

ORGANISATIONAL LEARNING, KNOWLEDGE MANAGEMENT AND COMPLEXITY FUSION - EXPLORING THE "FLAVOUR OF THE MONTH"

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ABSTRACT

The fusion of organisational learning and knowledge management theory in recent years has prompted some important insights into learning and knowledge in organisations which are yet to be reflected in integrated practice. The meeting of the traditional perspectives in each of the fields has triggered sophisticated discussion about the the unit of analysis for learning (Stacey 2003a; Field 2004), nature of knowledge (Blackman and Henderson 2005; Spender 2006), and the process of learning and how it contributes to organisational knowledge (Spender 1996). Quite recently, the discussion has been further enhanced by authors who have become preoccupied with complexity theories in their application to organisations (Stacey 2003a; 2003b; Firestone and McElroy 2004).

The findings of the study described here provide insight into the relationship between learning and knowledge in organisations through the lens of complexity as well as providing some input into developing theories of complexity as they apply to organisations. The fusion of perspectives in organisational learning, knowledge management and complexity contributes to integrative discussion and informs more holistic representations of organisational experience. The study described in this paper provides empirical support for the blending of themes apparent in the ‘flavour of the month’. It supports the consideration of organisational learning and knowledge management within a single theoretical frame and points to organisational practice which accommodates the blending of learning and knowledge functions in organisations. It does also, however, draw attention to the difficulties in merging the theories unproblematically and highlights the relevance and importance of maintaining some traditional individual flavours of the informing theories in their mix.

That learning and knowledge management in organisations should remain discrete in practice is at odds with contemporary theory and the findings of this study. Their separation disregards the opportunity inherent in the complementary flavours that each brings to the organisational table.

Keywords: Organisational Learning, Knowledge Management, Complexity

In recent years there has been a growing interest in the relationship between organisational learning and knowledge management through complexity theory (McElroy 2000; Kurtz and Snowden 2003; Firestone and McElroy 2004). The fusion of these

seemingly quite disparate discourses provides new insights, not only into their fusion, but into each of the disciplines themselves.

While the fusion of the fields has become the ‘flavour of the month’ in some quarters, little empirical work has been undertaken to identify the ways in which complexity clarifies or strengthens understanding of the experience of learning and its interaction with knowledge in work contexts. In the recent PhD study described here, experiences of learning and knowledge in an organisation were considered within a single frame and their exploration was sensitive to complexity theory. In the study, the phrase ‘intimately entwined’ was used to describe the fusion of learners, knowledge and context evident in the experience of organisational members.

The study based itself on the premise that the fusion of organisational learning and knowledge management theories concentrates discussion on three major themes: the role of the individual in the knowledge of the organisation; the increasing problematisation of the nature of knowledge; and debate over the role of mental models and organisational schema in the learning of the individual and organisation. In the study it was argued that these themes align with central themes in complexity theories, and complexity was posited as an appropriate lens through which organisational experience might be viewed.

The confluent themes and complexity supported a blend of methodological approaches. The research was inspired by grounded theory, but recognised the value that complexity provided as a sensitising device. The population for the research was drawn from a large Federal government department with its head office in Canberra, Australia. As a service delivery department it is very close to the environment within which it operates. Changes in the social, political and physical environment in Australia impact immediately and forcefully upon the organisation and its business. Its selection as a case for investigation was prompted by the typical disconnection of learning and knowledge management sections in large, bureaucratic structures and the tension that exists between policy or ‘organisational’ knowledge and training approaches and applied or ‘local’ knowledge and learning.

Narrative methods were used to collect data and participants’ sense-making informed the researcher’s analysis of the results. The research progressed using three naturalistic groups, each of seven or eight participants. These participants met at length to share narratives of their experiences of learning and the ways in which that learning contributed to the knowledge of the organisation. Upon transcription, the collected narratives from each group were coded by a group of seven participants from across the groups. The participants then used these codes to develop categories in which codes clustered. These codes and clusters were used in the researcher’s further coding and analysis of narratives.

The emergence of a complex adaptive systems (Holland 1995) heuristic from the analysis of the collective narratives provided a ground for exploration of organisational members’ experience using the grammar of complexity. This exploration led to discussion of the ways in which complexity accommodates the consideration of learning and knowledge within a single frame.

