Expertise as a 'capacity for action': reframing vocational knowledge from the perspective of work

Abstract

This paper considers how expertise is constituted and afforded recognition and status through work. It uses Barbour et. al's (2016) concept of expertise as a 'capacity for action' to frame the discussion and explores the implications of this framing through reference to: a) Knorr Cetina's (2010) production-consumption concept of 'information knowledge'; b) Boltanski and Thévenot's (2006) taxonomy of 'economies of worth'; and c) Haskel and Westlake's (2018) concept of 'intangible assets'. It argues that conceiving expertise as a 'capacity for action' offers the means to explore how work practices are shaped and disrupted by intangibility. Although the intangible dimension of work has always been central to the development, attribution and valuing of expertise, the rapid advances in digital technologies and artificial intelligence are accelerating its significance. Conceiving expertise as a 'capacity for action' also offers the means to transcend the structural rigidities of educational levels, occupational hierarchies and prescribed competencies that can encase the concept of vocational knowledge. This reframing of vocational knowledge has the potential to reinvigorate the co-production of initial and continuing vocational education and training (VET) through a more proactive relationship between the actors involved in the development and application of expertise.

Keywords

Expertise, communication, production and consumption, work practice and organization, intangible assets, vocational knowledge and knowing

Introduction

As this article was being prepared, the global Covid-19 pandemic surfaced creating considerable social and economic upheaval, two specific aspects of which are relevant to our argument. The first is the extent to which the deployment of digital technologies and artificial intelligence (AI) will accelerate as private and public

organisations seek to recalibrate their business models including a shift to greater levels of homeworking (Autor *et al*. 2020; Felstead and Reuschke (2020). The second is the way in which the pandemic has thrown into stark relief the diversity and inter-connection of the many different forms of work and types of expertise required to enable society to function in normal times let alone abnormal ones. From a material perspective, this has been illustrated by the international struggle to source and supply health and social care workers with protective equipment and develop a vaccine to control the spread of the virus. From a social perspective, media stories highlighting the combinatorial effort required to respond to the pandemic have made the contingent and relational nature of expertise more visible (Authors 2013). In the early stages of the United Kingdom's (UK) 'lockdown', the government and media's concept of the 'key worker' gradually broadened from doctors and nurses to include hospital cleaners, supermarket staff, teachers, transport and delivery workers, and production workers (particularly those making protective equipment).

Whilst these momentary reappraisals may not result in higher wages or regrading, they disrupt the derogatory and misleading way in which terms such as 'low-skilled' and 'unskilled' are used to describe both people and their work. In doing so, they draw attention to the elasticity of the concept of expertise and its presence in all occupations and roles, rather than an exclusive set. The aforementioned terms, used widely in both research and policy, denote the equating of 'skill' and, by extension, vocational knowledge with levels of educational attainment and sometimes with pay scales. A recent OECD (2020) report, for example, on the impact of Covid-19 on employment, refers to 'middle-skilled' workers based on their position in international comparisons of occupational wage distribution. This human capital approach remains resilient despite research evidence exposing the exclusionary processes and technologies that shape the way 'skill' is socially constructed including, credentialism, occupational and labour market gatekeeping, the gendered attribution of skills, and the impact of economic and labour market shifts on the value of skills (see, inter alia, Warhurst et.al. 2017; Attewell 1990). A human capital approach also treats workplaces as homogenous contexts equally capable of developing and utilising expertise rather than contexts of highly variable capacity (see inter alia, Fuller at.al. 2007).

The paper argues that conceiving expertise as a 'capacity for action' (Barbour et. al. 2016) offers the potential to transcend the structural rigidities of educational levels, occupational hierarchies and prescribed competencies that can encase the concept of vocational knowledge. This reframing of vocational knowledge has the potential to reinvigorate the co-production of initial and continuing vocational education and training (VET) through a clearer delineation of their respective contributions to the development of expertise. From this perspective, VET benefits from staying as close as possible to the sites where sector-specific and company-differentiated expertise emerges and is afforded value. This does not mean surrendering to an employer or a narrow policy-led agenda or to an uncritical acceptance of an increasingly precariat labour market at the mercy of platform capitalism. Our argument is that an expertise-led approach would help reposition both initial and continuing VET's contribution to society's response to the challenges posed by the rapid advances in digital technologies and 'AI augmented' capabilities on all forms of work.

Technological change has, of course, always contributed to the way expertise is constituted as well as afforded recognition and status (Edgerton 2008). The pace of the digital revolution in (re)shaping and disrupting work practices, work organization, and occupational boundaries is, however, proving to be particularly acute. It has thrown into sharp relief the role that 'intangible assets' (e.g. ideas, social relations, learning, brands, networks) play in the production of goods and services (Haskel and Westlake 2018). This increased visibility of the intangible dimension of expertise provides an additional perspective from which to reframe the concept of vocational knowledge.

