Workplace Learning in Informal Networks

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Abstract: Learning does not stop when an individual leaves formal education, but becomes increasingly informal, and deeply embedded within other activities such as work. This article describes the challenges of informal learning in knowledge intensive industries, highlighting the important role of personal learning networks. The article argues that knowledge workers must be able to self-regulate their learning and outlines a range of behaviours that are essential to effective learning in informal networks. The article identifies tools that can support these behaviours in the workplace and how they might form a personal work and learning environment.

Keywords: Workplace learning, self-regulated learning, informal learning, personal learning environment

Introduction

Traditional conceptions of learning focus on the formal learning that occurs in contexts such as school, college and university education. These however form only part of the learning experience for any individual. Indeed, for adults, most learning will occur outside formal contexts either informally or incidentally (Marsick, Watkins, Callahan, & Volpe, 2009). Informal learning is typically unplanned, or highly embedded within other activities such as work. The workplace is increasingly recognised as a key locus for informal learning (Harteis & Billet, 2008), particularly in knowledge-intensive domains where classroom training approaches are unsuitable. In the workplace, an individual develops trusted networks of current and former colleagues that provide access to the knowledge and expertise necessary to perform their role. These networks may be internal to an organisation or can extend beyond organisational boundaries, and can be activated when new learning needs arise. However, to take advantage of the learning

opportunities afforded by networks, individuals must be able to plan and structure their own learning, and to know how to interact effectively in order to learn.

This article explores workplace learning in informal networks. The article is structured into four main sections. First, we consider the context of informal learning in the workplace for knowledge workers (people who produce knowledge as an output through work) in knowledge-intensive environments (Davenport, 2005; Drucker, 1999). We explore how the changing nature of the workplace requires knowledge workers to be able to self-regulate their learning (Zimmerman, 2000). Second, we explore how people self-regulate their learning in practice. We outline people's learning behaviours - activities we have observed in individuals as they managed, monitored and optimised their interaction with the people and resources within their network. This analysis draws on our previous research in knowledge intensive organisations in the petrochemical (Littlejohn, Milligan, & Margaryan, 2012") and financial services industries. Third, we consider how these behaviours are currently supported by the tools that make up an individual's personal work and learning environment. Functions that are missing from existing tools are highlighted and we explore how they might be provided. Finally, we conclude by considering the nature of knowledge workers' learning in an open, networked world.

Informal Learning in the Workplace

Over the last two decades, the workplace has attracted increasing attention from 'learning' researchers (Tynjälä, 2008). This increased interest has coincided with rapid changes in working life brought about by the advent of communications technologies and the expansion of the knowledge economy. Whereas work has conventionally been viewed as a context where learning was applied, much recent research has focused on workplaces as locations where learning actually takes place. Organisational structures designed to maximise productivity using the principles of Taylorism are being supplanted by new organisational structures and workplace practices that support continuous learning to maximise innovation (Clow, 2013). New knowledge is not written down and recorded in organisational knowledge bases, but is instead exchanged and created as work problems are solved by interdisciplinary teams. Workplace learning is therefore fundamentally social (Brown & Duguid, 2000; Eraut, 2007) and is supported and occurs through practices that are more open, recognising the expertise held by the individual and the personal networks they maintain. We are now in a 'Networked Society' (Castells, 1996) in which the connections between people, content and tools (especially in the workplace) are almost ubiquitous (in the Western world at least). Knowledge work is now routinely conducted in technology rich environments. With the advent of web2.0 tools and the social web, learning in these informal networks is enacted through digital tools and in the open, across organisational boundaries rather than within closed silos. Personal networks do not follow organisational boundaries, and include not just co-workers, but also ex-colleagues and, contacts made through professional bodies. While research exploring the nature of learning in workplaces has typically focused on organisational issues, research which adopts an individual, rather than organisational,

perspective is also needed (Illeris, 2003).

