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“Cascades, torrents & drowning” in information: seeking help in the contemporary general practitioner practice in the UK

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ABSTRACT

This paper responds to the Alpine Rendez-Vous “crisis” in technology-enhanced learning. It takes a contested area of policy as well as a rapid change in the National Health Service, and documents the responses to “information overload” by a group of general practitioners practices in the North of England. Located between the spaces identified by Traxler and Lally as “competitive industrialisation” and web 1.0, and the consumer/ customer focus and ubiquitous ownership enabled by portable and devices and web 2.0, in this work we see the parallels of the responses of publicly funded bodies moving towards privatisation as part of a neo-liberal agenda. Interviews with health professionals (HPs) revealed marginalised spaces for informal learning in their workplaces, and a desire to build a community that would enable them to overcome the time/space barriers to networking. The EU Learning Layers Integrating Project develops mobile and social technologies that unlock and enable peer production within and across traditional workplace boundaries. Through the HP narratives, we capture insights into their daily life, which enable the articulation of their needs for an online “Help-seeking” networking service, underpinned by their desire to consult what Vygotsky calls “the more capable peer.”

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Introduction

Technology-enhanced learning (TEL) – the crisis and response was an international seminar addressing issues emerging from an educational sector increasingly characterised by challenges, disturbances and discontinuities. The TEL community has been at the forefront of initiatives to democratise access to learning through digital means, including open access (Traxler, Beetham, Holley, & Hall, 2013). The “Grand Challenges” presented to the European Union at the conclusion of the scientific event held in France included a variety of suggestions and responses, one of which was:

Design research: inquire how citizens and groups use digital resources to support educational and other forms of cultural/social success; produce model design approaches that take full account of cultural, social and geographical differences. (Beetham, Perotta, & Holley, *in press*)

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This paper takes the position that the National Health Service (NHS) is a body in crisis, and that alternative ways of problem solving are needed, supported by cross-cultural and multi-disciplinary approaches. To bring about a meaningful and significant change, both technological innovation and theoretical approaches are needed, so as to respond to organisational change driven by national/political agendas.

The NHS and its change programme are having a significant impact on the operation of general practitioner (GP) practices and their clinics. The key policy document, *NHS Five year forward view* (England, 2014), establishes the strategic move to person-centred care, breaking down the boundaries between family/doctors/hospitals, and between physical/mental health and health/social care. It calls for action so as to develop and deliver new models of care through local flexibility and investment in the workforce, technology and innovation. The way in which technologies are being used for work-based learning was the focus of a critical review by Kraiger (2008). The key findings showed *that the favoured "learning model" was that of replacing direct instruction with technology – a didactic approach. However, companies are seeking to capture the full potential of social technologies and drive through changes to their business models – and individual companies stand to benefit most* (McKinsey, 2012, p. 9). The McKinsey Global Institute Report (2012) on unlocking value and productivity through the use of social technologies *suggests that the productivity of high-skill knowledge workers could be increased by 20–25% if the use of social technologies is implemented within and across an enterprise.*

Applying these principles to the scaling up of social technologies for informal learning in Small and Medium Size Enterprises in Europe is the focus of the EU Learning Layers Integration Project. The "Help-Seeking Service (HSS)," one of the project tools, has been developed through an analysis of empirical data; initial interviews suggested that health professionals (HPs) most valued "assurance" from their peers and found that email was the biggest barrier to effective working – "cascades" "torrents" and "drowning" were three adjectives used to describe their feelings as they try to put their patients first during constant change. Trying to bridge the gap between "what used to be" (i.e. professionals were based at the same site, they saw each other daily, informal learning was easily supported) and what is existing "now" (where staff work on their own, at different clinics), a clear need was identified to access the expertise of their peers, and the lens of Vygotsky offers a useful way to explore co-design with participants to develop meaningful and useful online tools to scale informal learning in the workplace. (Cook and Santos 2014)

This work has fed into requirements for the HSS, as well as offers a framework to respond to one of the key project research questions:

How can the use of co-design enable us to develop digital tools for health workers that enable them to maintain their professional identities at a time of rapid change?