Conceptual resources

The main stimulus for the paper comes from the field of Communication Studies. We draw on Barbour et. al.'s (2016) concept of expertise as 'a capacity for action'. This encompasses the ability to determine how to think and act according to contexts and constituencies of interests. Using the term 'action' draws attention to the ontological dimension of expertise and offers a fresh way to engage with the situated and relational nature of the development, deployment and transformation of expertise in workplaces. This allows us to bridge the binaries of 'explicit'/ 'specialist', 'tacit' or 'everyday' knowledge, by considering the interplay between different forms of

knowledge and their ensuing outcomes. It also allows us to overcome the assumption that the work context acts largely as a cognitive and practical test bed for existing disciplinary and vocational knowledge acquired through individualized study of a vocational curriculum. In their study of hospitality and culinary students, Heusdens et.al. (2019, 846) raised this issue by revealing the complex ways in which knowledge and action were interlinked and involved a 'movement towards action' as they shifted between the conceptual and the concrete.

Rather than a test bed, work contexts disrupt an individual's sense of the extent and worth of their emerging expertise through a range of socio-material and relational encounters, some of which, such as with customers and clients, may be encountered both externally and internally to the main work site. In this regard, we turned to the work of sociologist, Knorr Cetina, and her studies of the intersection of science, technology and the mobilisation of information in work contexts into the modes of knowledge production and consumption. Knorr Cetina's (2010) production and consumption model of knowledge provides us with the means to further explore how expertise develops and is reshaped as it is deployed.

We deepen our discussion of the consumption conception of knowledge production and consumption by firstly, drawing on Boltanksi and Thévenot's (2006) taxonomy of 'economies of worth'. Their taxonomy allows us to consider how our conception and deployment of expertise is influenced by, on the one hand, the reconciliation of competing conceptions of value (e.g. aesthetic, technical, financial, sustainability) in occupational settings and, on the other hand, recognition and status of occupations within society beyond the traditional benchmarks awarded through educational credentials. We set our discussion within the context of a world of work increasingly affected by digital technologies. Yet, we are conscious that the danger of overly focusing on this 'digital turn' (and its associated focus on 'innovation') downplays and obscures the continuities in the relationship between technology and expertise. To overcome this potential pitfall, we draw on insights from studies in the history of technology; specifically, Edgerton's (2008, xi) 'technology-in-use' perspective, which conceives technological innovation as an historical layering process. Each technological step forward builds on existing expertise and becomes incorporated

with as well as helping to transform work practices. Hence, long-standing and newer forms of technology co-exist with and shape and contribute to work practice.

In a similar vein, the economists, Haskel and Westlake (2018, 22) argue that workplaces have always invested in intangible assets: 'Some of these investments are new technological ideas…Some take the form of lasting or proprietary relationships, such as a taxi app's network of drivers. Some are codified information, like a customer loyalty card database' (see also Unger 2019). Haskel and Westlake's (2018) ideas add a further dimension to our argument about expertise as a capacity to act involving decisions about which sources of information-knowledge to use, how to resolve competing conceptions of value, and how to use intangible assets to produce, improve, advertise and sustain the 'value' of goods and services in marketplaces. Our argument is that these forces have always characterized and shaped work across diverse occupational fields, including for example, bespoke furniture makers, hairdressers and chefs as much as architects, software engineers and accountants. Although they are now aided by digital technologies, they inhabit and co-create what the art historian, Caskey (2019, 293) refers to as 'webs of interaction', which also existed to produce medieval art such as illuminated manuscripts. These webs required 'negotiations of agency' among the many different actors (e.g. patrons, artists, theological advisers, parchment makers, bookbinders and so on) involved in the production and consumption of artefacts (Caskey 2019, 291).

From the field of cultural sociology, we draw on Boltanksi and Thévenot's (2006) taxonomy of 'economies of worth' to consider how our conception and deployment of expertise is influenced by, on the one hand, the reconciliation of competing conceptions of value (e.g. aesthetic, technical, financial, sustainability) in occupational settings and, on the other hand, recognition and status of occupations within society beyond the traditional benchmarks awarded through educational credentials.

In section five, we illustrate our elaboration of expertise as a 'capacity for action' by revisiting a comparative study of apprenticeship training conducted by (Author X) along with other colleagues.

Conceptualising expertise and vocational knowledge

The concept of expertise is often presented in academic disciplines as a one-dimensional individual accomplishment along a stage-based and linear trajectory of development, often captured by the gendered phrase 'mastery'. This can be seen in the literature on the philosophy of expertise (Selinger and Crease 2006) and the psychology of expertise (Anders Ericsson et.al. 2006). From the field of science studies, Collins and Evans (2007) proposed a three-dimensional model of expertise comprising: a) original specialization; b) meta-specialization (connoisseurship); and c) meta-criteria (track record). Their focus, however, remains on individuals and their stages of development rather than the interrelationship between these dimensions.

