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'Tacit pedagogy' and 'entanglement': practice-based informal learning and innovation

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Title

‘Tacit pedagogy’ and ‘entanglement’: practice-based learning and innovation

Abstract

Purpose: This paper argues that the informal dimensions of practice are critical for understanding workplace learning and innovation, but have been under-theorised and under-researched. It builds on the thinking of Elström (2010), Billett (2012) and Guile (2014) to account for the emergence of innovation through practice, and proposes two new concepts for improving our understanding of innovation as process: ‘tacit pedagogy’ and ‘entanglement’. This argument is evidenced through a recent study of team-working in a high-profile engineering company.

Design/methodology/approach: Qualitative interview data was collected on the informal features of organisational culture and work processes supporting innovation, and how these features intersect and interrelate with the formal features and procedures of the organization.

Research limitations/implications: Three generic modes of team-working practice are identified which, it is suggested, are likely to be associated with innovatory working, and are observable practices available to future researchers.

Practical and social implications: Productive approaches to the organization of work processes so as to enhance practitioner learning and the potential for innovation, are evidenced and evaluated.

Originality/value: The concepts ‘tacit pedagogy’ and ‘entanglement’, intended to improve theoretical understanding of learning and innovation through practice, are introduced.

Article classification

Research paper

1. Introduction

Workplaces are now generally understood to be dynamic and evolving contexts for practice, in which significant learning takes place informally; where much of the knowledge

involved, whatever the domain of practice, is tacit and shared between teams and communities of practice; and in which work processes, organizational structures, and relationships change and evolve constantly as they interact with changes in the social, political and economic environment.

However, a phenomenological account of workplace innovation and practitioner learning, describing the dynamic organizational and learning processes through which new practices can emerge, be articulated and tested, and implemented and become routine in their turn, is still lacking. Innovation is typically reified within the organizational development literature as an organizational goal, to be 'brought in' by external specialists and 'bolted on' (Nelson and Winter 1982, Brown and Duguid 1991). It is much more rarely seen as an emergent practice-based phenomenon, linked with employee motivation and development. Broadly-focussed discussions of technological change over historical time (eg Epstein 1998, Bijker et al 2012), while acknowledging the role of practitioners in these changes, pass over the detailed minutiae of everyday practice. Furthermore, a comprehensive account of learning and innovation through practice will need to problematize linear and mechanistic 'standard paradigm' (Beckett and Hager 2002) conceptions of both organizational development and of learning.

While some commentators have provided 'practice-based' accounts of innovation which avoid these problems, they have used different conceptual perspectives and terminology. The accounts of Ellström (2010), Billett (2012) and Guile (2014), for example, are broadly aligned conceptually, but highlight different elements of the phenomenological field, and use different conceptual terms. This paper reviews these three practice-based accounts as broadly representative of the field at present, and builds on them to argue that innovation emerges from the essential indeterminacy of everyday practice, in a process

which is simultaneously enabled and constrained by interdependent local conditions. Key to this account are the informal features of work situations and work practices, which have been under-researched and under-theorised (Jensen et al. 2007), as most work attends only to formal and explicit aspects of workplace environments and practice. It is argued here that informal modes of interaction and practice within and between project teams and practitioner communities are always present and critical, for better or worse, for productivity and the evolution of formal work processes.

Evidence for this argument is provided through discussion of a recent qualitative study of team-working practices in two UK organisations working in different domains. This paper focusses in particular on one of these settings, a globally-reputed engineering company. After reviewing the three practice-based discussions already mentioned, it provides a brief description of the empirical study, and a discussion of its findings. Three specific modes of workplace activity observed in the study and proposed as likely indicators of innovatory practice, are briefly elaborated, and two conceptual contributions are introduced: 'tacit pedagogy' and 'entanglement'. These are intended to help clarify the conceptual field by encompassing the diverging terminology and perspectives of previous work in the field. The paper concludes by summarizing its main points, and suggesting lines of possible future research.