Learning in the workplace is fundamentally different from formal learning. Sfard (1998) identified two distinct metaphors for learning. The first, *acquisition*, is characteristic of formal education and training, where there is clear transmission of knowledge from instructor to learner. The second, *participation* metaphor, is more typical of workplaces describing the transmission of knowledge through participation in stable communities of practice (Lave & Wenger, 1991). However, knowledge work is becoming increasingly cross-disciplinary, involving experts with different skills working collaboratively to solve novel problems. In such cases, a participation metaphor, while appropriate for passing stable knowledge from expert to novice, is insufficient. Paavola, Lipponen and Hakkarainen (2004) argued that a third metaphor, the *knowledge creation* metaphor is needed to describe 'trialogical' learning (Paavola & Hakkarainen, 2005). This is the type of learning that occurs alongside the processes of *"deliberately creating and advancing knowledge"* that typifies knowledge work in modern society (Hakkarainen, Palonen, Paavola, & Lehtinen, 2004, p.11). In this view, learning is opportunistic, authentic, and dynamic, occurring as a direct by-product of work (Paavola, this volume).

Self-regulation in the workplace

To work effectively in continually changing environments, knowledge workers have to self-regulate their learning through cycles of goal setting, self-monitoring and self-reflection (Zimmerman, 2000; Veen, van Staalduinen & Hennis, 2011). Sitzmann and Ely (2011) conducted a meta-analysis of a number of different models of self-regulation that had been applied to learning in the workplace. Their analysis identified a core set of constructs common to all theories of self-regulation, concluding that differences between models largely reflect different theoretical traditions. One example originating from the domain of educational psychology is Zimmerman's Social Cognitive model of Self-Regulated Learning (2000). Typical of many models of self-regulated learning, this example divides the Self-Regulated Learning (SRL) process into three phases (Puustinen & Pulkkinen, 2001), forming a cycle. During the **forethought** phase, the individual recognises gaps in their knowledge, formulates goals and plans their learning. In the **performance** phase, learners make decisions about effort and enact learning strategies, all the while monitoring their performance. In the **self-reflection** phase, the learner self-evaluates their learning based on internal or external criteria, driving further goal setting and planning. In knowledge-intensive workplaces, SRL is a highly social process, structured by and deeply integrated with work tasks (Billet, 2001; Margaryan, Littlejohn, & Milligan, 2013). However, it is difficult to understand how knowledge workers can apply self-regulated learning (SRL) strategies to achieve their learning goals.

Learning Behaviours in the Workplace

Knowledge workers are often unaware of the extent to which they are continually learning while working. We have explored the learning practices of knowledge workers,

in both technical and non-technical roles, in the petrochemical industry (Littlejohn, Milligan, & Margaryan, 2011"; Littlejohn, Milligan, & Margaryan, 2012"; Margaryan, Milligan, Littlejohn, Hendrix, & Graeb-Koenneker, 2009). Through this research, we identified four key learning behaviours that knowledge workers use when learning in informal networks.

The four behaviours are:

- **Consuming** knowledge and resources created by others. Individuals may discover new knowledge passively, through the knowledge sources (people and resources) they have incorporated into their personal learning environment - or in a more active way - through directed searching.
- **Creating** new knowledge, by authoring and extending resources to elaborate and record current practice. The new knowledge and knowledge structures created represent a dynamic, faithful and individually focused view of the knowledge and understanding they possess about a given topic, and how different topics inter-relate. Structuring knowledge and making these knowledge structures public adds a layer of value from which others can benefit. This sense-making process is continual, and collaborative, generating collective knowledge that evolves and changes over time.
- **Connecting** with people and resources (information sources) in a learner's personal learning network. This includes linking with peers who share interests or goals to develop ideas, share experience, provide peer-support, or work collaboratively to achieve shared goals. Connections can be loose and serendipitous, or can be directed, as perhaps when an individual seeks out another individual with specific expertise. Connections may be reciprocal or unidirectional, and may be made between colleagues within an organisation, and beyond it.
- **Contributing** new knowledge back to the network. This can occur both formally (as reports, publications, and other standalone artefacts) and informally (as reflections, ideas, ratings and other context-dependent content). Creating new knowledge and contributing knowledge resources back to the network are open processes, encouraging discovery and consumption by others in the network.

These four learning behaviours - *consume, create, connect, and contribute:* termed *the 4c's* - are complex and the classification here is somewhat simplified. However, together, they represent the ways in which an individual interacts with other members of their network to achieve their learning goals. All four behaviours are most effective when conducted in the open, since 'openness' extends the reach of each individual's learning network and, therefore, maximises the potential benefits gained through interacting with others. Learning networks tend to be loosely bound. Connections between individuals can be formed or strengthened when people identify that they share a common learning goal. Other studies have identified similar behaviours to the 4c's described here. For instance, Kop (2011) describes a set of behaviours that enhance learning in connectivist networks:*aggregation, relation, creation* and *sharing*. Similarly, Davenport (2005) outlines a typology of knowledge activities, including *creating, packaging, distributing* and *applying* knowledge. Table 1 maps the 4c learning behaviours to different phases of the self-regulated learning cycle, highlighting specific

behaviours typical of each phase.

