
The future of e-learning: a shift to knowledge networking and social software

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Abstract: The main aim of Knowledge Management (KM) is to connect people to quality knowledge as well as people in order to peak performance. This is also the primary goal of Learning Management (LM). In fact, in the world of e-learning, it is more widely recognised that how learning content is used and distributed by learners might be more important than how it is designed. In the last few years, there has been an increasing focus on social software applications and services as a result of the rapid development of Web 2.0 concepts. In this paper, we argue that LM and KM can be viewed as two sides of the same coin, and explore how Web 2.0 technologies can leverage knowledge sharing and learning and enhance individual performance whereas previous models of LM and KM have failed, and present a social software driven approach to LM and KM.

Keywords: knowledge management; KM; learning management; LM; e-learning; communities; Web 2.0; social software.

Reference to this paper should be made as follows: Chatti, M.A., Jarke, M. and Frosch-Wilke, D. (2007) 'The future of e-learning: a shift to knowledge networking and social software', *Int. J. Knowledge and Learning*, Vol. 3, Nos. 4/5, pp.404–420.

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1 Introduction

Research on Knowledge Management (KM) and Learning Management (LM) has enjoyed an extended history. In an organisational context, KM and LM have also attracted attention over the past years and are meanwhile important tasks to increase competitive advantages of a firm. In many cases KM and LM were studied in isolation. Thus, different and often incompatible concepts and tools were developed. Meanwhile there exists a growing community of researchers which argues for an adjustment by emphasising the close relationships between KM and LM in terms of input, creation processes, output, concepts and tools. In this paper, we argue that LM and KM can be viewed as two sides of the same coin, present a social software driven approach to LM and KM, and discuss why this approach can succeed whereas previous models of LM and KM have failed.

2 Knowledge and KM

Many researchers have provided different definitions for the term knowledge. Nonaka and Takeuchi (1995) define knowledge as justified true belief. Drucker (1989) distinguishes between data, information and knowledge and stresses that knowledge, by definition, is specialised. Naevé (2005) defines knowledge as 'efficient fantasies', with a context, a purpose and a target group, with respect to all of which their efficiency should be evaluated. Siemens (2006) points out that knowledge rests in an individual and resides in the collective.

Knowledge consists of different types, such as know what, know how, know why and know who. Different views of knowledge exist and many researchers have developed classifications of knowledge, most of them inform of opposites (Hildreth and Kimble, 2002). A distinction that is often cited in the literature is made between explicit and tacit knowledge. Explicit knowledge is systematic knowledge that is easily codified in formal language and objective. In contrast, tacit knowledge is hard to formalise, difficult to communicate and subjective (Nonaka and Takeuchi, 1995). Similarly, a

distinction has been made between structured and less structured knowledge (Davenport and Prusak, 1998), know what and know how (Seely Brown and Duguid, 1998) and hard and soft knowledge (Hildreth and Kimble, 2002).

KM is hard to define in a precise way. In the KM literature, there are many definitions and interpretations of the term KM, pointing to different perspectives and models. Most such interpretations share common emphasis on a static and predefined representation of knowledge (Malhotra, 2004). These interpretations adopt the view of knowledge as object that can be captured, stored and reused. For example, the Gartner Group (1998) cites that KM promotes an integrated approach to identifying, capturing, retrieving, sharing and evaluating enterprises information assets. However, the more recent KM literature stresses the importance of the people side of KM and acknowledge the input of individuals in making KM and its sharing effective (Akamavi and Kimble, 2005; Davenport and Völpe, 2001; Wilson, 2002). In contrast to the static and predefined representation of knowledge, these interpretations focus more on the dynamic, affective and active representation of knowledge needed for knowledge creation (Malhotra, 2004). Nonaka and Takeuchi (1995) adopt this dynamic model, view knowledge as activity rather than object and focus on knowledge creation, collaboration and practice as opposed to KM. Nonaka and Takeuchi argue that knowledge is created by the interaction and conversion of explicit knowledge and tacit knowledge and that real knowledge is created and applied in the processes of socialisation (tacit to tacit), externalisation (tacit to explicit), combination (explicit to explicit) and internalisation (explicit to tacit).