Applying these principles to the scaling up of social technologies for informal learning contributes to key questions addressed by Learning Layers:

A more systemic approach to scaling support would enable individuals to receive relevant and meaningful support for their learning needs in the context of their work, and take better advantage of learning opportunities about emerging methods, materials and tools, or of valuable experiences of others. (Ley et al., 2014, p. 1)

This work is being given increasing attention within national agendas, and throughout Europe in particular (Ravenscroft, Schmidt, Cook, & Bradley, 2012). The affordances of mobile devices, harnessed around learning in informal contexts, offer ways in which to deliver training just-in-time and when necessary, making use of peer-to-peer networking and delivering collaborative solutions (Pachler, Pimmer, & Seipold, 2010). Often a contested area, and falling between policy discourses of employability and lifelong learning, Eraut (2004, p. 249) argues the term "Informal learning" is poorly understood and largely invisible, and based on the assumption that working and learning are "separate activities that never overlap." Thus in this body of work, we use the term informal as an adjective, and define it as follows:

a natural activity by a self-motivated learner "under the radar" of a tutor, individually or in a group, intentionally or tacitly, in response to an immediate or recent situation or perceived need, or serendipitously with the learner mostly being (meta-cognitively) unaware of what is being learnt. (Pachler & Cook, 2009, p. 152)

The nature of the EU study with its focus on professional practice locates our work within empirically based literature. We acknowledge the work of other scholars in the field (c.f. Sawchuck (2010), Evans (2009), Illeris (2007), Livingstone and Scholtz (2006)); however, the work of Eraut (2000, 2004, 2007, 2008) – with its connectedness to other scholarship/research in the field, specialist insights into the study of professionals, and typology of Early Career Learning (2008, p. 18) – provides a basis for our conceptual thinking.

Our research is located in participating GP practices in the north of the UK. GP practices in the UK are small businesses, owned and run by partners. At present, the NHS in the UK is undergoing a period of complete industry-wide change with hospital services being rationalised and resources moving to focus on specialist and GP services. The focus, as set out in the NHS Five Year Forward View (2014), is about person-centred care; however, calling for a change agenda has seen this operationalised in streams on diktats coming “down” the hierarchy, and thus top-down policy innovation is clashing with “bottom up” patients, arriving at the surgeries armed with print-outs of their ailments from the Internet. Researchers Yan and Sengupta (2013) found that self-diagnosis via Internet search is very common in today’s wired world. But it is HPs who struggle to keep up-to-date with the cascades of new policies and procedures, and they want to consult, and share practice, with others “like them.” A call for embracing technology for learning, from the NHS Health Education England’s TEL Review and Scoping Working Group, cited “clear evidence that innovative educational technologies, such as e-Learning, simulation and m-Learning (mobile learning), provide unprecedented opportunities.”

In the case of the HPs in our study, informal learning takes place, in the spaces surrounding activities and events with a more overt formal purpose (Eraut, 2004). An issue they are very familiar with is finding the time to think; with typical clinics such as asthma, diabetes and sexual health, “routinisation” is evident in their practices. Experienced staff, Eraut argues, be confident in their own proficiency, and take advantage of the great benefit of routine, enabling practitioners’ attention to be focused on rapidly changing situations and to consider their actions from a meta approach. However, pressure to perform different tasks, assimilate knowledge and learn new skills quickly leads to knowledge becoming less explicit and less easily shared with others. Thus, practices become more tacit and lose value over time as new circumstances arise – a situation Tharp and Galimore (1988, p. 35) refer to as becoming “fossilised.” Their model suggests that a return to initial capacity building, at the start of the Zone of Proximal Development (ZPD) (proposed by Vygotsky and detailed below), is required to reframe and share practice.

We can see the tensions of practitioners’ desires to continue with established procedures, against the discomfort of change in routine demanded by the cascade of policy updates arriving daily across the desk of PMs. Eraut (2004) acknowledges the discomfort and difficulty of change: old routines are gradually “unlearned” and the new gradually implemented – during this period, practitioners feel like novices, despite the expectations of both managers and patients for them to perform as “experts.” The work of Vygotsky, with his theories of the More Capable Peer and the significance of Signs and Tools in developing understanding, is useful to frame our enquiries into how our interviewees are sharing informal learning in the workplace. The paper is structured as follows: the importance of context and confidence as precursors to change; a brief discussion of the significance of Vygotsky’s work; findings from the empirical cross-case analysis; and finally we explore the implications of the Vygotskian theoretical framework in relation to the possibilities of the proposed HSS.

Context and confidence

For exploring informal learning in workplaces, the context in which the work takes place is significant; a group climate for learning needs to be created and sustained (Eraut). He notes that being proactive in seeking learning opportunities takes confidence, and that this was expressed in a series of interviews with novices and mid-career workers. However, the term “confidence” used in his workplace

context is more akin to Bandura's (1986) concept of self-efficacy, defined as "one's belief in one's ability to succeed in specific situations." Self-efficacy represents the personal perception of external social factors, situationally related, and based on four key factors: physiological factors, social persuasion, modelling/vicarious experience or experience/enactive attainment where the experience of mastery is the most important factor determining a person's self-efficacy. Eraut (2004, p. 259) notes a precondition of high mutual *trust* is necessary, which takes time to develop. He comments:

when people talk about evidence-based practice, ... their assumption is that practice is what they can observe. However, practice can be more usefully described in terms of a person's or team's capability; because this highlights what performers bring to the situation that enables them to do what is observed, much of which is invisible ... performance, therefore ... cannot be well understood by disengaged novices, trainers or researchers. Eraut (2004, p. 259)

This offers useful insights into what and how HPs approach their tasks, and learn from each other in a workplace characterised by a need for rapid and frequent change.