The research explored the opportunities inherent in the fusion of the discourses, the opportunity to look at learning and knowledge in organisations through a single lens using

complexity theory as an integrating device. The fusion of themes in the literature provides support for more holistic perspectives on learning and knowledge in organizations and demonstrates the value of a complex adaptive systems focus in the mix. The study highlights the ways in which this fusion, while providing new flavours and accentuating features of the discourses so obvious in their separation, obfuscates others. It hints at caution in slavishly following ‘the flavour of the month’.

1 FLAVOURS EMPHASISED IN THE FUSION

Early iterations of knowledge management, while linked to organisational learning (or more obviously, to ‘the learning organisation’) differed from it, not only in focus but also in form. In recent years, and in the application of complexity theory to the fields, the apparently discrete fields have fused in their focus on a shared set of themes. These themes are at the centre of a research activity which was designed to enable better understanding of the learning experiences of organisational members and the relationship of this learning to organisational knowledge outcomes.

1.1 The Unit of Analysis

The link between individual, collective and organisational learning and knowledge has been a nebulous one. Whether organisational learning occurs as a result of the learning of its individuals has been hotly contested, research and opinion varying widely. Sivastva (1983) concluded from early research that organizational learning was wholly dependent on the learning of individuals within the organization rather than any knowledge sharing or organizational institutionalization of knowledge. Others are careful to differentiate between organizational and individual learning, and on the interactions of members of the organization and the social construction of knowledge that occurs as a result (Burnes, Cooper and West 2003). Spender, for example, strongly defends the opinion that the ‘...organization is capable of activities unlike those of individuals’ and goes on to assert that ‘...organizational properties had no correlate at the individual level and were not summations of individual capabilities, they were systemic properties that emerged unforeseen at the social level’ (1996). For Spender, it is in the interaction of individual and organizational knowledge, learning and memory, and the body of collective knowledge that is most vital to the organisation’s advantage.

Hedberg (1980) too asserts that organizational learning is more than the sum of the learning of its members, but focuses on the ability of any organization to develop ‘world views and ideologies’ which are impervious to change in the organisation’s membership and which are demonstrated through pervasive organizational behaviours, memories and values. In Hedberg’s argument, individual learning stems from the organisation’s learning. Fiol and Lyles share this understanding and summarise that organizational learning ‘...results in associations, cognitive systems, and memories that are developed and shared by members of the organization.’ (1985: 804).

Lakomski’s (2001) work on organisational learning focuses on connectionist networks and the distributed cognition that contributes to collective coordination. For Weik (2001) connectionism informs a discussion of the collective mind by providing insight into the form of connections within a group, a focus which ‘...is at once on individuals and the collective, since only individuals can contribute to a collective mind, but a collective mind

is distinct from an individual mind because it inheres in the pattern of interrelated activities among many people’ (Weick 2001: 262).

Lam (2001) on the other hand sees ‘the conversion of the acquired information or knowledge into organizational memory’ as the final stage in the process of collective learning. Further, in his view organisational learning is only possible when ‘...there is a collective mind which is doing the learning’.

The conceptualisation of a collective mind is apparent, too, in more recent knowledge management perspectives in which dynamic sense making at the collective level is linked to organisational knowledge outcomes (Snowden 2002). Tsoukas and Vladimirou (2001) attempt to reconcile individual and organisational knowledge through combination of ‘...Polanyi’s profound insight concerning the personal character of knowledge [and] Wittgenstein’s claim that all knowledge is, in a fundamental way, collective...’. Their empirical exploration demonstrates a continuing grappling with the relationship between the individuality and collectivity of organisational knowledge.