2. Three practice-based accounts of innovation

The accounts of Ellstrom (2010), Billet (2012) and Guile (2014) already mentioned, while all clearly critical of 'standard paradigm' conceptions (Beckett and Hager 2002) of workplace learning and innovation, diverge in terminology and in the main focus of their attention. Both Ellström and Billett see innovation and the evolution of workplace

processes as emerging from dualistic tensions: between the largely explicit and top-down 'logic of production' and the more implicit and bottom-up 'logic of development' (Ellström 2010 pp32-33), or between employees' motivation and 'the constraints provided by the workplace' (Billett 2012, p95). Ellström's perspective is primarily that of organizational development and his conclusion is that the traditional 'top-down model' of planned change needs to incorporate practice-based changes 'from below'. He highlights the significance of employee autonomy, and of employee motivation and engagement in making use of this autonomy. In comparison, Billett's 'socio-personal' account primarily reflects the employee's perspective, and the active role of employees, for better or worse, in the evolution of work processes over time:

> 'everyday processes of thinking and acting at work are constructive acts through which work tasks and processes are reconfigured in response to new requirements and to specific situational requests or problems (eg work tasks). This everyday process of work-related thinking and acting both ordinarily and necessarily leads to the remaking of occupations…' (Billett 2012, p93)

Billett, like Ellström, highlights the importance of employee engagement:

> 'The transformation of occupational practices arises in ways shaped by how employees engage in and learn through activities that are to various degrees new to them. Thus innovations are as much about those individuals' learning as they are about the implementation of new practices.' (Billett 2012, p94)

Both Ellström and Billett, therefore, emphasise the significance of employee activity and motivation in the evolution of work processes, innovation, and in their own learning: employees are both subjects of these processes and significant contributors to them.

Guile's (2014) account of learning and evolutionary change in work processes examines employee 'thinking and acting' (Billett 2012) in great detail. His concept of 'recontextualisation' provides a practice-based but also dialectical account of the application of knowledge and experience in new contexts, a dynamic process through which practitioners are both shaped themselves and help shape the evolution of work processes. In both formal and informal ways, practitioners share, collectively evaluate, build on and adapt the expertise and knowledge they bring from previous experiences; in making decisions and acting on them, within the material constraints of their work situation, they shape and recreate the workplace (Ellström 2010, Høyrup et al 2012), as well as their practice, and their own knowledge and capacities (Edwards 2010).

The relevant knowledge used by practitioners in this process is seen, firstly, as tacit and/or embodied as well as explicit and propositional; secondly as a matter of collective judgement between peers; and thirdly as inherently provisional - sufficient for present practical purposes, rather than correct for all time and contexts – the possibility of future iterations of practice is recognised (Edwards 2010). Guile argues that these three features of 'recontextualisation' open up a possibility space**,** in which work practices which are potentially innovative can emerge.

Guile's, Billett's and Ellström's accounts are aligned and compatible with each other, but have different perspectives and emphases. Note that none of them implies that changes in practice produced through these complex, fluid and uncertain processes, are necessarily changes for the better. Whether innovations are beneficial or not, and whether they are practically feasible and sustainable, are political questions: change is always provisional, and innovations often produce unintended consequences (Barad 2007, Marchand 2014).

The discussions of Ellström, Billett and Guile illuminate features and characteristics of the specific kinds of practical activities through which innovation can emerge from the material conditions, contingencies and processes of work. This paper's contribution is to highlight the importance of informal modes of interaction and activity in these processes, and now presents evidence from a new study which identifies specific generic modes of practice through which innovation can emerge.

3. The study

TLZ R&D is a relatively small division of a large broadcast-engineering and media corporation, (TLZ), partly supported by public funds under the terms of a charter nearly 100 years old. It has played a major role in many of the most important technological developments in broadcasting since the 1920s. TLZ itself is a household name, but its R&D division has a much lower public profile. There have been consistent research themes throughout its history: for example, the search to improve signal compression while maintaining quality, improving the experience of the users of its technology, and its public service responsibilities.