Despite lack of agreement on what is meant by KM, definitions of KM revolve around three core components: knowledge/information repositories, communities and networks and experts and knowers.

- *Knowledge/information repositories*: information is knowledge that is explicit and codified. Information repositories are created by codifying the collective knowledge of the organisation and making it readily available. They are organised and managed in ways that make finding, using and contributing knowledge easy (Rosenberg, 2006).
- *Communities and networks*: Siemens (2006) defines a network as connections between entities to create an integrated whole. He defines a community as the clustering of similar areas of interest that allows for interaction, sharing, dialoguing and thinking together. Lave and Wenger (1991) point out that community does not imply necessarily copresence, a well-defined, identifiable group or socially visible boundaries. It does imply participation in an activity system about which participants share understanding concerning what they are doing and what that means in their lives and for their communities. As a special type of community, they introduce the concept of Communities of Practice (CoP). In a more recent work, Wenger (1998a) defines CoP as groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. To differentiate between CoP and network, Wenger (1998b) states that a CoP is different from a network in the sense that it is about something; it is not just a set of relationships. It has an identity as a community, and thus shapes the identities of its members. A CoP exists because it produces a shared practice as members engage in a collective process of learning.

- *Experts and knowers* are persons with the required know-how that can help achieving better results. Allee (2000) points out that real experts are the entire community that needs the knowledge, creates it, identifies what is most valuable and continually renews, validates and revamps it. Rosenberg (2006) stresses that experts are more than a source of knowledge, they are also advisers who are charged with providing guidance, corrective feedback and performance assessment.

3 LM and KM as two sides of the same coin

In practice, LM and KM fields have evolved down separate paths. The two fields use incompatible technology infrastructures and are divided by the words they use and by some of their fundamental assumptions about users. In a corporate context LM and KM have been kept separate from an organisation structure point of view (Dunn and Iliff, 2005). In most of the firms, the LM community and the KM community work on different problems, do not really speak the same language, use different tools, rely on different authors and base their work in different concepts (Hackett, 2001).

Over the past few years, attention has been shifting towards the importance of KM in corporate and academic learning environments. Researchers and companies are starting to recognise relationships and intersections between LM and KM research fields and to explore the potential and benefits of their integration (Dunn and Iliff, 2005; Efimova and Swaak, 2003; Grace and Butler, 2005; Hackett, 2001; Hall, 2001; Lytras et al., 2005; Sanchez-Alonso and Frosch-Wilke, 2005; Stacey, 2000). In this paper we go a step further and argue that LM and KM solutions have to fuse and that we should speak about union and fusion of the two fields rather than intersection or complementary relationship between them. In this sense LM and KM can be viewed as two sides of the same coin. There are several commonalities between LM and KM. The two fields are increasingly similar in terms of input, outcome, processes, activities, components, tools, concepts and terminologies.

In terms of input, LM and KM deal with learning and knowledge which themselves are two sides of the same coin. Learning is the foundation of knowledge (Allee, 1999). The future of learning is written in the future of knowledge (Downes, 2004). Learning is a peer to knowledge. To learn is to come to know. To know is to have learned (Siemens, 2006). Learning is knowledge and social skill that has to be learned and continuously improved. It is one of the new basic skills of the future (Hodgins, 2000). Similar to knowledge, learning consists of different types comprising learn what, learn why, learn how, learn where and learn who (Chatti et al., 2006a). In the KM literature, learning is often closely related to knowledge. Sfard (1998) presents the knowledge-acquisition metaphor of learning, representing a view according to which learning is mainly a process of acquiring desired pieces of knowledge. Based on Nonaka and Takeuchi's SECI model, Paavola et al. (2002) point to the knowledge-creation metaphor of learning, meaning that learning is seen as analogous to innovative processes of inquiry where something new is created and the initial knowledge is either substantially enriched or significantly transformed during the process. Moreover, learning and knowledge share a similar nature; both are complex, dynamic, human and social.