1.2 The Nature of Knowledge

While early knowledge management focused on knowledge as an explicit product of organisations, and busied itself with its extraction from organisational members and distribution throughout the organisation via information technologies, later developments recognised knowledge as more elusive, more problematic and in 2nd generation perspectives, more personal (Malhotra 2002; Snowden 2002) (see also, for an alternative discussion of generations in knowledge management, Firestone and McElroy 2002). This perspective allowed for consideration of organisational knowledge in its tacitness (Polanyi 1969), as personal, embodied and embrained (Lakomski 2001). In this iteration of knowledge management attention turned to the retention and transfer of embrained intellectual capital, and strategies shifted from those dominated by information systems to more human systems of knowledge sharing (Wenger, McDermott and Snyder 2002; Snyder, Wenger and Briggs 2004; Wenger 2004). In this iteration tools were utilised in networking for knowledge sharing and the development of knowledge repositories, but even in the presence of such intuitively obvious movement toward learning in knowledge management, links were not made between workplace learning approaches and the newly emergent knowledge management approaches in practice.

Insights from the organisational learning literature (Spender 1996) draw on the social construction of knowledge and in further development of knowledge management theories this issue has become an important focus (Wenger 2004). Learning literatures increasingly look to the ‘...Vygotskian school of developmental psychology ... in insisting that development occurs as much by interaction with others and the social and cultural aspects of the environment as by internal mental, affective and physical processes.’ (O’Donnell 1999). Fenwick (2004), too stresses that ‘learning is not a mental process occurring in a vacuum’, but that ‘The context of these new learning encounters – their cultural, political, physical-environmental and social dynamics – are entangled with individuals’ actions, emotional responses, identity performances and meanings...’.

Discussion about the construction of knowledge is one which addresses a paradoxical notion which has at its roots epistemological debate about the nature of knowledge and the

individuality of the social being. ‘Habermas (1984; 1987a; 1987b) rejects this purely monological view of rationality and meaning and proposes a more dialogic, self-reflective and intersubjective view where meaning must be understood as something created between people...This discourse-theoretic approach is complemented by Vygotsky’s (1978) affirmation of the ‘philosophical and political power of the ontological socialness of human beings’ (O’Donnell 1999) and underlines the fact that knowledge is ‘...indeed a tricky concept’ (Tsoukas and Vladimirou 2001: 975).

1.3 The Process of Learning and how it Contributes to Organisational Knowledge

It is perhaps as a result of this ‘trickiness’ that in both organisational learning and knowledge management literatures, learning is ill-defined, unlinked to educational theory and ‘simplistically mechanical’ (Spender 1996). However, one clear (and contested) theme across the literatures of organisational learning and knowledge management is that of mental models, their formation, challenge and disruption. In the organisational learning discourse Argyris and Schon (1996) introduced the notion of single- and double-loop learning to illustrate their conception of adaptive and generative learning. Within this framework adaptive learning results from instrumental learning which leaves underlying values about ‘theory of action’ unchanged. In double-loop learning, however, the paradigm through which the world is understood shifts, disrupting values and norms. Schein (1999: 168), too, discusses ‘cognitive redefinition, as the ‘...essence of generative learning to distinguish it from merely adaptive learning’.

Discussion of challenging mental models is found in cognitive learning discourse where schema organise knowledge in a way which guides thought and behaviour in order to reduce cognitive complexity. Karakowsky and McBey (1999) describe these schema or scripts as discouraging individuals from critically evaluating new situations as they arise’. Mezirow’s (2000) work on transformational learning also looks to critical reflectivity to bring schema to the fore so that they may be critiqued in order to bring about generative change.

In knowledge management literature Snowden (2002) speaks of disruption, of breaking pattern entrainment, the habit of acting on ‘...past or perceived future patterns’ (Klein, 1998 in Snowden 2002) in order to bring about radical change. Stacey’s work problematises the cognitivist and constructivist perspectives so available in organisational learning and workplace learning theories, regarding the focus on the individual as ‘...primary and prior to the group’ (Stacey 2003b, 49) as in conflict with theories of knowledge as interactivity and in contrast offers perspectives on knowledge and learning influenced by complexity theory.

1.4 Complexity Theory

Developing focus on the epistemological underpinnings of organisational learning and knowledge management theory and practice progresses alongside developments in complexity theories and their application to organisational contexts. Complexity theories focus on the dynamics of interaction, self-organisation, connection, holism and emergence. A complexivist view shifts focus from assumptions of clear and linear relationships between action and effect, reductionism and direction to the emergent outcomes of nonlinear interaction.