In advancing this argument, we are not seeking to downplay the centrality of individuals to the way expertise is developed and utilized. As Billett (2019, 42) has argued individuals are 'the epitome of the social, but also individuals' learning and development are sociogenetic (i.e., what arises from the social world)'. Being part of the social world means that most individuals form, join and interact with what Hager and Beckett (2019) refer to as 'co-present' groups in social and work contexts on a daily basis, and it is through this interaction that expertise is formed, performed and changed. Our concern is to explore how expertise forms and changes, and how it is communicated and valued within the social context of work practice.

Following Lave and Wenger's (1991) breakthrough research on the relational nature of learning in the workplace, Hutchins (1995) showed how occupational expertise has always been distributed and inter-connected between mind, technology and the practices which unify them. Engeström (2008) and Edwards (2010) used, respectively, the concepts of 'knotworking' and 'relational agency' to reveal the simultaneous, multidirectional, and reciprocal nature of expertise. Fuller and Unwin (2004) have questioned the linear trajectory from novice to expert, which still underpins many apprenticeship systems and other forms of work-based learning, including in higher education. They found evidence of apprentices teaching and guiding older colleagues in a range of work-related activities. Similarly, Broad's

(2015) study of hairdressing teachers in English further education colleges showed that one way they could update their own expertise was by attending national student skills' competitions which feature the latest techniques and products. This connects to research by Author Y (2019) and Beckett and Hager (2002) on the highly contextualised nature of developing and applying judgement. Scholars inspired by actor network theory (see inter alia, Fenwick and Nerland 2014; Orlikowski 2007) have brought a more explicit socio-material focus to bear on the study of the contingent and multi-faceted nature of expertise.

The socio-material dimension of expertise is under-represented in accounts of how VET teachers and trainers develop expertise (see Broad and Lahiff, 2019 for a rare example). This may reflect a dominant focus in the literature on, what we referred to above, as an overly educational emphasis on the role of theoretical knowledge in the content and design of VET programmes and its centrality to the development of expertise. Drawing on, what he refers to as, the 'social realist' tradition, Young (2008, 148-9) uses Bernstein's (2000) distinction between 'vertical' (i.e. theoretical) and 'horizontal' (i.e. everyday) discourses to make the case for the inclusion of the former in any concept of vocational knowledge. He argues that vertical discourses embody principles for Bernstein's conception of 'recontextualisation' in curricula and pedagogy and so enable concepts included in vocational curricula to be made explicit to learners.

From a philosophical tradition, Winch (2010, 183) offers an account of the way in which theoretical knowledge is 'deployed in practice' in the German Dual System. The pedagogic challenge is to ensure that the 'required level of expertise needed in the body of organized knowledge is best acquired in a systematic manner' to ensure there are no 'critical gaps in the learner's knowledge'. Learners are then offered a 'simulatory environment for the safe practice of the knowledge-based skills' necessary for vocational performance (Winch, 2010, 183). Working with the grain of these perspectives, but also taking account of research in the field of workplace learning, Hordern (2018, 3) argues that a 'more acute differentiation of vocational knowledge' provides a means to differentiate those forms of vocational practice that are, 'purposive, the extent by which they are underpinned by a form of specialized knowledge, and by whether they provide the affordances and environmental

conditions … that enable the acknowledgment and recognition of those (and other) forms of knowledge in practice'.

The differentiation of forms of knowledge and their relationship with different forms of and contexts for practice is still hampered by the continuing influence of the image of the lone craftsperson (Sennett, 2008). Craft is seen as the paradigmatic form of occupational activity characterized by the unification of conception and execution, a distinction that has been axiomatically accepted since Braverman (1974) cited it as the defining hallmark of expert performance and worker control over that performance. Yet, as Marchand (2016, 8) argues, craft is a 'polysemous, ambiguous and often-contested term and many sites of craft work involve the co-mingling of different forms of expertise. The critically important role of the changing nature of division of labour in creating conditions for the development of expertise in modern economies has, however, been noted and discussed very insightfully by Redding (2012). He observes: 'As the division of labour increases, the output of each person's work will in general be likely to be directed towards the production of the execution conditions of someone *else's* activity' (Redding 2012, 61).

