Organizational learning, tacit information, and e-learning: a review

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Abstract

Purpose – The purpose of this paper is to introduce and develop the argument that e-learning technologies and techniques can play a pivotal role in encouraging and facilitating organizational learning, by transforming tacit knowledge into explicit knowledge and diffusing it throughout the organization.

Design/methodology/approach – By synthesising the evidence in organizational learning, information technology (IT) and e-learning research domains, this paper challenges the assertion that tacit information cannot be effectively transformed or diffused by technological means. The notion of organizational learning is examined, particularly in relation to the applicability or otherwise of anthropomorphic models. The cyclic nature of individual and organizational learning models is then discussed and a synthesized construct is offered. The importance of tacit knowledge expression and transfer in this cyclic model is examined, and the role of IT and e-learning techniques is considered as a means of encouraging tacit knowledge transformation and flow.

Findings – Topics of reflection, independence, creation of "safe" learning spaces and the importance of collaboration in learning are demonstrated as being some of the most synergistic issues. These are under-researched topics, though. There is significant potential for effective collaborative research amongst the organizational learning, IT and e-learning pedagogy research communities, addressing issues such as the effective extraction and communication of tacit knowledge.

Originality/value – This originality and value of this paper lies in the synthesis of evidence from research and practice domains that have traditionally been disparate, demonstrating that the information technology and e-learning pedagogy fields can offer effective means of enhancing organizational learning.

Keywords Tacit knowledge, Learning, Learning organizations, Communication technologies, E-learning

Paper type Research paper

Organizations as learning organisms

The concept of organizational learning was first introduced by March and Simon (1958) in their early work on organizations. Since then it has become an increasingly accepted theory, although the road to acceptance has not been straight, with scholars such as Argyris and Schon (1996, p. 1) commenting that:

> As late as 1978 when our *Organizational Learning* was first published, ... well respected scholars... found the idea confusing and, in some ways, repugnant.

One of the central points of debate about the concept is the notion of an organization as an identifiable organism that, as a whole, displays some of the characteristics of individuals. This anthropomorphic model of an organization is rejected by many writers (see, for example, Berger and Luckmann, 1966; Argyris and Schon, 1996), who argue that the concept of organizational learning is a metaphor rather that a

description of the behaviour of an independent entity. Many writers avoid the "ontological fallacy" (Berends *et al.*, 2003) of ascribing human characteristics to an organization by concentrating upon the role of individuals within the organization and how the learning of those individuals is, or is not, integrated and aggregated.

However, there are fields of study and practice other than organization studies that are concerned with the behaviour and accountability of organizations, notably commercial and industrial law. This field offers some interesting challenges to the avoidance of an anthropomorphic model, a prime example being the notion of corporate killing in UK law. Industrial accidents in the 1980s that resulted in large numbers of public deaths, such as the capsize of the *Herald of Free Enterprise* off Zeebrugge harbour (Sheen, 1987) and the fire at the King's Cross underground station in London (Fennell, 1988), led to increased public demand for companies to be tried for manslaughter. Many of the relatives of those who were killed felt that prosecutions under the Health and Safety at Work Act 1974 were technical offences that resulted in mediocre fines at most, and that justice was not being done.

There are, however, some significant problems with the current method of taking a case for corporate manslaughter in the UK. A company can only be prosecuted if an individual within the company, who can be identified as the embodiment of the company itself or the "controlling mind", can also be identified as being personally culpable: the "identification principle". Manslaughter is a serious offence that can result in a significant prison sentence, so courts can be understandably reluctant to convict individuals who are carrying out the will of a company that may have condoned similar practices previously. As Belcher (2002, p. 48) comments:.

> ...when companies kill people [their employees or members of the public] it is unlikely, under the current law in England and Wales, that anybody will be convicted of an offence indicating responsibility for death...

In fact, it is more likely that a successful prosecution will be taken against a small company where the identification of the controlling mind is easier than in large organizations, where decision-making processes are more diffuse. There have only been five successful corporate manslaughter cases in the UK to date, beginning with the prosecution of the small adventure activity company, OLL, for the Lyme Bay canoeing disaster in 1993. All four of the successive cases have also been taken against small companies (Law Commission, 1996).