Vygotsky and the "more capable peer"

Articulating the lack of attention given to supporting the learning of subordinates in the workplace, and creating a climate that promotes informal learning, Eraut (2004) calls for further work to explain the practical implications to strengthen informal learning, arguing that these are "not yet widely understood" (p. 271). In the setting of the workplace contexts narrated in this study, interviews have identified that PMs and nurses appreciate the opportunity to learn from their more experienced peers; they want to share learning across different contexts. They lack an easily accessible network of peer support and an online tool that could enable this communication to have a significant impact on their own continuous professional development, as well as scaffold the development of their colleagues. The Vygotskian ZPD can assist us in theorising about how the more capable peer in the health sector can assist others in developing their skills.

The ZPD is described as follows:

It is the distance between the actual developmental level as determined by independent problem solving and the level of potential problem solving as determined through problem solving under adult guidance or **in collaboration with more capable peers** ... The zone of proximal development defines the functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in embryonic state. These functions could be termed the "buds" or "flowers" of development rather than the "fruits" of development. The actual development level characterizes mental development retrospectively, while the zone of proximal development characterizes mental development prospectively. (Vygotsky, 1930/1978, p. 86 – authors' bold)

Vygotsky distinguishes between the mediating functions of tools that are "externally oriented" and "serve as the conductor of human influence on the object of activity" and that signs are "internally orientated" and "aimed at mastering oneself" (Vygotsky, 1978, p. 55). Further, using *words* to create a specific plan, "the child achieves a broader range of activity. Searching for and preparing ... can be useful in the solution of the task and planning future actions" (p. 26). *Signs* can be categorised into mediating activities.

Cook (2010) proposed an extension of Vygotsky's concepts to adult learners to explain how learners collaborate using mediating tools (mobile phones, augmented reality, language). This work provides a description of the components of a "context" that emerges at run-time (i.e. when learners engage with a task/activity using tools such as mobile devices and language), whereby context is conceived as "a core construct that enables collaborative, location-based, mobile-device-mediated problem solving where learners generate their own 'temporal context for development' within the wider frame of Augmented Contexts for Development (ACD)" (Cook, 2010). The ACD appears to act as part of the substitute for what Vygotsky calls "the more capable peer." As Cook (2010) states, mobile devices can be used as mediators in an ACD using them as the more capable peer that is able to guide and scaffold the learners to find the solutions.

Vygotsky (1930/1978) also describes how a range of skills could be performed with assistance of a “more capable peer”: experienced peers who can assist in developing the person’s skills, who cannot yet perform independently. In Vygotsky’s cultural-historical writings, the more capable peer could be a parent, a teacher, etc. In general, the idea that “more capable peers” are important for learning has been a central theme in social and organisational learning for more than two decades but this concept has its critics. For example, Van der Veer and Valsiner (1994) labelled the concept of a “more capable peer” as one of the blind spots in the educational interpretations of Vygotsky, as it is always presented as beneficial, in contexts such as collective problem solving which Vygotsky never discussed and who in this context instead “focused more upon Culture as providing tools for thinking” (p. 6). For us the role of the more capable peer is context bound and differs from case to case.

Fotheringham (2013), in a relevant paper, looked at the development of skill and judgement in nurse practitioners (UK) in terms of confidence to seek help and can be used to guide our planned extension of the concept of more capable peer to help-seeking. The context of this paper is very similar to our context of study (NHS Health Board areas within Scotland, 95 nurse practitioners who had successfully completed a specified course of skills based education). Research methods were mixed-method and semi-structured interviews. The main goal of the study showed how the provision of feedback from experts to unexperienced learners has an influence on the development of learners’ skills and judgement. The authors used Vygotsky and social constructivism as the theoretical basis of their study:

Learners make interpretations on information based on the context in which it is placed and, thus, learning is an essentially social activity and can be considered to be the intersection between the person and the social world, with the context of learning placed at the centre of the experience.

An analysis is undertaken of the feedback interactions between senior and junior nurses (mentoring activities):

The participants of this study are trainee nurse practitioners who are undergoing a programme of education to prepare them in a variety of clinical settings. However, the successful adoption of these new roles [they position themselves and are positioned] will depend not only on developing skill but also in sustaining this skill base and although there is a long history of research and comment into the development and assessment of skill, little has been written on the sustainability of this learning. This process relies upon the development of accurate judgement and self-monitoring in the learner and on their ability to evaluate their own level of ability and diagnose their learning needs ... A key feature of this learning journey is the judicious use of feedback by the supervisor ... good feedback from a supervisor can aid skill development ... For the participants of this study, learning was a highly social activity and learning with and from peers in group discussion helped to form judgement.