These cumulative changes in the nature of the division of labour have consequences for the concept of an occupation and recognition of belonging to an occupation. Forms of work may retain their occupational specificity, but they are nonetheless increasingly interconnected and contribute, in different ways, to the production of goods and services, hence the basis of expertise is increasingly to work with others. This poses challenges for McIntyre's (1981) distinction between 'internal goods' of practice (i.e. those obtained virtuously from within a practice) and 'external goods' of practice (i.e. those acquired from other sources, such as reputation). Although this idea has been cited in some accounts of vocational knowledge (see inter alia, Addis and Winch 2016), we argue that it takes insufficient account of changes in the division of labour that we discussed above. This requires us to consider the forms of expertise required to support collective work practice and, by extension, the communicative dimension of work. We found that debates about expertise in the field of Communication Studies conceive work as playing a constitutive role in the development and deployment of expert performance, rather than as a backdrop for the application of knowledge acquired elsewhere (Treem and Leonardi, 2016).

Specifically, we draw here on Barbour et.al's (2016) concept of expertise as a 'capacity for action' to engage with collective and communicative dimensions of expertise.

Expertise as a 'capacity for action'

Writing from within the field of Communication Studies, Kuhn and Rennstam (2016, 25) acknowledge that expertise has always fascinated researchers 'for its slipperiness.' They point out that expertise has been conceived in two ways: a) 'autonomous' in that the expert 'has acquired relevant training and accumulated the necessary experience within a field to perform some task at a level superior to a novice'; and b) 'attributed', meaning that the label of expert is 'affixed to an actor only by relevant others in (or with reference to) the conduct of practice' (Kuhn and Rennstam 2016, 25). If expertise is conceived as 'attributed' then this allows for a different analytical approach because it switches attention away from expertise being regarded solely from the perspective of something that resides in an individual's head to a negotiated and contingent phenomenon whose meaning and status is constantly in flux. This requires individuals to communicate their expertise through their practice in order to be acknowledged as experts. They continue:

> Expertise names the practice of directing skill toward particular problems encountered in practice; those problems emerge from, are recognized in, and are justified through communication. Expertise…is a claim to knowledgeability that appeals to an audience engaged in a practice. Claims to authority can be based upon expertise or position and these resources are often in tension in organizing (Kuhn and Rennstam 2016, 27).

Thus, expertise and authority are not fixed notions as they are subject to social, cultural, economic, and political influences, hence, '… who is to be considered an expert and what sorts of knowledge are valued as the basis of expertise depend upon the practice under consideration.' (Kuhn and Rennstam 2016, 27).

Following Hacking (2002, 3), the idea of expertise communicating itself through accomplishment rests on the concept of *historical ontology*, in other words, the ways

in which we constitute ourselves as 'objects of knowledge'. To capture the ontological – in their terms the emergent and situational – constitution of expertise, Barbour et. al. (2016, 45-6) formulate a typology of expertise underpinned by the following assumptions. The first is that expertise is 'relational' in the sense that the knowledge and experience which denote someone as an expert have to be affirmed by the parties with whom they are working. This assumption introduces the negotiated and contingent nature of expertise. It emerges through interaction with others in situations where issues may have to be classified and framed and interactions about those issues brought to a close in routine or novel ways. The second is that expertise is associated with a particular occupational 'practice', its normative performative conventions and constitutive processes of identity formation and negotiation. The third is that expertise is macromorphic:

> Expertise and communication are related in that experts employ and develop different forms of what they know in and through communication. Expertise is organizational in the sense that it is embedded in networks of relationships emergent in organizing …and extra-organizational in that expertise authority depends not just on the understandings of the local others' judgments about the expert (Barbour et. al. 2016, 57).

They account for the variability of knowing and practice in relation to its relational, practical and 'macromorphic' underpinnings by defining expertise as a 'capacity for action'. They explain their use of the term 'macromorphic', which has a geological origin related to the accretion of matter over time, as follows: "Expertise is *macromorphic* in the sense that it is entwined with extra-organisational perceptions, certifications, messages, and constellations of beliefs and practices that cast us in particular roles" (Barbour et.al. 2016, 46). Moreover, they elucidate the heterogeneity of this definition of expertise by formulating a taxonomy based on four 'forms of knowing' – *technical, arcane, interpersonal* and *embodied* – to incorporate aspects that tend to be discussed separately in debates about expertise. The ensuing taxonomy is cross-cutting since it categorises the 'communicative accomplishment' of expertise (Barbour et. al. 2016, 47) as opposed to differentiating between, and categorizing separately, expert functions. The typology assumes, therefore, that each form of knowing has tacit and implicit elements and that each element applies to every

occupational domain, rather than following other arguments that treat elements and domains as separate entities (see inter alia. Collins and Evans, 2007; Young and Muller, 2014).

