

Towards unstructured and just-in-time learning: the “Virtual eBMS” e-Learning system

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In the era of Knowledge Economy a just-in-time access to learning content as well as an efficient way to access to increasingly distributed knowledge sources is required, in order to solve the problem of “knowledge obsolescence”. In this scenario, traditional e-Learning systems are no more adequate and need a strong integration with Knowledge Management (KM) systems, in order to trigger a just-in-time/at work-place/customized/on-demand process of learning, in place of an old-fashioned time/place/content predefined one. In this paper we describe an innovative e-learning system that enables a just-in-time access to learning material, by also allowing some e-learning experiences based on an unstructured organization of the content.

Keywords e-Learning; Knowledge Management, Unstructured Learning, Just-In-Time Learning, Organizational Memory

1. The need for an unstructured and just-in-time approach to learning

In the current scenario of the Digital Economy, characterized by unpredictable and discontinuous change, organizations find themselves facing rapid series of market shifts, new technological innovations and shifts in government policies [1], therefore they need to change and to reconfigure themselves quite instantaneously. Indeed, successful organizations are those that have learnt how to be innovative and creative while at the same time maintaining enough discipline to effectively execute their work plans.

These fundamental changes involve new styles of learning approaches characterized by the right knowledge delivered to the right people, at just the right time, in the right way, and just enough. More specifically, *deliver the right knowledge* means that the knowledge must be relevant to the learner activities and properly structured and described, *to the right people* means that the relationships between people and knowledge should be modelled and supported with appropriate matching mechanisms, *at just the right time* means that a learning process should be triggered just-in-time, whenever it is needed, *in the right way* means that the knowledge delivery should be personalized according to the learning style of the learner and, *just enough* means that ideally only the self-consistent portion of knowledge required to solve the current problem and/or perform the current task/process should be delivered, and not more.

It is clear that these new learning styles are some of the next challenges for every industry. Incredible velocity and volatility of today's markets require just-in-time methods for supporting the need-to-know of employees, partners and distribution paths.

Time, or the lack of it, is the reason given by most businesses for failing to invest in learning. Therefore, learning processes need to be fast and just-in-time. Speed requires not only a suitable content of the learning material (highly specified, not too general), but also a powerful mechanism for organizing such material. Also, learning must be a customized on-line service, initiated by user profiles and business demands. In addition, it must be integrated into day-to-day work patterns and needs to represent a clear competitive edge for the business [2].

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Currently, most of web-based learning systems and Knowledge Management systems, have some limits referring to the knowledge organization and the learning materials navigation; therefore they do not appear as the most suitable kind of system for supporting such new learning styles.

2. Limits of traditional Knowledge Management and e-Learning systems

2.1 Knowledge Management systems

Knowledge Management (KM) is a tool for the creation, archiving, and sharing of information, expertise, and insight within and across communities of people and organizations with similar interests and needs, the goal of which is to build competitive advantage [3].

In terms of output, KM is about getting the right knowledge to the right people, in the right form and in a timely fashion, so they can do their best work. The ever-increasing pace of innovation in the field of Information and Communication Technology (ICT) has provided numerous tools ready to be applied in organizations to support KM approaches. Knowledge Management Systems (KMS) promise significantly enhanced functionality through an integrated combination of a substantial portion of existing ICT tools from a KM perspective. Goals of using KMS are for example to generate, share and apply knowledge, to locate experts and informal networks of people, to actively participate in networks and communities, to create and exchange knowledge in these networks, to augment the employees' ability to learn and to understand relationships between knowledge, people and processes [4]. In a few words, KMS seek to facilitate the sharing and integration of knowledge.

However, these systems have often had limited success with reported failure rates of over 80% [5]. This is because many of them are still, for the most part, used to support data and information processing, rather than KM [6], and also because many implementations neglect the social, cultural and motivational issues that are critical to the success [7].

2.2 e-Learning systems

E-learning is the use of Internet technologies to create and deliver a rich learning environment that includes a broad array of instruction and information resources and solutions, the goal of which is to enhance individual and organizational performance [3].