Increasingly, organisation theory incorporates complexity in attempts to represent observations and understandings of organisational experience in holistic ways. The well worn basics familiar to those interested in organisational dynamics rooted in traditional, linear approaches; organizational structures, behavioural change, and communication (Stacey 2001) are backgrounded in a perspective informed by complexity theory. Through this perspective the debate surrounding the relationship between individual and organizational learning is resolved as ‘... a paradox in which individual and group/organisation are aspects of the same processes of interaction between people’ (Stacey 2003b: 326). Learning is understood as ‘...shifts in meaning and it is simultaneously individual and social.’ (Stacey 2003b: 330).

Adaptation is inherent in complex systems and each discussion of complex adaptive systems includes reference to change as a result of nonlinear interaction within a context. Indeed, complex systems are, by nature, learning systems (Davis, Phelps and Wells 2004). Complexity theory offers a way of thinking about knowledge and learning that promises fresh considerations of the issues that have divided knowledge and learning functions in organisations.

Hawking predicts that this century will be the century of complexity (2000). Just as Newtonian science informed industrial notions of organisation and management operationalised by Taylor and practiced throughout the past century, organisational theorists are now looking to the new sciences for insight into organisations and their processes (Capra 1983: 31-33). In organisational learning and knowledge management complexity offers a gateway for the integrated investigation of the learning that occurs in organisations and the interaction of that learning with the knowledge of the organisation.

2 THE STUDY

The fusion of themes in organisational learning, knowledge management and complexity provides a base for exploration of organisational learning and knowledge in a novel way. Freed from discipline-specific questions for investigation and supported by the opportunities afforded by complexity theory, this research was designed to investigate the ways in which individual and collective learning contribute to organisational knowledge as well as the ways in which organisational knowledge is accessed and utilised by organisational members.

Complex adaptive systems theory provided an important sensitising device to the research, focusing attention on the aggregation of organisational members, the ways in which they identify others for selective interaction and the flows of information and resources through the system. It also directed observation to the role of diversity in learning and knowledge development, nonlinear interaction, and the ways in which individuals and collectives used and reconstructed mental models as a result of interaction with each other and their environment (Holland 1995).

2.1 The Organisation

The participants for the research were drawn from a large Federal government department with its head office in Canberra, Australia. This government department enjoys the stability of the national public sector framework while competing with non-government

organisations for work and subsequent funding. As a service delivery department it is very close to the environment within which it operates. Changes in the social, political and physical environment in Australia impact immediately and forcefully upon the organisation and its business.

The organisation is at the forefront in Federal public sector organisations in its development of knowledge management strategies that integrate latest knowledge management theory. Diverse knowledge management initiatives can be observed throughout the organisation, it is formally recognised as a strategic business issue.

Learning is a primary focus for this organisation. It has set up an award winning Registered Training Organisation within its boundaries and the organisational structure is supported by a learning and qualification structure. The organisation’s leadership group is committed to the learning of its members, and the value of learning is overtly discussed at all levels of the organisation.

The organisation is geographically dispersed and diverse in its membership in terms of educational background, cultural background, age and role. Varying workplace cultures exist providing breadth in organisational understandings, practices, and values.

The study drew on the experience of a total of twenty-one volunteer participants from three different naturalistic groups within the study site. The three groups operate within three discrete parts of the organisation; the learning and development centre, the information and communication technology centre and a client service centre.

These twenty-one participants contributed to the narrative workshops and from these participants, seven volunteers contributed to the sense-making and open coding activity, one from the learning and development centre, four from the information and communication technology centre and two from the client service centre.

2.2 Method

Complexity theory suggests, and grounded theory allows for, the iterative development of a research question based on emerging data. This research followed emergent themes from investigation. As the narrative developed and new insights and understandings were shared new perspectives emerged to inform the research question. Development of the question was bounded by the core terms learning, knowledge, organisation and complexity and began from the question, ‘What learning experiences support organisational knowledge?’

The methods were developed alongside the theoretical framework of the research. They were designed to elicit novel perspectives on the nature of learning and knowing, drawing strongly on the interactivity of collectives within the organisation, their stories and the ways in which they made sense of their experience.