The technical form of knowing refers to the mix of occupationally-specific knowledge experience required to perform in a particular domain. The arcane form of knowing refers to the codes, rules and conventions that not only govern work more broadly; but are also subject to situational variation (i.e. implemented differentially) and situational generation (e.g. firm-specific rules). The interpersonal form of knowing refers to the relationship between one domain of expertise and another and also that 'relationships *themselves* are a domain of expertise' (italicization in original). The embodified form of knowing refers to the conduct of work and also the arrangement of work spaces, including their socio-material dimensions and, as such, how they can encumber other actors in the sense of bringing differences to the surface because expert judgement is negotiated through a mix of action and communication (Barbour et. al. 2016, 48-9).

Barbour et. al. (2016, 54-5) identify a number of different generic types of expert interaction involving the four forms of knowing. They argue that in situations where experts agree, the expectation is that they would amplify each other, in other words, the framing of an issue is made clearer, the encumbering even stronger and the legitimacy of the agreed solution even more supported. They note, however, that when experts disagree or contradict one another, there tends to be competition between experts for the legitimacy of particular readings of an issue or situation. They deepen this discussion of expert interaction by considering that experts may disagree, but not necessarily contradict one another. In situations where uncertainty or ambiguity arises, the challenge for experts is to negotiate a resolution based on an explication of their interpretations and judgements, rather than presenting them in such a way as to obscure what might otherwise be a salient way to proceed.

Consumption and value

We pursue our historical ontological framing of expertise as a 'capacity for action' by employing Knorr Cetina's (2010) insights on the role of consumption in the way

knowledge is produced, adapted, used and discarded (see Corrado et.al. 2013 for an economic discussion of the way knowledge related to intangible work processes depreciates and decays particularly quickly). Whilst Knorr Cetina's argument arises from her empirical studies of the role and nature of information used in financial markets, we argue that it has much wider application. As she explains, up until the 1970s, 'production thinking' dominated both economic and non-economic social science inquiry including the study of knowledge. This seemed particularly suited to capture the way scientific knowledge is produced or 'manufactured' in laboratories, emerging as a completed product that endures underpinned by a process of 'consensus formation', in other words, mechanisms to resolve, contain or even eliminate disputes.

Knorr Cetina (2010) combines the phenomena of 'information' and 'knowledge', which normally kept separate in discussions about vocational knowledge and expertise, to form a new concept of 'information knowledge'. This captures the ways in which interpretation, calculation and explanation in the production process generate a form of knowledge that is used and transformed and/or discarded in the consumption process often at a rapid speed. For example, aircraft pilots have to consume multiple screen-based and oral messages from the ground as they negotiate different weather patterns, technical issues, and air-traffic control procedures. This will include consuming and deciding how to act on out-sourced computer-generated data relayed by the manufacturers of aerospace engines who track engine performance from the ground to pilots in real-time. Hence, the character of 'information knowledge' is 'shaped and patterned by the process of consumption' (Knorr Cetina 2010, 178).

Using a consumption metaphor draws attention to the logic and dynamic of the creative use of information knowledge as it passes through different stages of articulation and use, before being replaced by new analysis and information knowledge. In the more fluid and changing context of work, consumption-shaped practices occupy experts' attention, time and their engagement with the socio-materiality of occupational practice. Knorr Cetina (2010) identifies three knowledge practices that facilitate the consumption process. The first is 'outsourcing' such as in the use of information systems that offer feedback and analysis of technologically mediated production processes (Brinkman et al. 2017). Our reframing introduces the

notion of ‘in-sourcing’ alongside outsourcing as joint ways for experts to engage in what Knorr Cetina, 2010, 188) terms ‘analysis as detection’.

In-sourcing refers to an employer’s procurement of technological systems, increasingly likely to be underpinned by Machine Learning, and deployed to collect, analyse and aggregate internal performance and prediction data. This type of information knowledge generated through the processes described above offers a way to extend Barbour et al’s (2016) notions of technical and arcane knowledge. It provides, in the case of the former, occupational knowledge of the performance and outcomes of production systems and, in the case of the latter, a wider set of considerations than rules, conventions and procedures for experts to incorporate into their processes of deliberation and judgement.

The second and third knowledge practices described by Knorr Cetina (2010, 178) are: a) ‘economy of attention’ (strategies to observe, monitor and anticipate next steps); and b) ‘skillful deployment’ of information knowledge. They facilitate the process of consumption and have a more overt ontological character. Moreover, it becomes apparent that there is, in effect, a mediated relationship between these two practices when we consider the processes of ‘discounting’ and ‘revision’, which Knorr Cetina (2010) identifies as facilitating their enactment. Expressed in the more general terms of this paper, they refer respectively to the way in which: a) some information knowledge loses its significance when new information knowledge emerges; and b) information knowledge is constantly revised as more data or more experts become involved in discussions. The two information knowledge practices and the two processes which facilitate them offer a further way to extend Barbour et. al’s (2016) technical and interpersonal forms of knowing. They allow us to appreciate, in the case of the former, the nuanced ways in which experts simultaneously attend to the variety of information knowledge that emerges both within and externally to their workplaces and include it or exclude it in their deliberations and judgement. In the case of the latter, we can see that experts are ‘positioned’ (Hermans and Hermans-Konopka 2012) to work collaboratively with one another when discounting and revising information knowledge. As Knorr Cetina (2010, 196) stresses, ‘Consumption should not be considered as a component of knowledge processes that kicks in only when knowledge production has been completed’.