TLZ R&D's 150 practitioners, who refer to themselves as 'engineers' are physically located in two geographically distant 'Labs'. Staff are allocated to project teams, focused on solving various theoretical and technical problems arising from the design of new products. Projects vary widely, but most involve digital signal compression, signal quality enhancement, end-user research, the development of new digital applications or improvements in broadcasting kit. Many projects involve partnerships within the UK and internationally: these have included designing international standards for the global

broadcasting industry. Project teams are led by experienced engineers, and are usually made up of staff with different specialisms and experience.

The members of one of these project teams were recruited for this study, comprising a team leader and three engineers. Team members had different specialist backgrounds and years of industry experience, but the project leader was substantially more experienced, and had led other projects in the past.

Qualitative data was collected through two semi-structured 1 hour interviews with each participant, and two focus groups, each 1 hour long, over a period of a year. These focused on the role of informal aspects of work within the project team and the wider organization, on typical practices engaged in by members of the team individually and collectively, and on aspects of their work they saw as supporting innovation. Priority was given in this study to collecting in-depth qualitative data from highly-qualified and experienced informants, rather than extending the sample size (Kvale and Brinkman 2009). The transcripts of the interviews and focus groups were analysed using thematic codes derived from the literature and from ongoing data analysis (Maxwell and Miller 2008). Salient themes in the data for each research site were identified by developing 'significance coefficients' for each code, based on the frequency of occurrence and spread of each code across the data. Interestingly, the same four themes stood out clearly in the data from both research sites, and in the same order of significance: (1) Purposeful boundary-crossing; (2) Colleagues seen as peer reviewers; (3) Emphasis on formal and informal 'writing up'; and (4) Knowledge shared informally within teams (Derrick 2019). Limitations of space prevent all the findings being discussed here, but these four salient themes are now discussed further.

4. TLZ R&D: Findings

The most significant findings from the data on TLZ R&D, as indicated above, will now be elaborated in more detail.

4.1 Informal interactions

The TLZ engineers strongly value the informal and social aspects of work and learning, not just because this is comfortable and congenial, but because they see them as essential for the effectiveness of their work:

> *'we generally sit around the kitchen table at lunchtimes, so I get to chat to a lot of people in the other groups that are up here…. Some of it is just being aware of what other people are up to – for example I was talking to someone about traffic shaping….and RJ came around the corner….and said oh we've been doing similar stuff but we've been doing it this way instead. So we got into a discussion about how it could be done another way…'* (Billy, Project team leader)

This suggests that unplanned and informal interactions, allowing for autonomous, informal, and perhaps accidental interactions, enable the fertile potential of the TLZ engineers' collective expertise and experience to engage productively with the formal tasks in hand. The physical working environment at TLZ is organised to allow for such interactions, which are also actively and continuously cultivated by the TLZ engineers themselves: collective social and eating spaces, quiet individual working spaces, regular informal events at which people in different teams can come into unscheduled contact, and working schedules which allow time for them to happen in the first place, and to be developed spontaneously if they have potential.

However, formal aspects of the workplace are important for innovative working too. Examples of this include formal training programmes which can be incorporated into project

team-working whenever these are agreed to be useful; and the formal emphasis on 'writing up' and 'peer review' as standard elements of team-working procedure. The engineers recognise that these processes support the sharing of knowledge, but are always approximate: ongoing codification of workplace knowledge may be highly developed, but is never wholly completed. Nevertheless, they see the formal elements of their work, including mandatory procedures, project deadlines (usually set by the dates of external events such as industry conferences or seminars rather by the TLZ management), as being materially useful in the innovative process:

> *'Having deadlines helps focus the mind on things….it allows us to corral our efforts, and focus on particular things…..if we are going to set out our stall at the International Broadcasting Conference, then we need to have a demo up and running, ready to take it to Amsterdam by September. That's very helpful.'* (Billy, Project team leader)

The high level of autonomy and discretion (Ellström 2010, Billet 2012) afforded to the team in determining the direction and organisation of their work, combined with the engineers' commitment to the organisation and its public service goals, enables the productive use of their tacit knowledge and expertise: their capacity to utilise the potential of informal and unstructured interactions within and beyond their team would be severely limited without sufficient latitude to respond to these opportunities and act on the insights or adaptations to work processes suggested by them. Within this autonomous context, TLZ engineers also understand and accept that individual scope for action is informally subject to the collective approval of the team, guided by the team leader.