Narrative was used extensively in the research. Narratives, according to Stacey (2001), rather than facts, ‘...make experience meaningful and are the privileged mode of sense-making’. The study sought to draw on that sense-making in order to better understand the phenomena. Similarly, the study used collectives to provide insight into social construction of meaning in the organisational context. Weick (2001) regards sense-making as both

individual and social and affects the way in which text is constructed and interpreted. ‘When we describe something we are...reporting how something is seen and reacted to, and thereby meaningfully constructed, within a given community or set of communities’ (Crotty 1998).

The study drew on interactions of collectives in both the development and analysis of narratives. While individual stories were told, they were told within a social context and were subject to sense-making at the collective level.

3 FINDINGS

The narratives of this study’s participants highlighted issues around the social nature of learning, its emergence through individual and collective engagement with a changing and challenging environment, and the iterative development of knowledge through myriad interactions with diverse others. Participants’ narratives, too, underlined the processes through which they learn to cope with the challenges of the work environment through their identification of, and selective interaction with, entities that could support their success. Their stories told of the ways in which this selective interaction contributes to the success of the collective rather than the success of the organisation because of interruptions in the flow of knowledge between groups. The mechanisms for sharing across boundaries are described as limited by individual as well as organisational structures and schema, participants pointing to the need for structures to be broken down and recombined in response to contextual change.

These experiences were richly suggestive not only of the properties and mechanisms of complex adaptive systems (Holland 1995) but also of major themes across the literatures. Resonance was clear in the relationship between the literature’s interest of the unit of analysis and the concepts that emerged from the findings around aggregation and tagging. Similarly, consideration of the nature of knowledge as complex, situated and active aligns with the findings, particularly those categorized under nonlinearity and flows. The third major theme, about the process of learning and its relationship to organisational knowledge is mirrored in the findings categorized in internal models, diversity and building blocks.

While analysis developed along the properties and mechanisms of complex adaptive systems, and narratives were understood to be stories about agents operating within a complex adaptive system, the heuristic allows for broader interpretation. The themes linked with, and provided support for, fusion of theoretical perspectives described in contemporary organisational learning and knowledge management literatures (for example, Fenwick 2001; Winch and Ingram 2002; Vera and Crossan 2003; Fenwick and Tennant 2004; Field 2004). Some findings are briefly discussed here in relation to the convergent themes discussed earlier with insights from complex adaptive systems.

3.1 The Unit of Analysis

Participants talked about the relationship between the individual and the collective, recognising that through selective interaction individual learning contributed to that of the collective, ‘*But that’s not limited to you, to you individually. What you learn flows into us...*’ (participant 1.1). But more critically, their narratives told of a sense of collective knowledge. The knowledge that was amassed by the local aggregate within its environment

was held close within the aggregate, protected from the ‘organisation’ and used to inform local behaviour and culture.

Individuals spoke about their learning and that of the aggregate with whom they solved problems and shared knowledge almost interchangeably. The aggregate’s ability to innovate and solve problems in order to better meet the requirements of its environment was a central theme in narratives on learning and its support of organisational knowledge.

Participants told of the clear dislocation between this local aggregate and ‘*the organisation*’ or ‘*head office*’, collectivity of knowledge perceived as being confined to the individual’s immediate problem-solving context. ‘*Workarounds*’, shortcuts, and rule bending were seen to be knowledge of the collective, inspiring such comments as, ‘*We do a lot of workarounds that National would have a fit if they knew we did them*’ (participant 2.7) and ‘*We do things quietly*’ (participant 2.3), so while knowledge was developed and deployed at the local level, the collective knowledge remained with the local collective.

Discontinuity of knowledge sharing was particularly obvious in a perceived tension between policy areas of the organisation and those implementing or operationalising policy. At the policy end of the organisation there was a pervasive need for consistency, an encumbrance for those working with customers in its deployment where autonomy was seen as critical to meeting the ubiquitous novelty of the work. As a result, rather than aggregates working within nested hierarchies where each aggregate level contributed to the learning of the next, a knowledge chasm was shown to exist between ends of the organisation, the learning occurring between agents within the local aggregate seen as deviant and their innovations shielded from ‘*the organisation*’.