In terms of outcome, LM and KM have as primary goals the production of knowledge claims and learning resources, how to connect people to quality knowledge as

well as people to people. Both aim at enhancing the personal and professional performance and increasing the ability of any individual, project team or organisation. LM and KM are supposed to be means to improvement and effectiveness. Similar to KM, acquiring new knowledge is itself not the purpose of learning. We learn in order to better perform, integrate the gained knowledge in our daily work to solve problems and achieve the desired end result, create innovative knowledge and better ideas that lead to more success and share our own knowledge with others. In that sense, a learner becomes a knowledge worker. That is, someone who does not just consume knowledge but who is able to create it.

Furthermore, LM and KM share common processes, activities, tools, concepts, components and terminologies. Similar to the knowledge creation process, learning is an action-oriented process and a social activity. Learning is not a mechanical, static, linear process, nor one that can be understood by examining any of its components outside of its systemic context. It is a very human, dynamic and complex flow that resembles an organic structure more than a mechanical one (Hodgins, 2000). The tools, concepts and components that fall under KM are becoming key enablers of LM. For example, CoP, one of the major tools of KM, have been supposed to be closely related to learning. The theme of learning was a prime driver for the concept of a CoP in its initial form. As Lave and Wenger (1991) introduced the concept of a CoP, the examples given (non-drinking alcoholics, Goa tailors, quartermasters, butchers and Yucatan midwives) were concerned with apprenticeship which is a form of learning (Kimble et al., 2001). Wenger (1998a) also views learning as a social system within CoP. Moreover, the three major components of KM, namely knowledge repositories, communities and networks and experts and knowers, form also the key components of LM. In a LM context, we speak about learning repositories, Learning Communities (LC) and learning experts, that is, facilitators, coordinators and mentors. Furthermore, there are common words that are used by both fields. Terminologies that are currently being applied in the learning context, such as Learning Management System (LMS), learning object, learning asset and learning base, are in fact borrowed from the KM field (Chatti et al., 2006a).

4 Deficiencies in current LM and KM approaches

The expectations were that KM would be able to improve growth and innovation in organisations, productivity and efficiency, customer relationships, employee learning, satisfaction and retention and management decision-making. However, KM has not demonstrated any competitive advantage to the organisations that have invested in it and most of the KM initiatives have failed (Pollard, 2003). Such failures basically result from the practice to see KM mainly as a technology issue and not as social interaction between people (Delmonte and Aronson, 2004). Malhotra (2005) presents two paradigms of current KM implementation that have characterised the technology-push model of KM. The *inputs-driven paradigm* with its primary focuses on technologies such as digital repositories, databases, intranets and groupware systems and the *processing-driven paradigm* of KM with its focus on best practices, rules, procedures, workflow optimisation and automation of manual processes.

The inputs-driven paradigm focuses on the technology-based, static and predefined representation of knowledge. Thereby, a significant amount of attention is placed on implementing platforms and repositories to capture, store, control, manage and reuse

structured knowledge. In this view, knowledge is assimilated to objects (Nabeth et al., 2002) and KM systems are not really managing knowledge but information and a large part of what is presented as being KM is often simply information management under a new label (Kimble et al., 2001; Malhotra, 2005; Wilson, 2002). Information is explicit knowledge that is easily expressed, captured, stored and reused. In the KM literature, there is wide recognition that only a small fraction of valuable knowledge is explicit and there is a huge mass of high-quality knowledge embedded in people, which is not easily expressible and cannot be recorded in a codified form. Additionally, many companies are discovering that the real gold in KM is not in building platforms, distributing documents or combining repositories, but in sharing ideas and insights that are not documented and hard to articulate (McDermott, 2001). This undocumented, hard-to-articulate knowledge is what has been called tacit knowledge. Polanyi (1967) is often cited when describing tacit knowledge. For Polanyi, 'we can know more than we can tell'. Drucker (1969) disputes the notion that tacit knowledge can be managed. Nonaka and Takeuchi (1995) state that tacit knowledge differs from information in that it resides in people and can thus only be created, sustained, emerged and shared through socialisation.