In their study of work practices in high-fashion franchised hairdressing salons in England, Lee et.al. (2007) provided evidence of the way stylists responded to the highly detailed information and rules on dealing with scalp conditions, allergies, hair growth patterns and so on) specified in guidance documents produced by the company which owned the franchise chain. Far from consuming and reducing the guidance documents to a 'formulaic calculation or preset script' to be used in consultations with clients, the stylists deployed their expertise to turn each consultation into 'an irreducible sphere of discretion' in which to apply, test and continue to develop their judgement over the production and delivery of a service through negotiation with clients (Lee et. al. 2007, 7). Within the context of each individual consultation, the tangible and the intangible dimensions of expertise in action co-mingle with Barbour et.al's (2016) four forms of knowing to enable the stylist to act as an expert. Their expertise is not a static entity. Through practice and through exposure to the new techniques, fashions, products and technologies, the stylist develops and refines their 'capacity for action'.

The second way we pursue our historical ontological framing of expertise as a 'capacity for action' is by drawing on Boltanksi and Thevenot's (2006) taxonomy of 'economies of worth'. Writing from within the field of Cultural Sociology, Boltanksi and Thévenot (2006, 25) define their aim as to build a framework to address the 'relation between agreement and discord' to identify how competing conceptions of value can be resolved. To do so, they draw on some of the classic arguments offered by the social sciences in economic and social theory and political philosophy to identify: 'the critical operations people carry out when they want to show their disagreement without resorting to violence, and the ways they construct, display and conclude more or less lasting agreements' (Boltanksi and Thévenot (2006, 25).

Boltanksi and Thévenot's proposed (2006, 23 and 275) that it was possible to identify six distinctive 'economies of worth' or 'worlds' as models of good and legitimate action. These six worlds were presented as conventions based on practices that channel and resolve uncertainties through the 'imperative to justify' by 'assuaging critical tensions'. The original taxonomy comprised: the *market* world – where value measured by price and is the source of the accumulation of wealth; the *inspired* world

– where value arising from the domain of art, passion and creative talent; the c*ivic* world – where value arises from serving the public good; the *domestic* world – which reflected family loyalties, heritage and hierarchies; the *fame* world – where value measured by celebrity; and, the *industrial* world – where value is measured/ achieved by methodical planning, technical efficiency, scientific precision. Subsequently, Thévenot et.al. (2000) added another world, *green,* where value arises from addressing sustainability issues. The taxonomy provides a vocabulary for understanding the way in which expert action is underpinned by different types of value, which emerge from forms of justification manifest in occupational or inter-occupational practice.

This taxonomy enables us to consider the ways in which the *features* (agreement, disagreement and uncertainty) of expertise identified by Barbour et. al (2016) and the *processes* of the *consumption* of information-knowledge identified by Knorr Cetina (2010) (discount and revise and skillful deployment), contribute to individuals and teams justifying the value of their expert insights through the relational forms of practice they engage in when they collaborate with other experts either within their occupational field or across different fields.

We provide an example from research involving one of the authors of this paper in which architects and engineers with different specialisms attempted to strike the best balance between aesthetic, technical and financial considerations in relation to a construction problem (Author Y forthcoming). Viewed through our 'economies of worth' lens, a primary concern for the architects was to justify their recommendations on the basis of the 'inspired' nature of their expertise, possibly also invoking 'fame' values. A primary concern for the engineers was to justify their recommendations on the basis of the 'industrial' and 'civic' nature of their expertise. In both cases, the architects and engineers searched for agreement by overcoming uncertainties as they discounted some information-knowledge and suggested ways to skillfully deploy other information-knowledge. Moreover, the 'market' value was also important for both actors because the skillful deployment of information knowledge allowed the range of values that had been taken into account to, simultaneously, enhance their reputation and increase the likelihood they would secure repeat or new contracts for their services.

