. Consequently, in this concluding section, some considerations for practice that supports this learning are advanced. To advance these ideas, they are categorised in those considerations associated with curriculum and those with pedagogic practices.

Curriculum here is used in its original meaning of the course of pathways of experiences that learners progress along. Consequently, the focus is on the provisions and kind of experiences that are provided. What has been suggested above is that it is essential that the development of occupational competence require a consideration for developing both canonical and situated conceptions of occupational performance. So, curriculum considerations are necessarily associated with the provision of experiences that provide access to and engagement with what can be taken as the canonical knowledge of the particular occupation (i.e. domain of

occupational knowledge). This provision is usually realised through a combination of experiences in educational settings and workplaces which address the key kinds of learning that are required for anybody practising the particular occupation. Considerable attention is given to meeting occupational requirements in contemporary tertiary education, and these are often quite tightly regulated, that is, education institutions have to demonstrate the ways in which they address the competences required for the occupation. There are also external examinations organised by professional bodies that aim to ensure that anybody who is recognised as a practitioner in a particular occupational field can meet the requirements of that occupation. So, novice teachers are sometimes subjected to inspections of their teaching, pilots are tested in simulators and monitored by test captains in flight, and doctors and lawyers are subject to examinations by professional bodies. Hence, there are often well-established processes to identify occupational knowledge, find a range of experiences that can generate that knowledge in learners and then assess the degree by which they have learnt that knowledge before they are entitled to practice.

However, much less consideration is given to particular situational requirements of occupations and how students can develop competence in understanding something of the variations of these practices. What seems to be required is, firstly, that those preparing for an occupation are given access to experiences in different circumstances where that occupation is practised. This can assist in avoiding problems arising from novice practitioners only having experienced the occupation in one particular kind of setting. For instance, when trainee nurses were prepared in hospitals, they rotated through all the kinds of hospital wards. In this way, they came to experience something of the diversity of nursing work in general, medical, maternity, mental health and other kinds of wards such as intensive care, as well as being rotated through casualty and outpatient facilities. Through these kinds of experiences, they would come to know about and practise nursing in different ways across these wards. That is, they might come to understand how canonical knowledge of nursing is enacted across these wards. The outcome of these experiences is that nurses would come to realise there are situational variations of canonical nursing capacities, that is, what constitutes being a competent nurse differs across wards. However, rarely is it reported that explicit strategies were used to assist the trainee nurses in recognising these manifestations and also the canonical principles of nursing. All this suggests that a consideration of curriculum – the ordering, organisation and enactment of experiences – alone is insufficient. Instead, there is also a need for pedagogic practices to assist learners in developing understandings about these distinct manifestations of occupational competence.

Pedagogic practices comprise interventions by teachers and more informed others to assist individuals' learning. These practices can differ from classroom-type experiences that seek to make knowledge which would not otherwise be learnt, in practice settings, for instance, and seek to augment and extend what learners have previously experienced. In the nurses rotations described above, a need for interventions was recognised to assist the nurses to appreciate the particular kinds of goals, procedures and values associated with the ways that nursing work is conducted in each of those settings. Learners are not always best placed to identify nuances,

differences, similarities and exceptions, because they are actively engaged in constructing meaning, developing procedures and appropriating values associated with each of these instances of nursing practice. Hence, it is likely that some kinds of pedagogic interventions are required to assist these novices to appreciate the particular form of nursing required in each setting, yet also to identify the canonical concepts, procedures and values that are common and commonly practised across each of these settings. Most probably, these kinds of interventions will be most effective when they occur after the novices have had the experiences. Most helpfully and most practically is when learners are able to engage in discussions about these experiences and are being guided by a more informed partner. Students will bring and contribute their particular kinds of experiences to these processes, thereby opening up the range of experiences that are available to the learners. Yet, it is likely that such processes will need to be guided by a more experienced other who is able to assist learners in identifying particular qualities of the different kinds of instances that individuals or the cohort have experienced and thereby assist them in understanding something of the diversity of what comprises occupational competence in different kinds of circumstances where they are practised.

Also, part of those pedagogic practices is to assist learners engage effortfully in constructing meaning both within educational programmes and practice settings. For instance, it was found that there were particular roles to be undertaken by teachers and more experienced others before, during and after students have had their practicum experiences in a large-scale national teaching project (Billett 2011). Consequently, there are particular kinds of pedagogic practices that might need to occur before students or novices engaged in particular settings prepare to be active learners, because it is through those processes that they come to develop further personal domains of occupational knowledge and competence. Then, processes and interventions were suggested to enrich the kind of experiences that students have in practice settings to generate rich learning outcomes from those experiences and engage them in personal and collaborative considerations about what constitutes competence in each of the settings and how that relates to occupational performance more broadly (i.e. the situational and also the canonical). Then, at the end of those experiences, most important are the interventions associated with students coming to share and reconcile their experiences with others and in relation to what they are seeking to secure through their occupational preparation in terms of learning the canonical knowledge but also developing adaptable occupational competence. That adaptable competence is central not only to securing a smooth transition to practice on graduation and when first employed but also generating the kinds of understandings, ways of doing things and valuing which can be applied across a range of circumstances where the occupation is practised.

In conclusion, it is held that not only do we need to consider competence as constituting specific domains that comprise canonical occupational knowledge and situational requirements, but most importantly how individuals come to construct their own domain-specific occupational conceptions, procedures and values. All of this suggests that more than attempting to secure national statements and measures of occupational competence in students, novices and apprentices, there is also the

need to develop the learners' personal domains of occupational knowledge in ways that permit them to be aware of the variations of occupational practice they will encounter and have means of responding to the requirements of those situations.

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