Relations of power and hierarchy are also issues to be noticed:

The seniority and status of the doctors, nurses and workplace sometimes further conflated to impressions of being part of the professional socialisation of the doctors, an extension of the learning regarding the adoption of a new role and relationship to the doctors ... many statements were made on feelings of equality and professional socialisation with doctors, there remained feelings of separateness and hierarchy and although there was much support in development offered to the participants, these relationships appeared capricious and the historical hostility from the medical and nursing staff was voiced.

An interesting finding was the willingness of the participants to seek help and

know their limitations ... this interaction (exchange of feedback) has been seen to be one in which the learning of the nurse practitioners is dependent upon support and direction by the supervisors and demands of the workplace and the dependency that this engenders.

By integrating a HSS, we predict that this interaction could be potentially improved by enabling the learner to increase his/her connection with other “more capable peers.”

(In)formal learning: more capable peers' online network

Trends in informal learning in work situations have been identified by Schäper and Thalmann (2014), and their potential for uses in augmented contexts in the workplace echo calls from our professionals in their interviews for access to online tools “on the move” as well as an enabler when barriers to learning in terms of place and space are difficult to overcome. In particular, their focus groups showed that mobile devices enable workers to acquire knowledge in nearly every situation as they are not bound to office environments. The challenge for learning technologies in this regard is to support employees in filtering the overwhelming number of opportunities. Another advantage of using mobile devices is that the increasing creation of digital artefacts allows organisations to trace informal learning paths and gain documented learning experiences. These “informal” learning incidents are not currently captured within the GP practices we interviewed. The concept of the activity stream is the basic idea for integration, enabling a systematic analysis of informal learning in organisations. However, the drawback they identified was the potential of information overload – the “floods” identified by our HPs. Thus, the role of the “more capable peer” would need to be adapted, and one way of exploring this revised role could be in the appointment of what Eraut (2004, p. 271) calls a “new role of facilitated learning” in the workplace; here the concept of a knowledge-based economy and a learning organisation would share understandings of the complexities and uncertainties of the modern world, and offer a challenge to the dominant policy discourses both of governments and organisations. For Eraut, these bodies “treat problems as well defined and ... are therefore ... susceptible to formal types of training ... to clearly specified targets.”

The work of Palincsar and Brown (1984) on reciprocal teaching may offer a useful model for potential “more capable peers” of the future. This model combines expert scaffolding and guided practice in a group using cooperative learning discussions. Here the adult (capable peer) provides guidance and feedback to the needs of the current discussion leader and her respondents. Joint responsibility is a key feature; all members of the group, in turn, serving as learning leaders, responsible for orchestrating the dialogue and being “learning listeners” or supportive critics. The key activities most frequently undertaken and significant in the learning are:

Two of the four transfer tests were measures of the two most frequently engaged in activities during the reciprocal teaching sessions, summarizing (Brown & Day, 1983) and predicting questions that might be asked concerning each segment of text (Wong & Jones, 1981). In addition, two other tests were used as measures of general comprehension monitoring, detecting in- congruities (Harris, Kruthof, Terwogt, & Visser, 1981; Markman, 1979) and rating importance of segments of narratives (Brown & Smiley, 1977). (Palincsar & Brown, 1984, p. 133)

Thus, any online system may be enhanced by incorporating features (summarisation; predicting questions; comprehension; in-congruity) by recognising that learning will not occur in isolation. For Dourish (2004), it is the notion of embodiment, denoting a form of participative status – where interaction is intimately connected with the settings in which it occurs, considers work artefacts and activities and may play different roles through the direct embodiment that offers a solution to bringing together both tangible and social computing to better reflect the ways in which we experience the everyday world.

Cross-case analysis

In total, 11 health-care professionals were interviewed, at their normal place of work (i.e. GP Practice), over a 3-week period (between the following dates 29 April 2013 and 23 May 2013). A wide range of clinical, management and administration job roles were targeted in this interview sample, including GPs, practice managers, specialist and practice nurses, health-care assistants and administrative staff.

The three practitioners selected for the cross-case analysis worked in different GP practices and in different job roles, which therefore offers a wide variation of perspectives and experiences. NHS R&D approval was obtained for this study, allowing selected (anonymised) extracts of the transcripts to be included in this report, for purposes of illustration and example.