Attention to the relationship between the individual and the collective is central to the tenets of complexity. From a complexity perspective, the individual is irreducible from the collective; the individual and the collective are each a single learning entity. The focus in complexity is on the patterns that emerge from the collectivity of interaction of individual agents – that is, in complexity the individual and the collective are not discrete, rather, the individual and the collective are at once formed and forming, being and becoming. The unit of analysis for learning is unclear when individual and collective are indiscrete and learning emerges from, and contributes to, the dynamic interaction of the two.

Collective behaviour emerges from the interaction of agents – the learning of the collective not reducible to the learning of any individual agent nor a collection of individually learning agents, rather to the collectivity of the learning that occurs in interactivity. Backstrom’s (2004: 466) definition of collective learning as ‘...rather enduring changes in a collective as a result of interaction between the collective and its context’, captures a notion of collective learning concomitant with complexity although the findings of this study suggest that even its separation of collective and context is inappropriate.

3.2 The Nature of Knowledge

Participants’ stories illustrated their constructions of the terms ‘learning’ and ‘knowledge’, learning seldom relating to formal learning strategies within the organisation, and initially, knowledge seldom relating to ‘*common*’ or ‘*localised*’ knowledge. When participants in customer service in the organisation were asked to tell of their experiences and how they

contributed to organisational knowledge they insisted that they did not. At all. This comment early in one narrative workshop illustrates the ways in which the group had constructed a meaning around knowledge,

‘Suppose at this level we’re still stuck in what we do every day, I mean at the level that’s more grass roots than national, um that all we do is implement, we don’t necessarily create ideas or affect the organisation. We don’t see what we do every day, whether it be a workaround or finding a different way of dealing with a difficult customer as being any more worthwhile to the organisation than it is to us as an individual and to our office’ (Participant 2.1)

In this one example, the complexity of knowledge, its iterations as activity, problem-solving, innovation, a thing, a flow, individual and collective are each illustrated. Knowledge was valued only by its credibility in application, its availability at the point of problem-solving, its relevance to immediate, local and novel problems and learning was seen as occurring at the local level through interaction with (and through attempts to survive and improve fitness within) a local environment.

The nature of knowledge as an emergent property of the iterative interaction of agents in context is highlighted in learning and knowledge management literatures which are influenced by or draw on complexity theories. In this study, the role of the individual and collective learner in the development of knowledge through engagement with work is highlighted. The situated nature of the knowledge emerging from this engagement and its local production in localised activity of organisational members’ nonlinear dynamics is similarly important. The tension that this emergence creates in the formal organisation which is focused on client (that is, policy developer) requirements for consistency leads to frustration for members, lack of sharing outside of the aggregate, and protection of the aggregate.

3.3 The Process of Learning and its Relationship to Organisational Knowledge

Learning was also seen to be both adaptive and generative, and stories shared revealed examples of both occurring in response to pervasive novelty in the environment. In examples of shifts in collective and organisational knowledge, participants often spoke of ‘self organising’ teams who were operating in ‘frantic palaver’, which were diverse in background, came together for a short time and were able to operate outside of specific direction. Participant 3.1 spoke of her time with such a team which, ‘*was self empowered like that, and was able to find its own order, and to, out of, because people felt so comfortable, and because it sort of was like its own little hothouse, if you like, and it was able to generate all sorts of innovative and different approaches to different things, and we were lucky then...’*

Occasionally, participants spoke of others in the organisation with fixed mental models that they considered in need of disruption, ‘*There was no room for anything else. So, he couldn’t understand, didn’t matter what we did, he couldn’t understand what was being proposed, and he didn’t see the value of it, and that makes life quite difficult’ (participant 3.1)*. The sense-making workshop group identified the code ‘set in their processes’ to

cluster themes around the barriers they to learning and knowledge development and sharing in the organisation.

The emergent themes in this study of *diversity* and *internal models* are coherent with important debates in theories of workplace and organisational learning, and those of knowledge management. In Holland’s (1995) work, internal models are central to notions of learning, ‘All complex, adaptive systems – economies, minds, organisms, build models that allow them to anticipate the world’ (Waldrop 1994: 177).