We now discuss the three modes of practice which the study finds are central to innovation in the TLZ engineers' work.

4.2 'Writing-up'

The formal articulation of ideas so that they can be shared is referred to in TLZ R&D as 'writing-up', and is a central element of day-to-day practice. It ranges from brief and informal scribbled notes used as *aides memoires*, to slightly more formal reports for sharing with other team members, or made during informal meetings as tools for collective thinking and decision-making, to team-level progress reports, formal papers published within the organisation and occasional externally-published papers. TLZ practitioners explicitly emphasise the importance of various modes in which work can be 'written up', in a wide range of levels of (in)formality and comprehensiveness:

> *'I've got my logbook full of low level details, I establish some level of understanding, write about that a bit more clearly, pass that around, then at some point decide to put these questions onto [the project wiki] myself…. key unanswered questions at this point in time that we know will need to be answered.'* (Harry, team member)

TLZ engineers emphasise the importance of digital tools in supporting a wide range of different modes of informal communication, and also of long-established organisational formats for different kinds of 'writing-up'. One example is the 'technote': a moderately formal document published within the organisation, which may become the basis for external publications as well. Together with more informal notes and 'tickets' shared as part of team-working procedure, and the contents of even rougher notes typically kept in notebooks by individual practitioners, 'technotes' are examples of 'artefacts' (Brown and Duguid 1991, Engeström 2008) which are the potential and actual foci of collaborative innovation.

4.3 Peer review

The second key practice associated with innovation within TLZ R&D is 'peer review'. This is a mostly informal process through which the representations of practice produced by 'writing-up' are shared with members within or beyond the team and subjected to formative evaluation and feedback. This may result in an iteration or improvement, either to the task itself, or to the strategy the team is using to achieve it. The expectation is strong and explicit in TLZ R&D that everyone will share ideas and data, not just within the team, but with colleagues in other teams and sometimes with people outside the organisation:

> *'….it's crowdsourcing the problem.'* (Pete, team member)
>
> *'An important trait to foster innovation is….transparency….the passing on of information and knowledge, as distinct from hoarding it….that is a barrier to effective innovation, what you want is [for] information to flow freely.*' (Billy, Project team leader)

The process through which TLZ practitioners share and combine their own tacit and explicit ideas with those of others, through the back and forth exchange of ideas and judgements, is explicitly seen as having the potential to solve technical problems, and to produce new products or improvements in the work process:

> *'we started off with an example of a semi-formal thing we do in our team meetings when we exchange information, but actually these informal opportunities for serendipitous exchanges really, are extremely powerful, and every good academic research group has got its coffee room.'* (Billy, Project team leader)

The practice of peer review in TLZ R&D is both formal and informal: typically it is most productive when the formal and informal modes of it are not treated as separate. Sharing ideas and data, not just within the team, but with colleagues in other teams and

potentially with people outside the organisation, is also normal practice. Sometimes this is to get a 'second opinion', or to help solve a specific technical problem or overcome an *impasse*; at other times there may be no particular purpose for the interaction, but merely the sort of conversation that takes place at informal social events set up simply to enable and encourage such conversations. Often these conversations are also examples of 'crossing boundaries', discussed further below.

4.4 Crossing boundaries

The study suggests that 'crossing boundaries' is a key element of the TLZ R&D practitioners' innovative working practices. This consists of purposefully extending the range of resources available to the project, by going beyond the team's domain specialisms, or the department or even of the organisation, seeking inputs, usually in the form of feedback on some kind of representation of a specific task or problem, with the idea of bringing different perspectives to bear on the issues. It also includes the deliberate selection of challenging projects and tasks which may involve working in different or completely new domains of expertise or experience (Edwards 2010). TLZ's engineers see this as essential to their practice:

> *'A lot of the work that we do, is to do with integrating work, and we build on the shoulders of giants - there's people all around the world working on this stuff, and there's no way you can be innovative in isolation, it's all about collaboration.'* (Will, team member)

Informal consultations with close and distant colleagues are facilitated by the physical and technical infrastructure within the working environment provided by TLZ, and in the working and social culture of the organisation.