In terms of similarities, all the interviewees in the study were female, worked in the North of England and the practices where they are based can be typified as ranging from semi-rural to inner city. The practices ranged from a smaller practice based in one location to a very large more geographically dispersed practice offering clinics in a number of locations. In all three narratives, we can see a hierarchy/implicit status difference in terms of relationships inside the practices, the nurses/PM and the doctor/consultant relationship – one nurse comments that she would not ask a GP a question “because ... I find that quite difficult. We have a good relationship ... but you wouldn't get the same flow” (Tania; Practice Nurse; Practice B; 23 May 2013).

Following Wengraf (2001, p. 12) to build a robust cross-case analysis, three individual interviews should be analysed and compared as, if only two interviews are selected, there is a tendency to compare and stereotype, but by adding a third person the analysis is much richer. Thus, the interviews informing the cross-case analysis in this report are drawn from three different practices, giving insights into different working contexts. These interviews offer us a “snapshot” of the daily lives of the interviewees, and offer multiple perspectives of the practice as experienced by those living in a period of change.

Vignettes

Sonia presents as a dedicated and target-driven PM, who is keen to disseminate information in an accurate and timely manner: the right information to the right staff at the right time, and documenting the changes, ensuring that they are driven through and monitored, and that her practice is able to meet NHS targets and remain profitable. Significantly, through the interview, the processes and information flows are highlighted, which offers us some insights into the strategic priorities of practices. Much of the narrative displays business vocabulary, emphasising how much of the recent change to wider practice draws upon the UK Government principles (i.e. health as a business process, not a care provider). Sonia draws upon her peer network, facilitated via email, to make meaning of the many initiatives crossing her desk; this is what Vygotsky calls the “more capable and trusted peer.” Sonia is keen that nurses and health assistants have some network of their own for support. Here she identifies some of the issues she faces:

we have three part-time practice nurses, ... that work one day each a week, one of the nurses is our practice nurse around diabetes, and because they only work one day a week and generally a lot of that time is patient care, face-to-face patient care, it's not the same as having the same person, so they're kind of not integrating into the team which it feels very much like they work as locums, they come in and they see the patients and they go away, so I constantly chase up “have you seen my email about this, this is the change that's coming into”, and that can be any aspect ... (Sonia; Practice Manager; Practice C; 1 May 2013)

Sonia is learning from change, as well as facilitating others to learn.

Tania is a new nurse in her practice, and specialises in diabetes. Clearly keen to do a good job, she is not getting the support she anticipated – there is a lack of nurses' meetings (*I can't remember the last one*); the official template (*I wouldn't say the template is for learning*). Tania's ideal would be to revive the practice nurse group comprising nurses in three different towns in the region; however, she acknowledges this would be “impossible due to demands on nursing time.” She wants time to reflect and discuss her clinic experiences “at the end when somebody's [i.e. patients] gone and you think, hmm should I have done ... oh this happened, what do you think ... we'll go over things ... reflection” (Tania; Practice Nurse; Practice B; 23 May 2013). Clearly Tania wants to access a “more capable peer” to act as a sounding board for her emerging practice; this would benchmark and check her own practice.

Elizabeth is an experienced practice nurse who works at a busy practice running a number of clinics, and also goes out on home visits. She has an “excellent” relationship with her peers and is well informed as to national policy/local practice at the clinic (one of four in the area); she manages the SystemOne (a leading patient record system used by many organisations in the NHS)

internal patient system used in the NHS) and patients' needs. Her experience is evident in her comments about her diabetes clinics; she treats the person holistically in that she prefers to give her time to really focusing on the patient (as opposed to completing a complex online template), and sees their treatment as both psychological and medical. She has a firm grasp of the "tools" for the effective PN and is confident finding her way around both internal systems (SystemOne, templates, email) as well as using external systems such as Google for searching. As a reflective practitioner, she recognises the learning that can take place through conversations with peers, and is keen to find ways in which this can take place, thus reciprocity is key to her.

Her ideal learning points are informal:

unplanned discussions, you have to wait ... getting free time to do that" and "actually it would be lovely, wouldn't it, at the end of each clinic, to go through each patient ... to all sit down afterwards, ... (Elizabeth; Practice Nurse; Practice A; 29 April 2013)

Interactions between peers

All three of the women are comfortable otherwise with working and consulting a wide range of peers – data quality managers and administrative staff and nurses working at different clinics in terms of Sonia, the PM, and for Elizabeth and Tania the pharmacist, dietician, health assistants, interpreters and a range of other professionals. Tania and Elizabeth differ in that Tania would not usually consult the health visitors who are out in the community, whereas Elizabeth sees her colleagues who do home visits as a key part of the patient support team. She comments " ... it must be a nightmare if [someone] doesn't know them personally ... " (Elizabeth; Practice Nurse; Practice A; 29 April 2013). Regarding this difference in approach, this could be explained in part by the nature of the different clinical roles in the practices and Elizabeth's experience and time at the clinic having given her time to develop these relationships.