Table 1: Map of 4c learning behaviours and phases of the self-regulated learning cycle

	Consume	Create	Connect	Contribute
Forethought	Explore learning requirements via a search engine or other trusted information sources.	Articulate and record goals and learning strategies.	Connect to personal learning network to seek advice, or identify others with similar learning goals.	Make goals or development plan or learning strategies public and accessible by all.
Performance	Discover new knowledge to help achieve learning goals.	Create new knowledge or augment existing knowledge.	Engage with others to achieve learning goals, through collecting and connecting knowledge and developing new knowledge structures.	Make new knowledge and knowledge structures public, through formal and informal mechanisms.
Self-reflection	Seek evidence to validate learning strategy.	Write personal, reflection notes.	Find others with similar experiences to establish/confirm causality.	Public self-reflection through blogging or similar mechanisms.

The 4C behaviours represent the ways in which learners interact with the people and resources within their personal learning network. In effect, these behaviours describe how people self-regulate their learning. Together they illustrate how each individual plans, implements and reflects on their learning and development at work. We term this (metacognitive) process of planning and instantiating learning 'charting'. As people plan and manage their learning, they 'chart' their learning pathways. Therefore charting brings together the 4c behaviours (consume, create, connect and contribute; figure 6.1).

Figure 1. Charting learning pathways with 4c behaviours
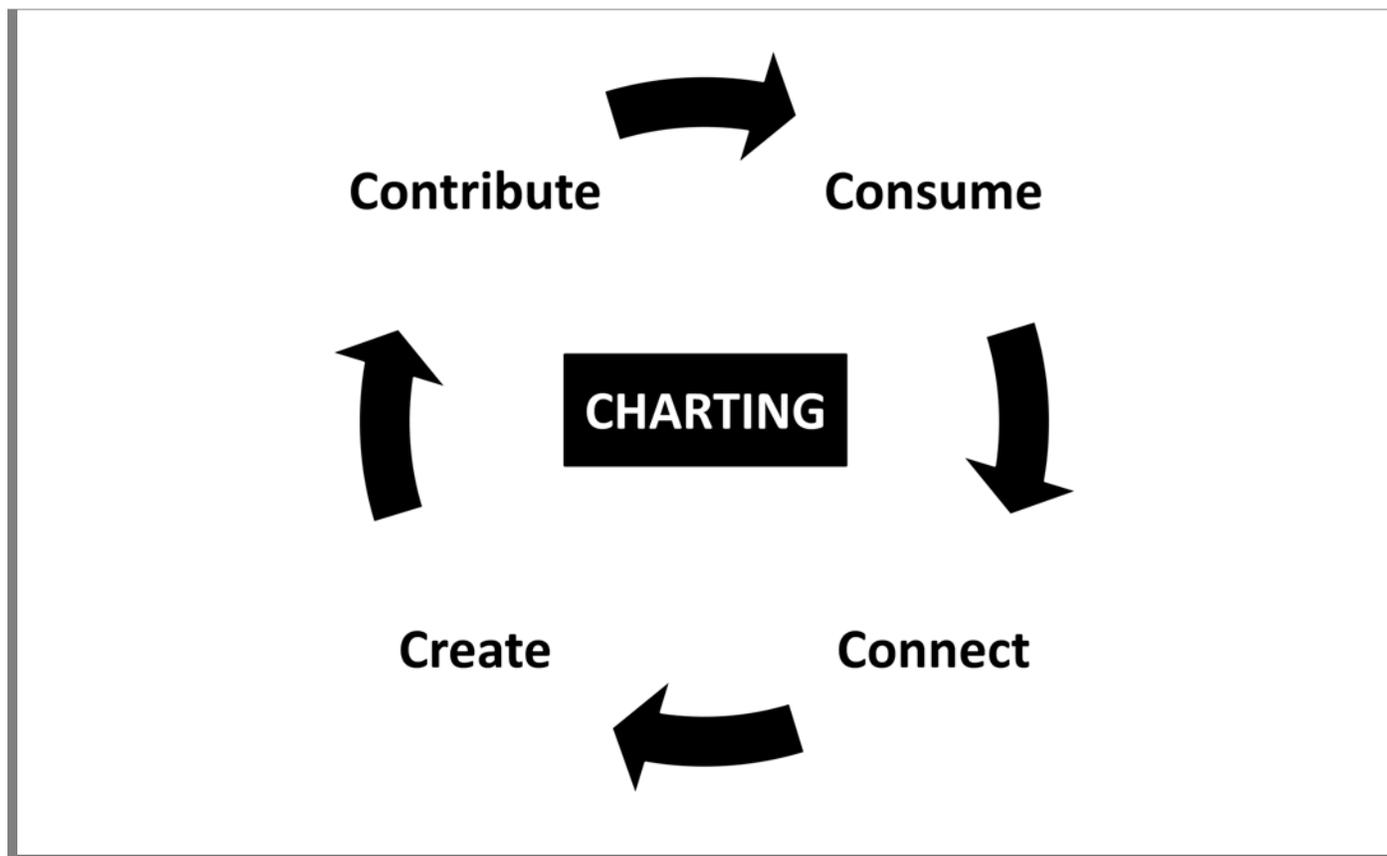
Supporting Charting through Technology