TLZ practitioners, as we have seen already, work purposefully and collaboratively on producing provisional representations of their practice, ('writing-up') both within their team and across boundaries. These continually reworked representations have been described as 'boundary objects' (Akkerman and Bakker 2011) and, as we have seen, are the provisional objects and foci of collaborative practice which may act as work-in-progress towards the articulation and development of new products, strategies and working processes (Edwards 2010).

5. Discussion

As we have seen, the study suggests that informal dimensions of practice, relatively neglected in the literature (Jensen et al 2007), are of central importance in understanding the mechanisms supporting or inhibiting productive changes in the workplace. It further spotlights three specific interrelated practices, clearly visible in the work of the TLZ engineers, which are associated with realising the innovative potential of practice. We now discuss the implications of these findings and introduce two new conceptual terms.

The phrase 'informal dimensions of practice', in the context of TLZ R&D, signifies firstly an organisational and teamworking culture which is social, collegiate and trusting, and secondly that the specific practices which constitute the activities of the team members, such as thinking, meeting, discussing, reading, writing, making notes and diagrams, are seen as often in informal as in formal modes.

Three factors appear to be central to understanding these informal dimensions in TLZ R&D: firstly that formal procedural frameworks are typically minimal and unspecific in relation to day to day work; and secondly, that there is a powerful though largely unspoken code of practice among the engineers, concerning the sharing of knowledge, pride in

working for the organisation, respect for the expertise of colleagues, and commitment to the 'cause' of public service (Fuller et al 2018), evidenced by the fact that many of them could easily get better-paid jobs elsewhere. Thirdly, it is critical that teams enjoy a high level of autonomy (Ellström 2010, Billett 2012), under the guidance of their team leader, in collectively designing and managing their own work processes. The concepts of trust and discretion, in relation to organisational and team-working cultures, bespeak the tacit aspects of practice, referring implicitly both to consensual and informal practices and processes, but also to what Brown and Duguid (1991) refer to as 'non-canonical' (and therefore potentially innovative) elements of workplace practice. The discretion afforded to TLZ engineers demonstrates to them that they are valued and trusted by their organisation, but they also believe it is more likely to produce innovation than a culture of 'micro-management'.

The significance of the informal dimensions of practice, then, is manifested partly through the particular social and cultural environment that is fostered and maintained by the organisation, and partly through the engineers' day-to-day activities and practices (both formal and informal) including 'Writing-up', 'Peer review' and 'Crossing boundaries'.

'Writing-up' refers to the production of any mode of representation appropriate to the context: in TLZ R&D it might include programming code, mathematical symbols and equations, diagrams or charts as well as writing. Informal 'writing-up' helps crystallise ideas and makes them available for informal sharing, discussion, and evaluation. The products of writing-up, however informal, are significant representations of practice, and constitute the raw material for making progress in the task at hand. Although learning always has tacit elements, innovation almost always needs to be expressed in terms of new or adapted representations of practice, and these are always examples of what is meant by 'writing up'.

The focus on 'writing up' has a number of interrelated functions within TLZ R&D, the first of which is that practice-based learning and innovation emerges from existing practice and knowledge, and this requires that, as far as possible, new knowledge generated by project teams needs to be recorded and made accessible for future use. In practical terms this produces an explicit emphasis at the heart of practice on 'writing up'. As a TLZ engineer said in an earlier study:

> *'[This is] to enable the knowledge to become part of organisational DNA….this is the way an organisation builds its expertise…. It's part of building that co-operative, collaborative culture, writing up all the time.'* (interview quotation in Derrick 2014)