In this research learning cannot be seen to be unproblematically attributable to expanding cognitive models. Learning is illustrated, rather, as emerging from myriad influences and linked to the whole, interactive learner (whether this be individual or collective) within a context and time.

4 FLAVOURS OBSCURED IN THE FUSION

The findings of this study in their alignment with complexity metaphors leads to reflection on traditional notions of formal learning and knowledge management practice. The fusion of themes in the fields through the complex adaptive system metaphor set prompts discussion using a new language which accommodates focus on connection and self-organisation. The metaphor set places some features of the participants’ experience in relief and it is these features which have informed discussion to this point. Fuller understanding of the experience and of the value of the fusion, however, can only emerge in consideration of what exists in the background when some features are brought to the fore.

The aspects of the participants’ lived experience that are not fully represented by the categories and definitions of the complex adaptive systems model are introduced below. This is not to suggest that they are not accessible through complexity, rather that the distinct properties and mechanisms of Holland’s (1995) model do not immediately point to their analysis.

4.1 Power and politics

In the study issues of power, economics and politics emerged on the periphery of analysis in relation to emergence and organisational limitations to building hierarchy through aggregation. While the links between organisational learning and power and politics have only recently gained prominence (Easterby-Smith, Crossan and Nicolini 2000), for some theorists (for example, Schein 1999; Huzzard 2004) these themes are central to understandings of learning and organisational dynamics. Issues around coercion, oppression, control, and direction are tied up with notions of moral force. Such notions challenge hegemonic logic in learning and organisation including the superiority of expert, scientific and disciplinary knowledge, and the orthodox positioning of the professional educator as the legitimate vessel for valued knowledge (Fenwick 2003). While not explicitly accessible through categories of complex adaptive systems, this study does highlight such issues, the narratives confronting traditional assumptions about legitimate organisational themes, allowing consideration of shadow themes.

Perspectives such as Holmes’ (2004) which challenge assumptions of empowerment through learning and Schein’s (1999) related preoccupation with organisational learning as

coercion, provide insights into deeper issues on the complexity of power relationships in organisational learning. In this study participants’ views supported a perspective in which learning (rather than training) prompts and promotes workers’ opportunities for more autonomous action while simultaneously opportunities for autonomous action lead to learning.

Schein’s (1999) concerns about coercion are also important in this study, however, his assertion that employees are coerced to shift their individual schematic sets to meet cultural change is challenged by the findings. Schein suggests that generative change by the individual requires free choice of exit, and that employment limits freedom to exit. While there is no argument with this claim, this study illustrates that individuals also exercise their freedom of exit by merely meeting the needs of *the organisation* rhetorically while persisting in behaviour that maximises their effectiveness in the immediate environment.

The experiences of the participants accords with Contu and Willmott’s (2003) conceptualization of power as articulated through social constructions of truth and exercised in localised practices and relationships. *Empowerment*, for the participants in this study, reflects a meaning in which the employee assumes power over the workplace rather than one in which the employer delivers power to the employee (Field 1997: 149). In this way, this study provides insight into the problematic and largely unaddressed relationship (Huzzard 2004: 350) between learning and power in situated learning theories.

4.2 Emotion

The complex adaptive systems model suggests an arrangement whereby action based on simple rules impacts on others taking action and from which patterns emerge. Indeed, mathematical simulations of complexity do just this. It would be easy then, using the model, to consider the interactions that occur in the workplace to be merely mechanical processes of selection, interaction, and response. However, as Spender (2003: 267) asserts, ‘...it is no longer empirically acceptable to avoid dealing with emotion in our organizational theorizing’. The study illustrates, and much literature supports, the recognition of the influence of emotion on the interaction and emergent properties of interaction (for example, Weick 2001; Fenwick 2003; Fineman 2003; Marshall and Simpson 2005).

In the study discussed here, the nonlinearity of the participants’ experience would be expected to lead to high levels of arousal. Weick (2001) develops an argument where the novel events in technology rich environments increase interruption to and pressure in the work environment which in turn increases emotion. In the study site participants spoke of ubiquitous novelty and change, of *frantic palaver* and *bubbling chaos*. Participants spoke emotionally about their experience and their stories reflect emotion as an emergent property of their interaction within the work context, again, emotion emerging from and contributing to the interaction and the resulting patterns of behaviour.