Increasingly, personal learning networks, mediated through tools such as Twitter and blogs, provide an important mechanism that allows workers to connect with other people from beyond their immediate group of colleagues. These open informal personal networks support learning in a variety of ways (Dron & Anderson, 2009): recommending new resources, filtering information streams, creating and augmenting knowledge structures. Digital tools influence peoples' learning behaviour, but the affordances of these tools can also limit the ways people are able to interact. We can map existing tools against each of the 4c learning behaviours identified above:

- *Consuming*: **Search engines** provide powerful mechanisms for discovery of new knowledge and ideas. **RSS readers** and **social bookmarking** tools assist in interacting with trusted knowledge sources.
- *Creating*: **Personal note taking tools** such as *Evernote* offer connected (accessible across devices) means to support personal annotation, knowledge creation and knowledge structuring.
- *Connecting*: **Microblogging** tools such as *Twitter* provide a method for establishing and maintaining personal learning networks. **Social bookmarking** and tools such as *Delicious*, *and Diigo* allow sharing of resource collections, and creation of knowledge structures. **Communication** tools such as *Gmail, Google Hangouts* and *Skype* facilitate collaboration and peer support.
- *Contributing*: **Collaborative platforms** such as *blogs*, *wikis* and *Google Docs* provide mechanisms for personal and collaborative publishing of new knowledge

and self-reflective content. **Cloud storage** such as *Dropbox* and **content hosting** such as*Slideshare*, *YouTube* and *Soundcloud* make it simple to share static files. **Social curation tools** such as *scoop.it* and *Pinterest* allow resource collections to be developed, accompanied by reflection and synthesis.

These tools are inherently open, encouraging the learner to make the evidence of their learning (the resources they use, the artefacts they create) public and freely accessible to all by default. In this way, one individual's learning becomes available to their peers, and to future learners. A range of these tools would constitute a learner's Personal Learning Environment (Leslie, 2012; Milligan, Beauvoir, Johnson, Sharples, Wilson, & Liber, 2006), integrated alongside the tools an individual uses to perform their work-role. The precise set of tools used depends on individual need and preference, but the full range of learning behaviours needs to be supported.

In compiling the list of tools that support the 4c learning behaviours, it becomes clear that some behaviours are poorly supported by existing tools - in particular, goal-setting. While tools such as Outlook contain useful task management tools and the web is inundated with 'to do list' apps, tools for expressing and managing learning goals are less common. In the workplace, goal setting may be supported through individual development planning tools. However, these tools are typically focused on organisational structures such as fixed timeframes (for example a 1yr development review) and are viewed (largely) as a private, rather than a public resource to be openly shared.