In 1996 the UK Law Commission reported on unlawful killing and recommended that a new offence of corporate killing be created, which did not require any individual to be found specifically culpable, but the organization as a whole could be responsible and could face prosecution. In other words, the organization could be guilty of an offence and be considered to have acted negligently or recklessly as a whole. This is clearly adopting an anthropomorphic model in relation to organizational behaviour. However, the recommendations have still not been enacted at time of writing this paper (October 2005) as there is considerable debate on how it would be operationalized; for instance, what penalty could be applied? An organization cannot serve a custodial sentence.

Whilst there are apparent difficulties with the notion of organizations leaning as a whole, there is clear evidence that learning does take place in organizations during dynamic interactions amongst individuals, groups and the organization itself (Akgun *et al.*, 2003; Chan, 2003; Sole and Edmonson, 2002; Drejer, 2000). The benefits of

effective organizational learning are well-recognized in terms of improved innovation (Chanal, 2004), achieving and sustaining change (Boyce, 2003) and in developing competence (Drejer, 2000). But this process can be unpredictable and difficult to foster (Pedler, 2002) and there is no overall consensus in the literature on how best to encourage effective organizational learning. However, most writers do recognize that formal and informal means, and both tacit and explicit knowledge, play an important part in the process. For example, Neergaard's (1994) model identifies four major types of learning that occur within this relationship, two of which focus on tacit knowledge. The four types are:

(1) The individual behaviour perspective, i.e. the informal learning processes of an individual that may both use and generate tacit information.

(2) The decision support perspective, i.e. the formal learning processes of an individual.

(3) The management systems and organizational structure perspective, i.e. the collective learning processes that are formally guided by an organization's structure and management systems.

(4) The corporate culture perspective i.e. what an organization "knows", outside of formalized systems. Again, this both draws upon and creates tacit information.

The next section of this paper explores some of the theories of organizational learning in more detail, and synthesizes a construct from some of the various theories that illustrates the role of tacit information/knowledge.

Organizational learning

As we have seen, learning in organizations can occur at the individual, group, inter-group and organizational levels. For example, Argyris (1995) argues that learning occurs the first time an intended action has a positive outcome, or when errors are detected and corrected. It is true that error correction is an important feature of learning, but errors can be corrected either by attempting to change the individual behaviours that caused them, or by changing the underlying causes of the error. For example, if a machine operator is injured whilst working at an unguarded machine, the company might attempt to change that individual's behaviour by sending the operator on a training course on machinery guarding. But, this does not influence the underlying cause of the error, which is the absence of an effective training policy for the entire workforce. Consequently, learning is incomplete when errors are corrected by concentrating on the immediate causes rather than considering the causes that lie deeper in the organization.

The importance of discriminating between individual and organizational behaviour is also described by Reason (1997), who distinguishes two categories of behaviour that cause accidents. These are "active failures" and "latent conditions". Active failures are those committed by people close to the accident in space and time and which contribute to it directly in some way. Taking the example of the injured machine operator, one of the active failures would be the error of the maintenance crew, who left the guards off the machine just before the victim used it. Conversely, latent conditions are those that are present in organizations but lie dormant, sometimes for many years, before contributing

to the accident. In this case the latent conditions would include the absence of an effective policy on safety at maintenance hand-over and a poor training system.

Tacit and explicit information
As this paper is concerned with tacit information, it is helpful at this point to consider what is meant by the term in the context of this discussion, and to contrast its nature with explicit information. The term "tacit" refers to the information and/or knowledge that individuals hold that is not outwardly expressed in the organization, echoing the dictionary definition of "unspoken" or "unexpressed". Knowledge and information can remain tacit for many reasons; there may be no effective way of eliciting it from the workforce, or the organization's culture might actively discourage its sharing, either deliberately or incidentally. Much tacit information is likely to be drawn from the personal knowledge and experiences of individuals. This can lead to the internal construction of values and beliefs, which in turn affect reactions and behaviours. Tacit knowledge often surfaces as intuition, insight or expertise amongst individuals, but can also foster antagonism and aggression if the nature of the experiences has been negative. Of itself, tacit information is neither positive nor negative; its usefulness results from the insight it can give into an organization.