The second productive function of writing-up is that it increases the effectiveness and utility of professional learning. The data suggest that while 'reflective practice' is often assumed to be limited to internally-directed thinking, in TLZ it is of greater use when taken beyond individual cerebration and extended into discussion with colleagues, or in the form of written representations which can be shared over time and space. Such pieces of writing, which in a range of formats are ubiquitous features of the informal and formal practices of the TLZ engineers, are starting points for discussion and the sharing of insights or hypotheses between practitioners, teams or organisations, and can also act as launch-pads for further development of both theory and practice. The disciplined and imaginative effort involved in crystallising observations, ideas, questions or hypotheses in sufficiently fixed form to be articulated or written down is understood itself by TLZ engineers to be a useful research and learning practice. The writing produced often acts as an 'artefact': a working draft or iteration, the improvement of which can be the focus of the next stage of collaborative work. In this conception, reflective practice (see for example Schön 1983) can

be seen in TLZ R&D as centrally important to professional learning for individuals, capacity-building for teams, and to innovation.

For the TLZ engineers, formal and informal 'peer review' is another explicit and ubiquitous element of work practice. It embodies the relatively unhierarchical collectivity of the TLZ R&D workplace, and is further evidence of the way the TLZ work environment and culture are oriented and organised to support enquiry: practitioners have both time and space for informal and formal peer review activities, and they demonstrate clear collective commitment to the quality and productivity of their work. This collectivity extends beyond the team, and the concept of 'peer' is in both principle and practice very wide: it can include new and inexperienced colleagues, colleagues working in different teams, and sometimes also people working in other departments and organisations within what is ultimately a global community of practice. Practitioners are therefore exercising judgement in terms of (a) when to seek peer feedback (b) who might be consulted and (c) evaluating the feedback received. Procedures may or may not be developed to formalise these decisions: in practice practitioners operate, as we have seen, both formally and informally – in TLZ, for better or worse, they are usually making autonomous judgements rather than operating any kind of standardised procedure – the data indicates clearly that both practitioners and the organisation believe that a more technocratic, 'top-down' and controlling approach to peer review of enquiry-based projects would be less productive.

Finally, the study suggests that 'crossing boundaries' of various kinds is a central, though largely informal, feature of the work of TLZ R&D practitioners. The practical and conceptual significance of boundaries in relation to innovative working has been widely discussed in the literatures of organisational development and professional learning (see for example Edwards 2010; Akkerman and Bakker 2011). For the TLZ R&D engineers, crossing

boundaries is embedded in everyday practice, and to a high degree an informal activity, rather than occasional, formal or specialised: this demonstrates its importance in supporting more productive peer review processes. Due to TLZ's size, its relatively protected position in the market due to its public funding, and its legal responsibilities in relation to public service, it can afford to take a nuanced and expansive stance on intellectual property rights, and this relative freedom is seen by the TLZ engineers as directly supporting their innovatory efforts, by allowing relatively free sharing of knowledge across organisational boundaries for the purposes of peer review, by giving the TLZ project teams access to specialist knowledge they may not have, and by enabling closer, and therefore more productive, partnership working.

Engeström's concept of 'negotiated knotworking' (2004) effectively expresses the informality and provisionality of much of the practice of crossing boundaries within TLZ R&D, and also describes the way peer review processes are not destined to be 'completed' in any formal way. But they have the potential, clearly visible in the context of the TLZ team's work, to be the occasion of three different kinds of valuable formal outcome, any of which may be embodied in particular 'boundary objects' (Akkerman and Bakker 2011): these are: explicit new knowledge (both theoretical and practical); improvements in the work process, both procedural or environmental; and practitioner learning.

Writing-up, peer review and crossing boundaries are closely interrelated and overlapping practices within TLZ R&D; they are not ordered either intrinsically or hierarchically; and they are typically found in varying degrees of (in)formality. All appear to be equally important in principle to innovatory practice; and in different situations, these modes of practice may be formally distinct, or informally 'mixed-up'.