Despite offering us a way to deepen our argument about expertise as a capacity for action, Boltanski and Thévenot's (2006) elaboration of their taxonomy is somewhat limited by the conventions of the classic social science tradition on which they drew. That tradition predisposes them to illuminate the significance of their taxonomy through reference to material or tangible examples of the worlds that comprise their taxonomy. More recently, researchers in the field of the economics of innovation have argued that there has always been an 'intangible' dimension to the economic sphere (i.e. market, inspired and industrial worlds) and we would argue to the other spheres as well (Corrado et. al 2009). Haskel and Westlake's (2018, 9-10) concept of 'intangible assets' provides a means to translate the notion of intangibility into more practical language. They identify four features of intangible assets: (i) they represent a 'sunk' cost as they cannot be sold on in the same way that traditional business equipment could be to another workplace; (ii) they generate 'spillovers' because they are design-based and designs can be copied or 'invented around'; (iii) they are 'scalable' in the sense that the value in the form of the brand underpinning the product or service is exportable globally; and, (iv) they have 'synergies' with other products, services and markets. These contributions from the field of economics have enabled us to highlight the intangible dimension of Boltanski and Thévenot's (2006) taxonomy can be revealed through the perspective of expertise as a 'capacity for action'.

Contrasting contexts for understanding expertise as a 'capacity for action'

In this section, we revisit research involving Author X (with other colleagues) to identify the ways in which they provide evidence of the concept of expertise as a 'capacity for action', the production-consumption dimension of vocational knowledge, and the ways in which expertise is attributed and valued. The example comes from a comparative study of the impact of international industrial standardisation on the training of apprentice aircraft mechanics in England and Germany (see ANON 2019 for a detailed report; see also Author Y 2011 for a study of the impact of standardization on the design of aerospace engineering degrees). The study involved mixed-methods research in four companies in Germany and three in England. We have selected those aspects of the original research which we consider to be particularly illustrative of the argument we have tried to pursue in this paper.

Aerospace companies in England and Germany are governed by standards laid down by the European Aviation Safety Agency (EASA), which controls certification process in respect of the safety and environmental standards of aircraft, engines, and other components. This cross-border jurisdiction requires companies to co-operate both in terms of product standardization and maintenance and, hence, as ANON's (2019) research showed has resulted in considerable convergence in terms of the companies' approach to apprenticeship training, despite the structural and cultural differences between their countries' VET systems. As the standards arise from and are consumed within the production process, they are subject to transformation through Barbour et. al's (2016) interpersonal form of knowing (in this case forged through the collaboration and communication between engineers, technicians, designers, data scientists and pilots). As a consequence, some of the vocational knowledge embedded in the standards may be discarded and changes made to the apprenticeship training programmes and certification procedures.

Apprentice maintenance engineers work towards achieving the EASA CAT-A licence. This is accepted internationally as the proof that they have the expertise to carry out routine maintenance on operational aircraft and, importantly, certify that it has been done correctly. From the outset, therefore, Barbour et.al.'s (2016) technical and arcane forms of knowing have a tangible presence in the apprentice mechanic's training programme (covering both classroom and workplace-based components) and, through the EASA 'licence to practice', the means by which their expertise would be attributed and given status in their occupational field.

In relation to Boltanski and Thévenot's (2006) seven 'worlds of worth', working within the regime of international standards means that apprentices in both England and Germany are able to relate the vocational knowledge they develop to: a) the *industrial* world (as the focus on methodical planning, technical efficiency and scientific precision are highly valued in their sector); b) the *market* world (their companies' stability depends on building safe planes); c) the c*ivic* world (safety is a public good and working in aerospace brings the recognition of contributing to the national economy); and d) both the *domestic* and *fame* worlds (safer planes accrue greater customer loyalty, but an association with good design and customer service can also bestow higher status).

The interplay between the worlds will vary according to the status and nature of the work involved, hence, an international aerospace company will generate greater 'fame' than a smaller company in its supply chain. These 'worlds' will, of course, be subject to further transformation in light of the industry's positioning in a post-COVID and more environmentally-conscious world.

Whilst the industrial standards provided the over-arching framework for the technical aspects of a maintenance engineer's expertise, it became clear during the research that vocational trainers in the companies in both countries did not view the standards as providing a complete or static pedagogical roadmap. A surprising finding from the study was the extent to which all the companies were seeking to recruit potential apprentices from a wider pool than just individuals with a high level of prior educational attainment as innovation and creativity were central to their survival. The trainers stressed that apprentices needed to develop the capacity to critically engage with any form of documentation they encountered. Learning how to use 'information knowledge' in a range of contexts, including meeting company clients who regularly visit aerospace workplaces, was as important as developing technical knowledge. Pedagogical approaches in all the companies focused, therefore, on the development of apprentices as team members through their early immersion in production and project teams, and on their capacity for problem solving. Apprentices were not regarded as 'novices' and were expected to contribute ideas within their teams as well as participate in giving feedback and the solving of disputes as work progressed.

Here we can see that Barbour et.al's (2016) interpersonal and embodied forms of knowing were present in the organization of apprenticeship so that, together with the technical and arcane forms of knowing, the training was not limited to a one-dimensional concept of expertise, but rather one that developed a 'capacity for action' within an industry that depends on the nurturing of both its intangible as well as tangible assets.