By contrast, explicit information refers to that which is openly expressed in an organization. The manifestation of this type of information varies considerably, from predominantly word of mouth in small organizations, to more formal, documented information sources in large organizations. Just because information is explicit, does not necessarily mean it is easily accessible; this depends upon the efficiency and effectiveness of the organization's communication systems. But the differentiation between tacit and explicit information is that explicit information is openly available, whereas tacit information is not.

The concept of latent conditions is closely allied to the notion of tacit knowledge. Latent conditions are often known about inside an organization but are not explicit, often because the constituent parts of the condition are not located in one focal point, but are diffuse across the organization. To return to the discussion of corporate manslaughter for a moment, this is why the notion of an organization as a whole having the capacity to cause death by recklessness or neglect, whilst falling into the trap of anthropomorphising, does nonetheless describe a real phenomenon. The lack of care may not be located in any one place within the organization, yet it exists all the same. How organizations identify and learn about these latent conditions is therefore critical.

Learning cycles
Many models concerning effective individual learning concentrate upon its experiential, cyclic and/or iterative nature: learning from experiences, modifying behaviour and applying those behaviours to new situations that then give rise to new experiences (see, for example, Kolb, 1984; Race and Brown, 1998). Similar cyclic models are also common in the field of organizational learning. For example, Dixon (1999) sees effective organizational learning beginning with the widespread collection and creation of information, both external and internal, which is then reflected upon and integrated into the organization's own context, interpreted by the organization as a whole and then acted upon by the organization through the means it has created to authorize

action. In turn, those actions create new information and generate it widely, and so the cycle continues.

Savolainen (2000) offers a positive model of promoting organizational learning that begins with clear organizational perception and effective communication and then leads on to increasing commitment and involvement that results in overcoming resistance to learning. Murray (2002) sees a complete learning cycle as an uninterrupted link between actions and responses, responses and beliefs, and beliefs and new actions, and Berends *et al.* (2003) consider that learning takes place in and through recurring practices. Again, all these models are cyclic or iterative in nature.

Argyris and Schon (1996) classify organizational learning behaviours into single-loop and double-loop learning. In this model, single-loop learning is said to take place when the organization learns in a way that only changes actions or strategies for actions (the process loop), rather than affecting the underlying policies, values and assumptions that drive those actions (the policy loop). This single-loop mode of behaviour is described by Garratt (1987) as binary thinking, i.e. doing more of or less of the same thing. The problem with this mode of learning is that it does not result in any fundamental changes, and therefore leads to a form of thinking that looks no further than existing actions for solutions to problems. In this way, the underlying reasons why errors or problems may occur are perpetuated. This model is very resonant of Reason's active failure/latent condition theory discussed above. However, when double-loop learning occurs, it does result in changes to policies, values and assumptions: the learning from the process loop feeds into the policy loop and back again.

Double-loop learning is a more dynamic and effective means of learning than single-loop, but it is not easy to cultivate. It depends upon many things, including effective communication systems and the learning styles and capabilities of the members of the organization. The mass of day-to-day priorities can result in the process loop becoming dense and dominant, and exerting a gravitational field that draws learning into orbit around it. It can be difficult for the learning experiences to reach escape velocity and venture towards the policy loop.

These models all share a similar construct, which is summarized in Figure 1. This cyclic model shares the characteristics of Hegel's 1830 thesis/antithesis/synthesis dialectic (see Geraets *et al.*, 1991), and also demonstrates the constructivist approach to organizational learning models, i.e. that learning is constructed from experiences in the individual's own context. The effectiveness of this model depends upon moving information and knowledge around the cycle, encouraging members of the organization to engage with it, and to change as a result.