6. 'Tacit pedagogy'

The concept of 'tacit pedagogy', applied to contexts of workplaces or contexts of activity in general, is suggested as helpful in understanding the phenomenology of practice in TLZ R&D, as experienced by the engineers themselves. It denotes all aspects of environments for practice which impact upon practitioners, in both enabling and constraining senses, and including, critically, those more informal modes of knowledge and innovation described by Jensen et al (2007) as 'Doing, Using and Interacting' (DUI), as well as features of the working environment which can be understood as agentic in practice (Knorr Cetina 1999; Marchand 2017). It also includes the explicit Science, Technology and Innovation (STI) modes of knowledge (Jensen et al 2007), when these act tacitly and in affective ways as well (see for example Knorr Cetina 1999). The key conceptual function the concept serves is to delineate the indeterminate space of potential within practice which allows us to account for unplanned or unexpected outcomes (which may be either desirable or undesirable depending on the perspective of the observer). It is important that this space is understood to include explicit, formal, codified elements of practice, but that it is not restricted to these. This space appears in Guile's account of 'recontextualisation' (2014) as an implication of the essentially unpredetermined nature of the judgements made by practitioners in peer-reviewing the quality and validity of each other's representations of practice. Another dimension of this space is constituted by the continuous interaction, for better or worse, between the dynamic environment and human practitioners: this point rebalances Ellström's organisation-based account of practice-based innovation (2010), and enriches Billett's (2001, 2012) delineation of 'affordances' for workplace learning.

The concept of 'tacit pedagogy' suggests that continuous re-creation is a more accurate description of practice than repetition; it also unifies previous accounts to provide an explanatory mechanism for the emergence of innovation from everyday practice.

7. 'Entanglement'

'Entanglement' is proposed as an analytical and descriptive term which can overcome the phenomenological distortion in most accounts of practice and workplace learning implied by positing discrete dualities such as 'theory and practice', 'formal and informal' or 'tacit and explicit knowledge'. It is suggested on the evidence of this study, that TLZ R&D practitioners in the moment of practice experience these dualities not as distinct entities but as mutually-undifferentiated elements of the field of practice. They use their professional judgement to manage these entangled dualities, for better or worse, in their continuous reconstruction and renewal of practice. The term is not intended to echo its use in particle physics: a powerful precedent for using it in this epistemological context can be found in Barad (2007) who in her critique of technocratic epistemology speaks of 'the mutual constitution of entangled agencies' (p33). Introducing the term is also not intended to imply that there is no value in making use of these intellectual distinctions: rather it is a reminder that such conceptual devices distort practice as it is, for the most part, experienced and enacted.

8. Conclusion

This paper suggests that observing instances of 'writing up', 'peer review' and 'boundary crossing', and particularly of the degree to which and the ways in which, in different situations, they are undertaken formally or informally, provides a viable

methodology for evaluating the significance of the informal dimensions of workplace practice, learning and innovation, and that this approach may pay dividends in other contexts of practice too. Applying this approach to other contexts of practice would extend productive research in this field and help further develop the theoretical literature framing it. Different situations in which this conceptual, epistemological and methodological approach might produce interesting and valuable data would include practice in purely commercial organisations, in wholly web-based digital collaborative projects, designated 'crowdwork' by Margaryan (2019), in contexts characterised by self-employment, consultancy, in other forms of precarious contract work, and in 'hobbyist' activities (Marchand 2017).

Finally, future research might explore synergies and transferable insights between the organisation-level implications of supporting emergent innovative practice and the design of national-level enabling policy frameworks to support innovation (see for example Felstead et al 2009, Mazzucato 2017).