Even capturing knowledge that may be expressed, codified and stored is not without its problems. Capturing knowledge in a codified form is time and effort consuming. Additionally, knowledge can be isolated from its context and it can rapidly become out-of-date, obsolete and useless. Busy knowledge workers have often been asked to make explicit the implicit knowledge that guides their daily work. They have to interrupt their work and try instead to get familiar with a central, feature-rich and often difficult to use KM system and then focus on how to use a given template for example, to write a report or classify a document. Often, a knowledge worker does not have the willingness to do this extra job. And, if he/she is willing to take the time to capture his/her knowledge, the result will likely be static documents that are general and out-of-context. In the KM literature, it has already been pointed out that knowledge is context sensitive. Codification of knowledge in the form of information tends to abstract knowledge from the context in which it acquires its specific meaning and that provides the common ground for understanding between individuals (Devlin, 1991). It is quite possible to have knowledge that makes sense and is useful in one context, and makes no sense at all and is utterly useless in another (Owen, 2001). Wenger (1998a) also stresses that information stored in explicit ways is only a small part of the picture.

The processing-driven paradigm of KM has its primary focus on the automation of the processes of

- 1 archiving best practices and past success stories to guide future decisions and actions
- 2 getting the right information to the right person at the right time.

Malhotra (2000, 2004) points out that it is impossible to build a system that predicts who the right person at the right time even is, let alone what constitutes the right information. Pollard (2003) states that, unlike the work world of the last two centuries, most employees today either come into their jobs knowing more than their boss about how to do it, or quickly acquire such superior knowledge from their peers and from personal experience on-the-job. Every job today, every process, is unique and therefore, the expectation that KM systems could capture best practices, success stories and lessons learnt that could be reapplied by others again and again was unrealistic. In the same

direction, Siemens (2006) stresses that yesterday's solutions do not always work today. In today's world, knowledge life is short; it survives only a short period of time before it is outdated.

In a learning context, current LM approaches are also following the same static and predefined representation of knowledge and the view of getting the right information to the right person at the right time. A strong emphasis is being placed on how to centralise and standardise the learning experience. Most learning content today is designed, authored, delivered and managed via centralised LMSs, Learning Content Management Systems (LCMS), Course Management Systems (CMS) or Content Management Systems (CMS) such as CLIX, WebCT, Blackboard, Moodle, ATutor, ILIAS, Plone or Drupal as static-packaged online courses and modules. In most of the cases, an initially paper-based learning resource is just converted into a digital form and a classroom training event is transformed into an online course.

The view of learning as course delivery and learning resources as learning objects has led to the implementation of large and centralised learning object repositories of context-free and reusable content described by metadata. Complex standards have emerged to make learning objects shareable and learning object repositories interoperable. Learning providers often try to deliver SCORM compliant content. In order to achieve interoperability among learning repositories, different communication frameworks for querying have been proposed, such as the universal interoperability layer Simple Query Interface (SQI). However, in learning, the key issue is neither the interoperability nor the reusability of content, but rather the support of learning as a cognitive and constructive process (Lytras et al., 2005). Obviously, the course/LMS-centric model of learning has failed to achieve performance improvement and innovation. A major reason of the failure is that learners and knowledge workers resist to the one-size-fits-all, centrally-managed learning approaches that often fail to address what today's learners need. Hessian and Vogt (1999) stress that, courses, by definition, capture yesterday's knowledge. Siemens (2004a) argues that LMS is the wrong place to start learning. The LMS-based Management of learning activities conflicts with how we are actually learning today. Most learning today is informal. Cross (2003) states that at work we learn more in the break room than in the classroom. We discover how to do our jobs through informal learning; observing others, asking the person in the next cubicle, calling the help desk, trial-and-error and simply working with people in the know. Formal learning is the source of only 10% to 20% of what we learn at work. Informal learning is however not restricted to a corporate context. Our academic learning also comes from different informal channels; for example, through games, simulations, experiments, story-telling and discovery. Outside the classroom boundaries, we use Google, communicate with peers, join online communities, work on problems together, share learning resources, etc.