On the face of it, it seems that formal and explicit techniques are fundamental to the success of organizational learning. But, a large proportion of information and knowledge in organizations is tacit (Polanyi, 1966; Baumard, 1999; Haldin-Herrgard, 2000) and therefore a real challenge is to get tacit information and knowledge moving around the learning cycles. Tacit knowledge in organizations is recognized to be a largely untapped resource, due to a mistrust of its veracity and the sense that it only exists in people's heads. But that is, in fact, the nature of all knowledge. The illusion that some knowledge is "true" or "fact" and that only this type of knowledge is meaningful is challenged by many writers, including Jankowicz (2001), who argues that all knowledge creation proceeds from the intuitive and tacit. He offers a method for making the tacit more explicit and in turn hopes that the false distinction between objective and subjective
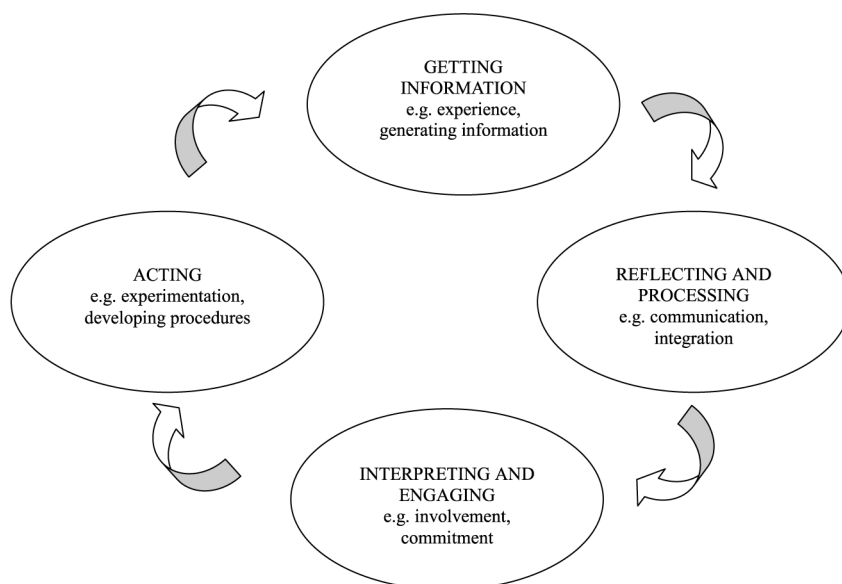
Figure 1.
Cyclic construct model of
organizational learning

knowledge may one day be abandoned. Wang and Ahmed (2003) recognize the importance of knowledge management in organizational learning, particularly that knowledge stored in individuals in the form of skills, experience and personal capability. Evans and Kersh (2004) also discuss the importance of understanding how tacit forms of key competences can contribute to improved work performance

To enable sharing of tacit knowledge, and its movement around the organizational learning cycle, it first has to be made explicit. This first step is probably the hardest. So, the next section of this paper concentrates upon the evidence that transformation of tacit knowledge to explicit knowledge, and its diffusion amongst and across groups, can be effectively facilitated by IT in general and e-learning techniques in particular. The term e-learning refers to the use of online technologies to deliver learning materials and to facilitate communication and collaboration amongst learners and between the learner and the tutor.

IT and e-learning technology and techniques
Tacit information and IT
Authors from a wide range of industrial and commercial sectors, such as information services (Stover, 2004), examination grading (Greatorex, 2002), health care (Cheah and Abidi, 2001), occupational risk management (Falconer, 2002) and knowledge management (Herschel *et al.*, 2001), agree that to be usable, tacit knowledge has first to be made explicit. But Johannessen *et al.* (2001) argue that "the role of IT in making this happen is rather limited" and that the effective use of IT is restricted to the transfer of explicit, codifiable knowledge and therefore cannot be used to convert tacit knowledge to explicit knowledge (see also Antonelli, 1997). Haldin-Herrgard (2000) argues that tacitness is hard to diffuse technologically, as it requires face-to-face interaction and exchange of experiences. It is understandable that there may appear to be a mismatch

between IT, viewed as a technical issue, and tacit knowledge transformation which is viewed as a creative task. But the following discussion of the evidence from recent IT and e-learning literature demonstrates that this dichotomy is misguided.