Conclusion

We have argued that conceiving expertise as a 'capacity for action' draws attention to its ontological dimension and, in the process, offers a fresh way to engage with the

situated and relational nature of the development, deployment and transformation of expertise in workplaces. Furthermore, this conceptualisation allows us to bridge the binaries of 'explicit'/ 'specialist', 'tacit' or 'everyday' knowledge that continue to engulf debates about vocational knowledge, by considering the interplay between different forms of knowledge and their ensuing outcomes. It also allows us to overcome the assumption that the work context acts largely as a cognitive test bed for existing disciplinary and vocational knowledge acquired through individualized study of a vocational curriculum, by acknowledging that the outcome of much occupational expertise is related to the outcome of other occupational expertise. We argue that it offers the means to transcend the structural rigidities of educational levels, occupational hierarchies and prescribed competencies that tend to encase the concept of vocational knowledge. Our reframing and broadening of vocational knowledge via the concepts of information knowledge, production and consumption, economies of worth and intangibility enable us to revisit the contribution of, and relationship between, initial and continuing VET through offering a clearer delineation of their respective contribution to the development of expertise.

We conclude the paper with an attempt to present the implications of our argument in the form of a framework (see Figure One below) setting out the necessary components for the development of expertise as a 'capacity for action' within VET programmes. We have constructed the framework by describing the contributions that the classroom/workshop-based and workplace components of VET make to the development of the four forms of knowing – technical, arcane, interpersonal and embodied – as discussed in this paper. We have identified the purpose of the respective contributions by distinguishing between *preparation to participate* in canonical (i.e. conventional) workplace practice and *participation in* workplace practice, in relation to the identified four modes of expertise. By *preparation to participate, we* refer to the role of education to introduce, attune and alert a vocational learner to the forms of occupationally specific knowledge, conceptual thinking and canonical ways of doing things, associated within a specific occupation field. This might draw on pedagogical practices such as role plays, group projects, and simulations, and through programme components such as work experience and skills competitions. By *participation in, we* refer to the process of workplace enculturation the vocational learner undergoes en route to becoming a recognized member of the

occupational field. We have positioned the four forms of knowing in the middle of the framework. This allows us to indicate that while the classroom/workshop component plays an invaluable role in preparing a vocational learner for the transition to the workplace, the development of expertise requires workplace participation to enable the individual to experience the four forms of knowing that together forge a 'capacity for action'.

Throughout the paper, we have wrestled with the thesis found in the literature on vocational knowledge that some vocational practice is underpinned by a form of specialized knowledge. This feeds into a view that some occupations are knowledge-lite, which underpins the way some occupations are under-valued and certainly misunderstood that we mentioned at the start of the paper. It is clearly evident from our framework that although the curriculum and qualifications that codify and certificate different occupational fields will include (to a greater or lesser degree) specialized knowledge, the actual way expertise exists in practice is underpinned by diverse forms of knowledge associated with the arcane, interpersonal and embodied modes of expertise. Overly attributing the basis of expertise to a body of specialized knowledge privileges an educational conception of expertise diverts attention from the complex process in which expertise is constituted and afforded recognition and status through *work practices* that combine both tangible and intangible dimensions.

Figure One

Framework for the development of expertise as a 'capacity for action' within VET programmes

Classroom/workshop-based component	**Modes of Expertise**	**Workplace component**
Preparation to participate through: - Exposure to occupationally specific knowledge, techniques, and conceptual thinking. - Consideration of their relationship to canonical work practice.	Technical	*Participation in:* - Production of goods and services. - The deployment of intangible assets as an integral part of work practice. - Inferring how in-sourced and out-sourced forms of information-knowledge (IK) are used in and affect practice. - Making judgements about discarding IK and deploying new IK to support workplace needs.
Preparation to participate through: - Engagement in (simulated) practices and technologies in an occupation field. - Appreciation of the codes, rules and conventions that underpin them.	Arcane	*Participation in:* - Inferring how codes, rules and conventions shape workplace occupational practice. - Engaging with the reappraisal of the use of codes, rules and conventions.
Preparation to participate through: Engagement with the relational aspects of occupational practice through simulation, role play and work experience.	*Interpersonal*	*Participation in:* - Relational work practices (teams, client-focused activity, boundary crossing). - Involvement in situations where there is agreement, disagreement and un-certainty and contributing to negotiations to resolve boundary disputes.

Preparation to participate through: - Exposure to technologically-mediated and simulated workplace environments, workshop practice, and skills competitions.	Embodied	*Participation in:* - The production of goods and services in technologically-mediated workplace environments. - The evaluation and use of feedback in real-time from range of internal and external sources. - The fusing of technical, arcane and interpersonal modes of expertise to develop an embodied sense of being an occupational expert.

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