References

Akkerman, S. and Bakker, A. (2011). 'Boundary crossing and boundary objects'. *Review of Educational Research* 81 (2), pp132–169

Barad, K. (2007). *Meeting the Universe Halfway*. London: Duke University Press

Beckett, D. and Hager, P. (2002). *Life, Work and Learning: Practice in Postmodernity.* London: Routledge

Bijker, W., Hughes, T. and Pinch, T. (2012). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology.* Cambridge, Mass: MIT Press

Billett, S. (2001). "Learning through work: workplace affordances and individual engagement", *Journal of Workplace Learning* 13 (5), pp 209 – 214

Billett, S. (2012). Explaining Innovation at Work: A Socio-Personal Account. In Høyrup, S., Bonnafous-Boucher, M., Hasse C., Lotz, M. and Møller, K. (eds). *Employee-Driven Innovation: A New Approach.* Basingstoke: Palgrave Macmillan, pp92-107

Brown, J.S., and Duguid, P. (1991). 'Organisational Learning and Communities of Practice: Towards a Unified View of Working, Learning and Innovation'. *Organization Science* 2 (1), pp40-57

Derrick, J. (2014). *Learning through practice: a study of 'TLZ Research and Development'*. Unpublished Ed. D Institution-Focussed Study. London: Institute of Education

Derrick, J. (2019). *Learning, innovation and 'tacit pedagogy' in workplace practice: a comparison of two high-performing organisations in different sectors.* Unpublished Ed. D Thesis. London: UCL Institute of Education

Edwards, A. (2010). *Being an expert professional practitioner: the relational turn in expertise.* Dordrecht: Springer

Ellström, P-E. (2010). 'Practice-based innovation: a learning perspective'. *Journal of Workplace Learning* 22 (1/2), pp27-40

Engeström, Y. (2004). 'The New Generation of Expertise: Seven Theses', in H. Rainbird, A. Fuller and A. Munro (eds), *Workplace Learning in Context*. London: Routledge, pp145-165

Engeström, Y. (2008). *From Teams to Knots: Activity-Theoretical Studies of Collaboration and Learning at Work*. Cambridge: Cambridge University Press

Epstein, S. (1998). *Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe.* Cambridge: CUP

Felstead, A., Fuller, A., Jewson, N. and Unwin, L. (2009). *Improving Working as Learning*. London: Routledge

Fuller, A., Halford, S., Lyle, K., Taylor, R., and Taglborg, A-C. (2018). 'Innovating for a cause: the work and learning required to create a new approach to healthcare for homeless people'. *Journal of Education and Work* 31 (3), pp219-233

Guile, D. (2014). 'Professional knowledge and professional practice as continuous recontextualisation: a social practice perspective'. In Young, M. and Muller, J. (eds), *Knowledge, Expertise and the Professions.* London: Routledge, pp78-92

Høyrup, S., Bonnafous-Boucher, M., Hasse, C., Lotz, M. and Møller, K (eds, 2012). *Employee-Driven Innovation: A New Approach*. Basingstoke: Palgrave Macmillan

Jensen, M., Johnson, B., Lorenz, E. and Lundvall B. (2007). 'Forms of knowledge and modes of innovation'. *Research Policy* 36, pp680-693

Knorr Cetina, K. (1999). *Epistemic Culture: How the Sciences Make Knowledge*. Cambridge, MA: Harvard University Press

Kvale, S. and Brinkmann, S. (2009) *InterViews: Learning the Craft of Qualitative Research Interviewing.* London: Sage

Marchand, T. (2017). Introduction. In T. Marchand (ed) *Craftwork as problem-solving*. London: Routledge, pp1-29

Margaryan, A. (2019). 'Workplace learning in crowdwork'. *Journal of Workplace Learning*, 31 (4), pp250-273

Maxwell, J.A. and Miller, B.A. (2008). Categorising and connecting strategies in qualitative data analysis. In P. Leavy and S. Hesse-Biber (eds), *Handbook of Emergent Methods.* New York: Guilford Press

Mazzucato, M. (2017). *Mission-Oriented Innovation Policy: Challenges and Opportunities*. Working Paper #1. London: UCL Institute for Innovation and Public Purpose.

Nelson, R. and Winter, S. (1982). *An Evolutionary Theory of Economic Change.* Cambridge MA: Belknap/Harvard University Press

Schön, D. (1983, 1994 ed). *The Reflective Practitioner*. Burlington: Ashgate Arena

Schatski, T., Knorr Cetina, K., and von Savigny, E. (2001). *The Practice Turn in Contemporary Theory.* London: Routledge