Cheah and Abidi (2001, p. 158) offer an IT technique for expressing tacit knowledge in the healthcare sector, in an attempt to overcome the tendency for organizations in this sector to be "information-rich but knowledge-poor". They report that traditional, face to face, methods of harvesting tacit knowledge, such as interviews, role play and talkback, have been ineffective in acquiring such knowledge from health professionals. Based on the proposition that tacit knowledge is best elicited by provoking action and application of that knowledge, their IT technique relies upon offering health care professionals a range of problems that require them to apply their knowledge and skills, much of which is experiential and tacit, in order to solve them. The problems, offered as scenarios, are presented as a series of electronic forms. The knowledge that is applied to these problems is then converted ("crystallized") into explicit knowledge.

Falconer (2002) offers a system for gathering and codifying tacit knowledge and subject-specific intuition (together classified as "grey data") by asking structured groups to score the truth of a series of statements that relate to standards and operation of the workplace. The system requests a numeric score and also encourages the groups to record their views in writing. Each member of the group is given statements that are generated from a bank that has been created by the company itself. There are therefore two aspects to the process; one that requires consideration of what is important to the company, drawing on tacit and explicit knowledge, to create the statements to be scored; the second requiring an assessment of the statements. Both parts can be carried out and facilitated online using synchronous (e.g. instant messaging and chat) and asynchronous (e.g. e-mail, discussion boards) techniques.

Selamat and Choudrie (2004) propose that IT can contribute to the creation of environments that encourage expression of tacit knowledge, by providing methods for processing, delivering and sharing knowledge that demonstrate the value of externalising tacit knowledge, thereby influencing the culture of the organization. Sandars (2004) discusses the potential of IT communication to facilitate the sharing of tacit knowledge, arguing that the efficiency of communication and the rapid access to large quantities of information offered by IT facilitates can be seen to enhance professional expertise and thereby encourage the sharing of tacit knowledge.

Evidence that directly relates effective use of IT to improvements in organizational learning is just beginning to emerge. Chou (2003) reports on research that demonstrates that organizational learning computer systems (OLCSs) have a positive impact on the organizational learning process. OLCSs are defined as those systems with knowledge acquisition, knowledge distribution, broadcasting, updating, and memory features.

Tacit information and e-learning
We have seen already how there is significant potential for IT systems to offer opportunities to apply tacit knowledge to problems and so identify and develop it, and to encourage the creative and interpretive tasks that can extract tacit knowledge. We will now focus on e-learning techniques to demonstrate this potential further.

The constructivist model emphasizes that knowledge is gained in context. The notion that tacit knowledge can be extracted from the workforce as an objective resource is flawed; the most effective methods extract it in context by offering

scenarios that encourage the participants to apply their experiences and skills, and thereby reveal it. We do not always know what we know until we are motivated to call upon our knowledge.

Nonaka (1994) proposes four processes that occur when tacit knowledge is translated into explicit knowledge, namely:

(1) socialization, i.e. tacit to tacit transfer, through implicit learning or "learning by doing";

(2) externalization, i.e. tacit to explicit transfer through communication;

(3) internalization, i.e. explicit to explicit transfer by systematic procedures of communication; and

(4) combination, i.e. explicit to tacit transfer by distribution, where it is combined it with other explicit knowledge.

Once again the cyclic nature of this model is reminiscent of the organizational learning construct in Figure 1. Next we will examine the evidence that e-learning techniques can facilitate the first and second phases, namely, the acquisition of tacit knowledge and its transformation into explicit knowledge.

From the point of view of the individual, e-learning techniques have been shown to encourage independence (Falconer and Williams, 2002) and reflection (Salmon, 2000) in the participants. This is partly accomplished by the creation of a "safe space" in which to fail and learn from that failure (Schank, 2001), and the ability of e-learning programmes to be adapted to different learning styles such as verbal/linguistic or visual/spatial.