Implementing change

Being/feeling overwhelmed with the pace of change and communications about practice from "high up somewhere. It'll be the Government" is an underlying theme across our professionals; Elizabeth and Sonia are both tasked with onward dissemination of changes to practice, and this causes them concerns about how to *interpret and share* the relevant sections, in a context that the recipient will understand. Sonia tries to explain further:

By the time [they] have worked through and become overawed with the change that doesn't concern them! and feel quite flattened because ... They don't understand it ... So if we had these groups (practice nurse and health-care) when you've got change, something to say "change is coming in relation to ... and this element of change is relevant to you and this is where, how you'll work and what you'll do ... " because we don't have these peer groups, so everybody gets everything and everything is not relevant to everybody. (Sonia; Practice Manager; Practice C; 1 May 2013)

All participants express *concerns about the speed and volume of new practice guidelines* – applying regional guidelines and trying to embed new practices is seen as problematic – there may be a series of conversations, "but soon people have been doing things a while they just slip back into the old ways" (Sonia; Practice Manager; Practice C; 1 May 2013) and Tania in particular is not always convinced by the guidelines for new practices as "they seem to conflict ... and then they ideas change" [*sic*]. (Tania; Practice Nurse; Practice B; 23 May 2013). The constant updating is made more difficult by the time lag all three report on "SystemOne" which lags behind governmental briefing by around 3/6 months.

At the receiving end of the changes, Tania, as a new practice nurse, reports a complex set of *needs in terms of accessing information*, which she categorises as "time" and "urgency."

Her preference is to supplement the notes she can access on the patient by drawing upon notes from her courses, by looking at drug company websites and more general health sites; as time pressure increases, she is more likely to move from what Vygotsky terms as “tools” to “signs” – she wants to talk to a “more capable” peer. She is unable to do this as the clinics run concurrently, but manages her *need for more knowledgeable input* by using the internal email system and adds an “urgent” comment to her colleagues’ clinic list, trusting her colleague to come and support her. Thus, we can see unease at the key transition point from policy into practice and this is reflected from both the management perspective (Sonia) and that of the experienced nurse (Elizabeth). The lack of consistency is picked up by the new practitioner Tania, with her comments on practices that seem to “conflict,” and do not resonate with her very recent training courses. Tania comments:

she [the specialist diabetic nurse at the practice] might be busy when I need her, but there’s always something that you can do, ... take a bit of history and the same time so you’ll be **putting a note on her list** saying, “Please speak to Tania” and she’ll come and say, “What is it you want?” that’s how we tend to communicate. (Tania; Practice Nurse; Practice B; 23 May 2013, emphasis in the original)

Tools and signs

Sonia and Elizabeth perceive a need to move from “tools” to “signs” as a symbol of acknowledgement of change being “understood” by others. Vygotsky (1978, p. 26) suggests that using words to create a specific plan enables a child to achieve a wider range of activity, by applying *tools* “... but searching for and preparing such stimuli can be useful ...”

Our interviewees comment on a range of planning tools, e.g.:

... usually they’re a **printed sheet** (guidelines), like there might be **one laminated**, say for vaccines, childhood vaccines when they’re out of the usual, say they’re coming from abroad or we’re unsure of their history there’s like a **chart** we keep, so there’s guidelines from **NICE guidelines** and things like that. (Tania; Practice Nurse; Practice B; 23 May 2013, emphasis in the original)

For Sonia, the email torrent, the volume of change and managing change are mainly dealt with through a series of tools, and signs occasionally used when “it is simple [everyone acknowledges] to say ‘got that fine’” (Sonia; Practice Manager; Practice C; 1 May 2013). Elizabeth explains:

these new extra things that they need to remember. But I will, in passing, probably mention it to most people as well, just to say, “Had you got that? Did you understand it?” kind of thing. So that would be done purely by email, so that I’ve got a copy of what I’m, **[I know I’ve told]** everybody the same thing. So that was the important thing there. (Elizabeth; Practice Nurse; Practice A; 29 April 2013, my emphasis)

Learning in the workplace

Formal learning comes through courses, with access to space to store key documents via the practice intranet patient record system (EMIS). The nurses make extensive use of reliable and trusted websites (e.g. the menopause one) cascading them to patients, and are aware of bias on drug manufacturers’ websites. However, professional updating is not simple to arrange – Sonia sees whole staff meetings as inefficient and a waste of time; in smaller practices for a nurse to be released means cancellation of clinics. Set against a backdrop of the constant stream of policy change requiring professional updating, practitioners want to make sense of information changes in their own contexts.