In the recent years, new breeds of Information System (IS) known as Learning Management Systems (LMS) and Learning Content Management Systems (LCMS) are evolving to enable learning in organisations [8]. In essence, LMS replace isolated and fragmented learning programmes with a systematic means of assessing and raising competency and performance levels throughout the organisation, by offering a strategic IS solution for planning, delivering, and managing all learning events, including both online and classroom-based learning [9]. LMS are often coupled with LCMS which facilitate the management and administration of the learning content for the online learning programmes in the form of learning objects [8].

Such kind of IS, on the other hand, lack in specific functionalities for the construction and delivery of dynamic, modular learning paths that match the knowledge needs in a contextualized (according to learner's current activities) and individualized (according to learner's experiences, competences profiles, learning history and personal preferences) way. This brings towards a strong integration among e-Learning and KM functionalities to define a rich learning environment with wealth and variety of resources available just-in-time to learners, both through structured and unstructured knowledge objects, both through interaction with other people.

3. Overcoming the limits: the convergence between e-Learning and Knowledge Management

In the new competitive scenario e-Learning has come to be an essential tool to speed up the learning process. However, the evidence shows the limitations of current course-based, barely customized e-Learning solutions. To fully exploit the real potential of e-Learning, it is necessary to reshape the processes that support designing, development and delivery of learning in a just-in-time, individualized, and action-oriented manner, integrated into day-to-day activities.

In such a context-aware and time sensitive approach enabling the human capital creation process, e-Learning functionalities could not be considered in isolation with respect to KM ones, rather the two kind of functionalities should be integrated in a unique, overarching service architecture which becomes the new core 'operating system' of the organization. This requires not a merely integration of e-Learning and KM processes or the development of some interfaces, but the rethinking of the nature of what e-Learning systems and KM systems are, and how they are perceived. In this perspective, e-Learning shifts from a simple technology-enabled provisioning of courses and contents to a new contextualized and interactive paradigm which combines people, contents and technology through just-in-time processes and ad hoc strategies, according to the organization's business model. KM, on its own, shifts from storing, organizing, and sharing knowledge across the organization to the management of the effectiveness to which knowledge is applied to the creation of innovations and business value.

Although until now e-Learning and KM have been considered as two separated worlds (different histories, target markets, knowledge backgrounds, IT solutions, market players and approaches to the development of human capital), both perspectives have a common element: the focus on an effective organization, delivery, and application of knowledge to improve business performance and competitive advantage. Indeed, there are several common characteristics between them, in terms of the system architecture adopted (both client-server based), in terms of the broad variety of forms in which knowledge can be provided to the final users, and in terms of the communication and cooperation facilities, as well as the personalized services, provided to users by both the two kinds of systems [10].

Having defined the need to integrate e-Learning and KM solutions the question is: which could be a suitable approach to e-Learning allowing people to replace old-fashioned time/place/content predetermined learning with a just-in-time/at work-place/customized/on-demand process of learning?

4. Virtual eBMS: an integrated e-Learning and Knowledge Management system supporting unstructured and just in time learning

According to these considerations, it is envisaged a core e-Learning and KM Solution around which all the other IS components of an organization interact to support a highly contextualized, collaborative, just-in-time and action-oriented learning environment where all the activities are strictly integrated, and learning and working are seamlessly intertwined. The potential implications of such an integrated system can be significant: rather than organizing well structured learning paths, it would be possible to use unstructured information to help people learn and improve their performance; it would be possible to differentiate between skills that must be performed automatically from information that can be accessed when needed; it should be no more necessary to teach people the steps for performing a specific process or task, it might be quite enough to teach people where to find such steps.

In this paragraph an innovative system based on these requirements is described, with particular reference to the functionalities enabling a just-in-time access to learning material, by also triggering and supporting an unstructured learning process through the creation of e-learning experiences based on an unstructured organization of content.