The creation of a safe space in which to try out ideas before making them openly available to others is a significant benefit of e-learning techniques. In particular, playing games designed for e-learning can be an effective means of eliciting tacit knowledge. Al-Jibouri and Mawdesley (2001) developed a computer game to teach construction project planning and control. This enables participants to be put in realistic circumstances with complex problems to solve (in this instance the construction of a rock and clay-fill dam), in a safe space, both physically and socially. In particular, the game requires the deployment of both explicit technical knowledge and tacit understanding, the latter being mined by the game reacting to the participant's actions. One example of this was the tendency for most participants to begin trying to build the dam in the game without considering the financial consequences. Their tacit fixation on the physical aspects of the project, rather than the balanced view necessary, was exposed by their reactions to the game, captured and made explicit.

Tacit knowledge is often centered on communities and groups, based on collective experiences and grounded in the context of the group (Blair, 2002). The incorporation of tacit knowledge into organizational learning systems can greatly enhance the efficacy of decision-making (Falconer, 2001) and the collaborative learning facilities of e-learning have the potential to make a real contribution to this process. From the group perspective e-learning techniques can help to facilitate communication, assist in sharing experiences and collaboration and also help to reduce the sense of isolation felt by some members of organizations who work remotely or in small, specialized teams. McFazdean and McKenzie (2001, p. 471) state that:

Virtual learning ... encourages collaboration and experiential learning.

They discuss the positive evidence that communication becomes an all-round relationship in virtual groups (i.e. groups that communicate primarily or substantially via IT), but also make it clear that this does depend upon a facilitator, or tutor in the case of formal education environments, being able to support and advise the group. In organizations the position of facilitator might be relevant in a variety of roles such as trainers, managers and peers. The tasks set for the groups should require the members to use a variety of skills, including their tacit knowledge or workplace savvy, be meaningful and relevant and have significant consequences for themselves or the organization they work for. Communication via IT can also tend to reduce the natural social inhibitions we all feel when communicating face to face. This can be of benefit in eliciting tacit knowledge, but can also lead to overly aggressive or inappropriate behaviour in some participants. The careful moderation and mentoring of virtual groups is therefore essential.

In relation to e-mentoring (using electronic means as the primary channel of communication between mentors and protégés in organizations), Hamilton and Scandura (2003, p. 389) comment that e-mentoring generates the opportunity for greater flexibility in creating and sustaining relationships, overcoming some of the traditional barriers to mentoring such as organizational structure, inter-personal skills and cross-gender relationships. In particular they emphasize that:

> The use of electronic media in e-mentoring can extend beyond mere information gathering to emotional nurturing and fellowship. Current trends in technology, which include rich multimedia communication in real time, enable emotional expression and social bonding that one typically observes in face-to-face interactions. For instance, online medical groups provide emotional support to patients. Online interest groups for food aficionados or garden enthusiasts provide a sense of self-esteem and personal validation as their expertise is acknowledged and support is given freely.

The expression and validation of expertise is clearly an example of tacit to explicit knowledge transfer being facilitated by online communication technologies. Also, the movement of this knowledge between individuals and amongst groups facilitates the organizational learning cycle.

Conclusions

Organizational learning is generally acknowledged to consist of the sum of individual learning inside an organization, as many writers are unhappy with the anthropomorphic concept of an organization learning as a whole, despite the notion that an organization might be able to be guilty of causing death by negligence or recklessness, i.e. of committing manslaughter. Organizational learning is generally accepted to take place in a cyclic fashion, following many of the models of individual learning. These models propose that effective organizational learning begins with the creation or recognition of knowledge, which is then integrated into the organization, and which then provokes action based upon that knowledge. But much of the knowledge in organizations is tacit rather than explicit, so the effectiveness of organizational learning is at least partly dependent upon the expression of tacit knowledge and its movement around the organization. Some writers assert that IT cannot facilitate tacit knowledge expression, an assertion refuted by this paper.

This paper has concentrated upon synthesising evidence from the organizational learning, IT and e-learning research domains to establish the proposition that IT and

e-learning techniques offer significant potential to transform and communicate tacit knowledge. Topics of reflection, independence, creation of "safe" learning spaces and the importance of collaboration in learning have been demonstrated as being some of the most synergistic. This is an under-researched area, though. There is significant potential for effective collaborative research amongst the organizational learning, IT and e-learning pedagogy research communities, addressing issues such as the effective extraction and communication of tacit knowledge.

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Further reading

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