To summarise, the failures of current LM and KM solutions mainly result from the heavy emphasis on content and technology. Learning and knowledge are more than static content and technology is just an enabler. At the heart of LM and KM lie people. Consequently, current technology-push models of LM and KM have to be replaced with new models that reflect the nature of learning and knowledge and respect the human side of LM and KM. This requires a radical shift in emphasis from a focus on know what to a focus on know how and know who. In the future, people driven implementations of LM and KM need to be the norm rather than the exception.

5 The future of LM and KM

Learning and knowledge are social, personal, flexible, dynamic, distributed, ubiquitous, complex and chaotic in nature. We need thus to rethink how we design new models for LM and KM that mirror those characteristics. In this section, we discuss seven critical factors that must be addressed to ensure that future LM and KM models will endure.

5.1 Knowledge networking and community building

Many researchers emphasise the social aspect of knowledge and learning (Lave and Wenger, 1991; Nonaka and Takeuchi, 1995; Polanyi, 1967; Wenger, 1998a). Lave and Wenger (1991) introduce CoP as ideal vehicles for leveraging tacit knowledge and learning and explore the participation metaphor of learning. Within the participation metaphor, learning is matter of Legitimate Peripheral Participation (LPP). According to Lave and Wenger, in a CoP, a newcomer learns from old-timers by being allowed to participate in certain tasks that relate to the practice of the community. Over time the newcomer moves from peripheral to full participation. It is however argued that, in modern and dynamic knowledge communities, there are not such clear-cut roles for newcomers and old-timers because everyone has to function as a newcomer in a sense of continuously surpassing his or her earlier achievements, and because sometimes new generations develop competencies that are very difficult for older generations to attain (Bereiter and Scardamalia, 1993; Paavola et al., 2002). Wenger (1998a) revises his earlier work (Lave and Wenger, 1991). While Wenger does not ignore legitimacy and peripherality, it is participation that he extracts as being crucial to the revised notion of a CoP (Hildreth and Kimble, 2002). Wenger stresses that learning is social participation and points out that participation is not tantamount to collaboration. It can involve all kinds of relations, conflictual as well as harmonious, intimate as well as political, competitive as well as cooperative. He explains that any CoP will then produce objects and refers to this process of giving form to the experience as reification.

More recent research also view learning as a social process. Paavola et al. (2002) cite that most of the CSCL literature relies on the socio-cultural theory of learning. Recently, Siemens (2004b, 2005, 2006) stresses that the challenge today is not what you know but who you know, and introduces connectivism as a new learning theory. In contrast to the behaviourism (focus on externally observable change), cognitivism (focus on computational models of the individual mind) and constructivism (learners create knowledge as they attempt to understand their experiences) views of learning, connectivism presents learning as a connection/network-forming process. Connectivism principles acknowledge that learning is complex, multifaceted and chaotic and consist of:

- 1 learning and knowledge require diversity of opinions
- 2 learning is a network formation process of connecting specialised nodes or information sources
- 3 knowledge rests in networks
- 4 knowledge may reside in non-human appliances and learning is enabled/facilitated by technology
- 5 capacity to know more is more critical than what is currently known

- 6 learning and knowing are constant, on going processes (not end states or products)
- 7 ability to see connections and recognise patterns and make sense between fields, ideas and concepts is the core skill for individuals today
- 8 currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities
- 9 decision-making is learning.

To have a chance of success, LM and KM approaches need to recognise the social aspect of learning and knowledge and as a consequence place a strong emphasis on knowledge networking and community building to leverage, create, sustain and share knowledge in a collaborative way, through participation, dialogue, discussion, observation and imitation. To build such communities and networks, we need to go outside the classroom and organisation boundaries to involve peers, customers, partners, suppliers and different types of communities such as CoP, Communities of Interest (CoI) which encompass people with shared interests or LC, defined by Siemens (2006) as external structures that we create in order to stay current and continually acquire, experience, create and connect new knowledge. Wenger (1998b) also notes that communities and networks are everywhere. We all belong to a number of them; at work, at school, at home, in our hobbies. Some have a name, some do not. We are core members of some and we belong to others more peripherally. As knowledge networking and community building become the next challenge, Social Network Analysis (SNA) techniques are required.