Tania expresses her wish to have *time to reflect and discuss* her clinic experiences:

at the end when somebody’s [i.e. patients] gone and you think, hmm should I have done ... oh this happened, what do you think ... [in the ideal world] we’ll go over things ... reflection. (Tania; Practice Nurse; Practice B; 23 May 2013)

Elizabeth, the experienced nurse, sees the potential in sharing:

it would be quite nice at the end of each clinic, for all the clinicians who've been in that clinic, to sit down and go through the patients and what's happened with them. (Elizabeth; Practice Nurse; Practice A; 29 April 2013)

However, tight budgets and limited resources often push these spaces for learning into the informal spaces that are used by the nurses to catch up when passing each other at the start and finish of a clinic, or packing up at the end of a clinic, reflecting on the patients they have seen.

The more capable peer

In our context, informal learning occurs through interaction with peers (electronic and face-to-face) and their in-house pharmacist is a good source of information. Status has a role to play – although GPs are acknowledged as a source of excellent information, they are not a chosen point of informal learning “because ... I find that quite difficult. We have a good relationship ... but you wouldn't get the same flow.” This quote shows how *the behaviour interacting with similar peers is different from interacting with peers such as GPs*. The GP is only asked when Tania/GP are the only professionals running an external clinic in a remote area. Tania draws a *distinction between “insider peers” (other practice nurses) and “external peers” (district nurses) and GPs* – so the selected peer group for informal learning seems to be currently constrained by physical proximity, even if the selected communication is the practice intranet. This could be explained in the word “trust,” which has implications for the design of the Learning Layers “Help-Seeking” service, and, as Eraut comments, takes time to develop.

Elizabeth comments on her role outside, doing patient visits:

I've been on a home visit where I could have really done with looking something up and I had no way to do that ... so I've come back to the clinic and **I'm going to have a word with somebody** and go out and do it. I might actually look it up, actually. (Elizabeth; Practice Nurse; Practice A; 29 April 2013, emphasis in the original)

She does mention in passing that she “may have liked to look up the information,” if she had a smartphone, but clearly the peer to peer (P2P) interaction is the preferred mode of obtaining information.

Tania makes a similar comment:

I think just because you're working sort of independent you know you've got to get on with it and things and obviously if there's any queries like that I'd **ask another colleague** then you've got to handle it a different way ... (Tania; Practice Nurse; Practice B; 23 May 2013, emphasis in the original)

These instances can be related to Vygotsky and ZPD – the *nurses looking at their own level of independent performance*, considering what their level may be with assistance/collaboration and also considering what their level of independent performance would be after assistance.

In health care, PMs have access to a network of their own peers, and Sonia turns to her online peers for support – “I use it in the first line ...” (unless a practice-specific issue) – the PMs' network, and this group share knowledge and practice, and can be described as having self-selected areas of expertise they share. Interestingly, Sonia acknowledges that the health-care assistants and practice nurses lack their own peer mentoring groups of this type; and she seems to suggest that this is, in fact, a barrier to learning, in that she has to act as a filter point for practice nurse updating. She is uneasy in this role as she is pressurised, “And that's pivotal really, you need to ... be abreast of change all the time ...” (Sonia; Practice Manager; Practice C; 1 May 2013) and goes on to relay the sets of educational events, national and local guidelines she has to deal with on a regular basis.

Discussion

What characteristics would comprise a proposed network? By searching the narratives for insights, we can consider a personal learning network (PLN) system that enables its users to co-construct knowledge. We can see our HSS being realised in our emergent contexts as recommendation services to users for relevant, trusted and more capable peers. Furthermore, strong ties to a “more capable

peer” (as opposed to weak ties at edge of a person’s network) could be more useful in that they actually contribute slightly more to the overall knowledge gained by participants, and share less information the participant already knew (Popovich, Miller, & Karger, 2012). However, we note that weak ties on the other hand could reflect persons with another view on the topic and who, hence, could potentially contribute different knowledge and problem solutions in a workplace context.

Rajagopal, Joosten-ten Brinke, Van Bruggen, and Sloep (2012) suggest that to make best use of learning opportunities, three key elements are crucial in a PLN:

- (i) building connections: adding new people to the network so there are resources available when a learning need arises, (ii) maintaining connections: keeping in touch with relevant persons; and (iii) activating connections with selected persons for the purpose of learning.

Our analysis indicates that the professionals interviewed would value these features in the future design of a “Help-Seeking” service (Learning Layers, 2014). A preliminary, mock-up version of the HSS was presented in Santos, Cook, Treasure-Jones, Kerr, and Colley (2014) in which the results of co-design activities with health staff are discussed in detail.