In addition to the traditional and structured offering of e-learning content, the system allows a learner both to freely access to a structured knowledge base and therefore to self-organize his/her learning patterns, and to follow a recommended learning path suggested by the system according to the his/her interests or competences profile. Such system is a component of a more complex and integrated

KM and e-Learning platform, called “Virtual eBMS”, that has been designed and developed at the e-Business Management Section (eBMS) of the Scuola Superiore ISUFI, University of Lecce (Italy).

The on going experimentation of the system into the Higher Education programs of the School is focused on Business Management and Technology Management topics; these two general areas of content has been structured according to an extensible and more detailed content taxonomy. Such content taxonomy is strictly related to the competences taxonomy of the School that is organized on three levels (Level 1: Competence Area; Level 2: Specific Target Competence; Level 3: Learning Objective), according to the approach adopted by the School for mapping and developing its competences. This approach allows learners and knowledge workers to have a single access point for searching and retrieving structured and unstructured knowledge items from the knowledge base of the School. Such competence taxonomy is used for classifying mainly two kinds of learning materials:

- **Knowledge Object (KO):** an object composed of a single document in its native format (such as text, graphics, image, presentation, audio, video, etc.) or a collection of them. Each KO is characterized by a name, a description, a learning objective and a set of references to further resources (Fig. 2a).
- **Learning module (LM):** a self-consistent learning path allowing learners to reach a specific competence. The structure of a learning module relies on the Problem-based approach according to which a learner has to solve specific problems related to real cases, by proposing his/her solution in the form of deliverables. Indeed, by submitting such valuable material and by passing some specific tests the learner can reach the target competence under which that module is classified. A set of high level learning content (multimedia presentations, Web resources, knowledge objects, SCORM objects, virtual classroom events), together with some additional services (chat, forum, personal/shared notes, exercises and games) are embedded in each learning module, in order to drive the learner to reach the solution to the problem more easily and fast (Fig. 2b).

Fig. 2. Some Examples of learning material available in the knowledge base. a) Knowledge Object. b) Learning Module.

The interaction between the learner and the system can be represented through a use cases diagram, that shows different ways to access to the organizational memory of the School (Fig. 3):



Fig. 3. Use cases diagram

As use cases show, learners can access to the learning content in several ways:

- Free search of knowledge objects and learning modules, either by surfing the competence taxonomy or by a textual search. The textual search can be made by specifying the name of the object or module (or a portion of it), the problem that learners has to face, or a specific topic of interest. In this way learners can access to the right portion of knowledge they need exactly when it is needed.
- Learning modules recommendation, according to the competence profile of the learner or his/her specific interests. Again, the competences taxonomy is used to organize and present to the learner both the profile-based and the interest-based recommended learning modules. This allows a constant delivery of meaningful content to learners, in order to obtain a continuous acquisition of their competencies, skills and know-how.

Moreover, the availability of different ways of knowledge delivery (use of multimedia presentations, Web resources, knowledge objects, SCORM objects, virtual classroom events), together with the use of several collaboration tools (chat, forum, shared notes), allow learners to decide how to better personalize their experience according to their learning style, in order to maximize the effectiveness of learning.

5. Concluding remarks

The strategic choice of integrating e-Learning functionalities with KM functionalities in the e-Learning system of the Virtual eBMS allows learners and knowledge workers to increase the effectiveness of their learning process and to boost their problem solving capabilities.

Indeed, from the final users point of view the main benefits of using such system are: a remarkable time reduction of the problem solving process, a strong correspondence between the learning activities of learners and their competences profile, improved capability of learners to generate value for the organizations through the access to the organizational memory and, finally, knowledge productivity of knowledge workers significantly increased.

In conclusion, the e-Learning system of the Virtual eBMS assures a personalized and just-in-time access to learning patterns (by also granting the possibility to have a structured access to learning content), therefore adding to space and time flexibility (already common in traditional e-Learning contexts) flexibility in the knowledge base access through a dynamic and customizable configuration of learning patterns.

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