5.2 *Content-centric versus user-centric*

As discussed before, past LM and KM initiatives have failed because they place too much emphasis on content without understanding the unique needs of learners and knowledge workers. Recognising that learning and knowledge are personal, LM and KM approaches require a move away from one-size-fits-all content-centric models, and move towards a user-centric model that puts the learner/knowledge worker at the centre and gives him/her the control.

In a learning context, a user-centric model means the creation of self-organised learning networks that provide a base for the establishment of a form of education that goes beyond course and curriculum centric models, and envisions a learner-centred and learner-controlled model of lifelong learning (Koper, 2004). This would mean a shift from e-learning to me-learning; a vision that will provide personalised learning experiences to every person everyday (Hodgins, 2005) and a move away from LMS to Personal Learning Environments (PLE). Milligan (2006) defines PLEs as systems with a set of tools which more fully support the learning process and are more closely matched to the needs of individual learners. These tools would give the learner greater control over their learning experience and would constitute their own personal learning environment, which they could use to interact with institutional systems to access content, assessment, libraries and the like. Consequently, the traditional instructor's role description has to change. The new role of the instructor is to act as a knowledge broker, knowledge co-creator, mentor, coordinator and facilitator of the learning experience.

In a corporate context, a user-centric model implies the equipment of knowledge workers with the appropriate services and techniques to support their personal-knowledge and information-management needs. This would mean a shift from

KM to Personal Knowledge Management (PKM). Wilson (2002) points out that in contrast to data and information, knowledge can never be managed, except by the individual knower and, even then, only imperfectly. PKM is therefore getting mainstream. Efimova (2004) notes that PKM and traditional KM differ depending on whether an organisational or personal perspective is adopted and states that PKM shifts responsibility for learning and knowledge sharing from the company to individuals, which is a challenge to both sides.

PLE and PKM driven approaches do not only provide personal spaces, which belong to and are controlled by the users, but also require a social context. These approaches need to offer means to connect with other personal spaces and networks for effective knowledge sharing and collaborative knowledge creation.

5.3 Centralised versus distributed

Learning and knowledge are distributed and ubiquitous in nature. Stephenson (2004) writes 'I store my knowledge in my friends'. Today, information is broken up into microcontent units that can be distributed over dozens of domains (MacManus and Porter, 2005). Learners and knowledge workers are collaborating more than ever outside and across classroom and organisation boundaries which become more and more irrelevant. Centralisation works well for organised knowledge or established structures. Decentralisation is effective when things change rapidly, diverse viewpoints are required and knowledge has not settled into a defined state, which is the case in today's complex knowledge spaces (Siemens, 2006). Most traditional LM and KM initiatives fail because they violate this principle and continue to store information on a centralised basis and perform in closed and controlled environments. To be more effective, LM and KM solutions need to operate with a more decentralised and socially open approach, based on small pieces, loosely joined and distributed control.

5.4 Top-down versus bottom-up

Top-down models and hierarchical controlled structures are the enemies of innovation. In general, learners and knowledge workers love to learn but they hate not to be given the freedom to decide how they learn and work (Cross, 2003). Nowadays, educational institutions and organisations follow a top-down model and put heavy emphasis on how to force users (learners, employees, customers, partners and suppliers) to access their closed environments and join their small communities. These attempts often fail due to the 'what's in it for me' factor. As a solution, Davenport and Prusak (1998) state that communities should emerge naturally and evade the control mechanisms of the formal organisations and institutions. Furthermore, learning and knowledge are dynamic and complex in nature. According to Cross (2005), emergence is the key characteristic of complex systems. It is the process by which simple entities self-organise to form something more complex. That is, the effective way to cope with complex systems is to let them develop and emerge naturally, in a freeform way. Consequently, LM and KM solutions need to follow an emergent bottom-up approach, driven by the learner/knowledge worker and based on sharing rather than controlling.