Goal setting is a critical component of self-regulated learning since it is the mechanism by which an individual recognises and articulates their learning needs and plans and monitors their subsequent learning. Learning is inherently social, so it seems incongruous that people's learning goals are not routinely shared. Articulating and sharing goals communicates learning intentions to other members of an individual's network. Goals provide a way of connecting with other learners. Charting is based on the idea that learners set and share their learning goals. Learning goals are individually set, but influenced heavily by others in the workplace and may be shared with co-workers or with colleagues outside the organisation. Furthermore, learning goals provide a purpose for interaction with other people and resources when learning. In other words, learning goals serve as a "social object" around which people interact (Engeström, 2005; Knorr-Cetina, 2001). Therefore tools that support 'charting' should promote social goal setting and goal-sharing.

A prototype charting tool has been developed (Milligan, Margaryan, &Littlejohn, 2012; http://charting.gcu.ac.uk/). This tool has been designed to support people in continually learning and expanding their work practice. The tool allows learners to articulate and share their learning goals, creating opportunities for connection and interaction with other people who may share the same or similar goals. The more learners there are in the network, the more effective goal discovery is likely to be. As the learner goes about their daily work, they can use a bookmarklet to associate resources with a specific goal. Providing simple ways to create and contribute new knowledge to the system emphasises that a user structures new knowledge by making his/her own connections between disparate resources. Over time, the user develops a set of resources and notes

which constitutes the knowledge and understanding they possess for that goal. Therefore, the charting tool allows individuals to collect and structure knowledge related to a specific learning goal. Through collecting (consuming), using (connecting), structuring (creating) and sharing (contributing) knowledge, people learn.

The charting tool is open and social: anyone in the network can view and adopt public goals contributed by other users. Once adopted, the learner gains access to all the public resources and notes created by the original user. This affords two usage scenarios. First, users can share goals, on which they are collaborating, for example, two or more co-workers who are on the same project and need to develop a joint understanding of a new area. Second, learners can search and discover goals and associated artefacts of other learners who are unknown to them. Finding others with similar goals allows them to gain an insight into how these learners achieved the goal they set or work with them to achieve goals together.

Conclusion

This article has highlighted that changes in the nature of knowledge work have placed increasing demands on knowledge workers to self-regulate their learning in the workplace. While self-regulating their learning, knowledge workers utilise four learning behaviours - consuming, connecting, creating and contributing knowledge. Together, these behaviours make up the processes of 'charting': a mechanism through which an individual regulates and participates in the learning and development and knowledge management essential to their effective learning in the workplace. Although focused on the individual, the behaviours (like the learning they support) are fundamentally social and enacted online. Traditionally, learning networks in the workplace may have been closed and private, controlled by the organisation. With the learner in control, the locus of learning moves to where the expertise is, and expertise does not respect organisational boundaries. Executives in some organisations understand this, and are moving towards greater use of open social networks by their employees. Furthermore, organisational leaders understand that if learning is viewed as something which occurs only 'within the organisation', then the possibilities for new types of knowledge interaction beyond organisational boundaries, afforded by social networks, are missed (Tapscott & Williams, 2006).

Understanding the nature of knowledge workers' learning at work as a set of learning behaviours allows exploration of how technology can support the enactment of these behaviours. The role played by technology in mediating this learning in the workplace is critical. For knowledge workers, computers (and, increasingly, mobile devices) represent the primary tool through which they carry out their role. Social tools disrupt previously closed organisational networks, freeing knowledge from internal silos. The use of public social networks blurs the boundaries between peers within the organisation and colleagues in the wider network. Peripheral network connections can become important members of an individual's personal learning network as specific needs arise. For the learner, contributing new knowledge and reflections back to the network is a key activity, as it enables reputations to develop, trust-based relationships to form, and

networks to grow. This in turn leads to more effective knowledge flow and learning. The value of the knowledge in the network increases as paradata - such as ratings and usage data - is incorporated. Emergent knowledge structures provide additional signals about the quality and utility of resources. Over time, the knowledge held by the network is enriched by the contributions of its members. Individualmembers learn from each other's reflective practice, benefitting from seeing how others solved problems, the resources they used and the routes they took to learn.

Informal learning in networks occurs most effectively as the boundaries between work and learning dissolve and where the individual is able to manage their learning in the context of their work. This facility to structure learning is not only critical for knowledge workers, but can also support lifelong learning. With an active aging population, more and more people want to plan, structure and take forward their own learning. Tools such as the charting tool described in this article provide a mechanism to discover others with similar interests who can provide support, advice and input in striving towards goals.

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