Other useful features suggested, and also identified by Rajagopal et al are levels of interaction, ranging from the strategic (the capable peer pulling together relevant sections for their own contextual use and highlighting areas of rapid change in service for the help-seeker); to the capacity for dealing with government or NHS-generated technical documents; and the iterations of conversation generated from implementation. The HSS will facilitate the construction of locally trusted PLNs (i.e. internal peers), where professionals can seek collaborative support by interacting with their peers by tagging people and learning resources, and exchanging questions and answers around topics of interest. As a worker’s or group’s connections and confidence grow, they then go on to build what we are calling a shared learning network (i.e. other professional profiles and external peers).

The notion of “tagging” people draws from the EU MATURE project, which developed an ontology of collaborative tagging. Cook and Pachler (2012) review systems that enable tagging of resources and people; they note people tagging is a useful approach to the classification of the knowledge. Focus group feedback from nurses (Learning Layers, 2014) indicates that tagging potential network collaborators is increasingly important as a network starts to extend. A “Tag” for quick wins (e.g. drugs being withdrawn; medication alerts; technical hints and tips) as well regular updates, e.g. SystmOne. Embodied in users as well as their social networks, rather than digital artefacts, “dynamic alerts” moves us beyond existing approaches into more personalised uses of tagging, signifying the intention to communicate. The desire for an acknowledgement that the communication has been received, understood and internalised is crucial. The “Will/does this help you?” aspects of design, identified in the co-design workshops, explained as the need for an online equivalent to peer acknowledgement – “yes I understand”; feeling of the other users being present; sharing of good news stories; capturing reflections (more accurately the outcome of a critical/enquiry-based dialogue after a clinic). Targeted at HPs “like me” but could include “other professionals I consult” – dietician, data quality manager on specific instances; for a “new” nurse, a mechanism for the equivalent of “meeting” others would build confidence; the type of format suggested was like a “problem page” in a magazine. Ellison’s (2007) work on social network sites (SNSs) assists in identifying a key concept, where relationship initiation is emphasised; and Merchant’s (2012, p. 5) work suggests that SNSs are part of “the wider textual universe” with a significance placed on the unifying feature of public displays of friendship and connections.

Conclusions

This paper poses the question: how can the use of co-design enable us to develop digital tools for health workers that enable them to maintain their professional identities at a time of rapid change? We describe work investigating this by drawing upon narratives from the daily life of

professionals in medical practices; one conclusion is that we identified their preferred strategies for learning in the workplace, which very much focuses on the informal. Co-design revealed that the time/space for meaningful conversations, discussions and sharing of practice with their peers is being marginalised. The building of their own, negotiated, shared PLN by co-design with the Learning Layers team offers possibilities to enhance the interactions with their peers. The benefits of such a network lie in the personal; the opportunities to access the system on location, and there may be possibilities of extension in the future for “on the move” sharing of both context and content with selected others. Indeed, as Sonia (our PM) explains, she makes extensive use of her own e-group and considers the lack of equivalent networks as a barrier to the sharing of informal learning for her colleagues.

By taking a design-based research approach (McKenney & Reeves, 2012), a commitment to developing theory and practice simultaneously offers a multi-disciplinary, iterative and situated methodology. Researchers in the TEL community are offered a ground-up approach to exploring complex challenges, such as those identified in the Traxler/Lally response “after the dust has settled” (2015). In this paper, we have seen a publically funded organisation (the NHS) calling for rapid change, drawing up on free market principles; cascading these downwards throughout the bureaucracy; and drawing upon web 1.0 practices while calling for web 2.0 solutions. Individual practitioners, however, see that these moves to more market-based principles clash with dearly held traditions of sharing practice, knowledge and reflections in informal spaces; and they are calling for different ways to construct their networks and communities – looking for the flexibility of community building of web 2.0; complex situations which need tools that can situate meaning where interventions are introduced into real-life settings. The proposed HSS, in its practitioner approach, offers some insights into how it may be possible to integrate “large-scale TEL” into first-generation “industry” by drawing upon global and “just-in-time” principles – for our busy nurse to access her network, and find an answer to a question; to tag another practitioner’s response; and seek out other professionals by bringing personal devices from “outside” the institution to inside the institution, and benefiting that most precious relationship – the professional and her patient.

This work is feeding forward into a series of additional co-design workshops running parallel with the development of a working prototype, thus ensuring the presence of the user voice. The evaluation is contributing to the Learning Layers work on the use of the social semantic server, designed to underpin and scale usage of innovative tools in complex and challenging workplaces (Cook, Santos, & Holley, 2014). Further work is needed to investigate further the notion of context formation in health in particular, and integration into different contexts, for both formal and informal workplace settings.

Notes on contributors

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