5.5 *Knowledge-push versus knowledge-pull*

Traditional LM and KM initiatives adopt a knowledge-push model and are concerned with exposing people to content and expecting that then learning will happen. Recognising that learning and knowledge are dynamic and flexible in nature, LM and KM approaches require a shift in emphasis from a knowledge-push to a knowledge-pull model (Naeve, 2005). In the knowledge-pull case, people create an environment where they can pull content that meets their particular needs from a wide array of high-value but less structured resources like information repositories, communities and experts, thus creating much more of a flexible, real time learning and knowledge culture (Rosenberg, 2006).

5.6 *Adoption*

Abundant empirical studies in user technology adoption literature show that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) predict a user's acceptance and actual usage of a system (Zhang and Li, 2005). PU is the degree to which a person believes using a particular system enhances his or her job performance. PEOU is the extent to which a person believes using a particular system is free of effort (Davis, 1989). Consequently, for LM and KM approaches to be adopted, their systems need to be both simple and useful. To be useful, LM and KM systems need to provide environments that support the effective capturing of quality and context-rich knowledge as it gets created. Collaboration contextualises content (Cross, 2003). The wisdom of crowds ensures that knowledge is up-to-date and relevant. Knowledge created by many is much more likely to be of better value. Communities decide what is valuable through filtering, rating, feedback, reviews, criticisms and recommendations. They also support the certification of people's expertise and the assessment of individual digital reputation. This collective intelligence is what is making for example, Google, eBay, Amazon, YouTube and Flickr so successful and popular today. Effective LM and KM approaches also need to develop mechanisms that ensure that learning and knowledge are embedded into the workflow of the job and in our daily activities in order to avoid any additional work.

5.7 *Knowledge sharing culture and trust*

Often, people tend not to share their valuable knowledge. Babcock (2004) cites two key reasons why people do not share knowledge:

- 1 people believe knowledge is power
- 2 people do not trust each other.

Motivation of learners, knowledge workers, customers and suppliers to share valuable knowledge is based firstly on a culture that supports and encourages knowledge sharing and secondly on trust. A key requirement for knowledge sharing is a culture that allows knowledge to flow and rewards rather than punishes collaboration initiatives. Collaboration has to become the norm and a meaningful part of the performance evaluation of learners and knowledge workers. A major prerequisite for knowledge sharing is trust. Relationships foster trust. As a solution for the trust problem, Babcock (2004) suggests to create opportunities for people to meet and interact in formal and informal settings, give them time to develop relationships, to evaluate each other's

trustworthiness and to learn each other's strengths and weaknesses. Similarly, Siemens (2006) states that social contact is needed to foster a sense of trust and comfort and secure and safe environments are critical for trust to develop. A bottom-up approach and distributed control also build a base for successful knowledge sharing and trust. People only tend to share their knowledge if they do not feel that they are forced to. Therefore, encouraging people to build their personal social networks and join communities based on their needs helps to ensure trust and motivates them to share.

6 Web 2.0 meets LM and KM

Over the past few years, the web was shifting from being a medium, in which information was transmitted and consumed, into being a platform, in which content was created, shared, remixed, repurposed and passed along (Downes, 2005). We are entering a new phase of web evolution: The read-write Web. A new generation of user-centric, open, dynamic web, with peer production, sharing, collaboration, collective intelligence, distributed content and decentralised authority in the foreground. This new web generation has been referred to as Web 2.0 (O'Reilly, 2005). However, the concepts, technologies, practices and principles behind Web 2.0 are far more important than the term itself. Social software has emerged as a major component of the Web 2.0 movement (Alexander, 2006). Social software can be defined as a tool for augmenting human social and collaborative abilities, as a medium for facilitating social connection and information interchange and as an ecology for enabling a system of people, practices, values and technologies in a particular local environment (Coates, 2003). Rapidly evolving examples of social software technologies include wikis, blogs, RSS, podcasts, media sharing and social tagging. Social software is however not restricted to these technologies.

6.1 Social software driven approach to LM

In the following, we present a social software driven approach to LM that can also be applied for KM, since, as discussed in Section 3, LM and KM can be viewed as two sides of the same coin. At the heart of this approach are the challenges of personalisation and collaboration. This approach can be broken down into three key points.