Emotion is a theme which emerges, too, in the feminist literatures (Hayes and Flannery 2000 in Bierema 2001; Reger 2004) in discussion of the choices for interaction and learning women make in the workplace. This literature supports the findings of the study which illustrated the value placed on relationships for learning and knowledge sharing in aggregate. In the study, however, both male and female participants discussed the emotion

in connections, the *sphere of inclusion* theme carrying with it important issues about the role of emotion is selecting others for interaction and the development of supporting relationships based on trust.

4.3 Intelligence

The complex adaptive system model does not provide a frame for discussion of intelligence as a singularly individual characteristic. Using the model, intelligence is held in the agent’s ever-changing mental models, in their selection of others with whom to interact and in the iterative interaction itself. In this way, intelligence from a complexity perspective sits at once within the individual and the context, but alone in neither. The ‘inherent capacity’ aspect of intelligence theory (Fenwick and Tennant 2004: 57) is not recognised in this model, unless it can be reduced to the mental models of the individual. Such a cognitivist construction is at odds with the narratives collected.

The findings accord with Spender’s (1996: 65) conceptualization of intelligence as ‘...both the ability to experience and the facility to abstract from that experience’, a behaviour noted in this study in individual and collective pursuit of effectiveness in the environment.

4.4 Ethics

A variety of ethical issues in work associated with the activity of organisational members in their learning and knowledge sharing emerge from the study. While the model does not lend itself immediately to discussion of ethics it is an important peripheral theme.

Ethics emerged in narratives of knowledge *ownership* and the equity of formal relationships in the organisation. Several narratives describe experiences where knowledge developed within the local aggregate is appropriated by others at higher levels of the organisation, these others then receiving recognition for it as their own. Similarly, they reflect a hierarchical structure and rules system in which conformist behaviour is seen as good and nonconformist as bad. Stacey (2003b: 395) positions this view of ethics as one in which ‘...leadership and ethics become matters of explicating the rules of qualities of the harmonious whole and of individuals conforming to it’. In this study, in which no harmonious whole is seen to exist as *the organisation* and in which non-conformity is seen to be critical to acting ethically, ethics takes on a new form.

The ethical considerations participants made are based on an emergent understanding of ethical behaviour as discussed in relation to *the right thing*. This local construction of the ethics of work practice is open to development within the context but closed to other areas of the organisation, thereby allowing for a construction deviant from organisationally or even societally sanctioned ethical standards.

Ethics in the study as not about participants adhering to a clear set of standards based on universally held codes of conduct developed rationally by individuals. It as much more closely aligned with the thinking of Griffin (2001) whose focus on the interaction of agents with one another in the development of ethical approaches is based in context and moment. Such constructions of ethical behaviour make it impossible to shirk responsibility for one’s own action. The study, however, also highlighted the role of the iterative construction of ethical action as defined by the group, the aggregate providing an opportunity for the individual to claim group responsibility for action.

There were several examples of individuals acting on their local ethical standard and being prepared to lose respectability (and employment) as a result. This is an important consideration when reflecting on self-organisation, learning through work and the development of ethical practice and knowledge in the organisation.

5 CONCLUSIONS

It is clear that the fusion of organisational learning and knowledge management through complexity theory offers an opportunity for a more holistic understanding of organisational experience. The fusion in the literatures provides a background for integration of theory and practice and in doing so highlights important themes for attention. In this paper, complexity theory provided a ‘...a new, active, grammar... to facilitate the analysis of those complex relations which exist within the passive constructs of management and organization’ (Collins 2000: 12), a useful yet too simplistic a frame for a complete discussion of findings in this study. The grammar of complexity is insufficient for full representation of experience as, while it illuminates some aspects of learning and knowledge in this organisation, it obscures others from view.

In the study described here, learning and knowledge were represented within a single frame, providing a clearer and more complete perspective on the ways in which people learn at work and the relationship of that learning to the knowledge the organisation holds. This paper illustrated the entanglement of learning and knowledge in context and interactivity through engagement with work and juxtaposed the flavours highlighted through fusion against the silences that become apparent in following the ‘flavour of the month’.

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