6.1.1 Personal tools and environments

This approach is based on PLE and the freeform use of a set of lightweight tools that belong to and are controlled by individual learners. Rather than integrating different tools into a centralised system, the idea is to provide the learner with a myriad of tools and hand over control to him/her to select and use the tools the way he/she deems fit. Chatti et al. (2006b) for example discuss the potential use of social software in learning environments.

6.1.2 Get people to people

Social software supports knowledge networking and community building. For example, wikis provide an opportunity for collaborative content creation and social interaction. Blogs are a good example of social software in action. Commenting on blog posts makes

the interaction between blog-authors and -readers possible and can lead to interesting discussions. New blog-readers can then join the discussion by commenting or writing a post on their own blog with a reference to the blog post that they want to comment on. Trackbacks detect these remote references and enable to establish a distributed discussion across multiple blogs. Consequently, a social knowledge network from people with similar practices or interests can be created and even enlarged by blogrolls. Media sharing, social tagging and folksonomies are good examples of the collective intelligence at work. They provide a powerful way to foster community building as users share, organise, discover, look for what others have tagged and find people with same interests. Social software takes a bottom-up approach and enables people to organise themselves into a network based on their preferences (Kaplan, 2003).

6.1.3 Get content to people

The idea is to take a knowledge-pull model based on small pieces, loosely joined. RSS is a good example of a successful technology that brings content (e.g. new blog posts, podcasts) to a user's personal space, once she has subscribed to the feed source. The main obstacle of the knowledge-pull model lies in the information overflow on the web. Therefore, we need federated, intelligent and social search engines that build on user recommendations, reviews, filtering and rating to locate quality resources, services, communities and experts. The search result should be modular content than can be remixed to generate personalised learning resources, lightweight services than can be mashed up to form adapted services, PLEs that can be aggregated to build a community and small communities that can be networked to create interdisciplinary knowledge clusters.

6.2 Benefits of the proposed approach

The social software driven approach has several advantages over traditional approaches to LM and KM. Firstly, this approach is a means to combine LM and KM solutions into one integrated approach. Secondly, it reflects the nature of learning and knowledge as being social, personal, distributed, flexible, dynamic and complex. Thirdly, it represents a fundamental shift towards a more social, personalised, open, dynamic, emergent and knowledge-pull model for LM and KM, as opposed to the one-size-fits-all, centralised, static, top-down and knowledge-push models of traditional LM and KM initiatives.

The question that might be raised now is whether busy learners and knowledge workers will adopt this approach. In Section 5.6, we pointed to the fact that people will not adopt a new approach unless it is both easy and useful. The technologies that might be used here (e.g. blogs, wikis, RSS, social tagging) have a high PEOU, since they are relatively easy to use. The simplicity of these technologies can ensure successful adoption. This approach has also a high PU. It supports the effective capturing of quality and context-rich knowledge. For example, discussions around a blog post through comments and trackbacks give more context to the codified knowledge. And, recording of phone/video-conferences and instant messaging sessions supports the online capturing of context-rich knowledge as it gets created, thus avoiding any additional work to capture this knowledge at a later time. Furthermore, this approach ensures that learning and knowledge are embedded into the workflow of the job and in our daily activities. We want here to stress that today's learners and the knowledge workers of tomorrow are

today's teenagers and kids. Today's teenagers and kids are digital natives, that is, native speakers of the digital technology who grow up with blogging, commenting, podcasting, tagging, sharing and collaborating over the internet, rather than digital immigrants, that is, those of us who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology (Prensky, 2001). It is thus much likely that today's teenagers and kids will adopt a social software driven approach mainly based on collaboration and networking.

7 Conclusion

In this paper, we addressed how LM and KM have become essentially two sides of the same coin as the two fields are increasingly similar in terms of input, outcome, processes, activities, components, tools, concepts and terminologies, reviewed previous models of LM and KM and explored their failure to address the problem of learner and knowledge worker performance, discussed seven critical factors needed for the success of LM and KM initiatives and presented the details of a social software driven approach to LM and KM that has the potential to overcome the deficiencies of previous LM and KM models.

Acknowledgements

This work is supported in part by the EU Network of Excellence PROLEARN (<http://www.prolearn-project.org>).

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