Integrating ‘Context’ in e-Learning Systems Design

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Abstract

Whilst there is a common agreement on the need to design e-learning systems able to take into account more explicitly the ‘context’ in which learners operate within organizations in order to achieve higher levels of customization (personalized interaction) and impact, many different perspectives exist related to the characterization of which ‘context’ has to be integrated in the design process, and how to accomplish it. The objective of this paper is to report on insights generated within an EU-funded research project - LIP (Learning In Process) – aimed at providing highly contextualized e-learning systems addressing the needs of knowledge intensive organizations.

1. Introduction: The changing needs of ‘Learning Organizations’

Private and public organizations, and the environment in which they operate, have considerably changed in the last few decades. More than before, organizations feel the need (and often the necessity) to renew themselves more rapidly to adapt to an increasingly competitive and changing environment, to (re)design their processes to achieve higher levels of flexibility, and to introduce more sophisticated ways of managing their knowledge assets [1]. In this context, the employees - increasingly labeled as ‘Knowledge Workers’ - are experiencing significant transformations in the nature of their work and roles: their expected contribution and the way in which they create value for their company is shifting from fulfilling relatively routine tasks that can take time to acquire but typically change relatively little over time, to more autonomous and creative activities that are subject to continuous changes. In addition, employees are less and less likely to run their entire career in a single company within a relatively deterministic career path, and have rather to envisage that their career will encompass an important diversity of roles, requiring several reorientations, and spanning multiple companies [2].

1.1. A learning organization empowering people

These new conditions have been addressed by authors aiming at describing and investigating the theory and practice of so-called ‘Learning Organizations’ [3][4][5], i.e. emerging knowledge-intensive companies displaying the structure and processes most adapted to operate in the so-called ‘Knowledge Economy’. Such learning organizations are typically characterized by two factors: (1) a significant transformation of the relationship between the organization and its employees/members, and (2) an increased capacity for adaptation and change. A learning organization expects from members that they " ... act as learning agents for the organization, responding to changes in the internal and external environment of the organization by detecting and correcting errors in organizational theory-in-use, and embedding the results of their inquiry in private images and shared maps of the organization" [6].

A key aspect of a learning organization is therefore the ‘empowerment’ of its members: people in a knowledge organization have more autonomy and more freedom to define lines of actions that will contribute to the generation of value for the organization, becoming also more responsible and accountable for their actions.

2. The limits of the traditional pedagogical approaches

In spite of much of the dominant rhetoric about ‘e-Learning revolutions’ and alike, the traditional pedagogical approach used (both online and offline) to train people in organizational contexts has not
radically changed and still basically reflects the good old classroom-based instructor-led teaching method.

This mode of learning relies on a well-established model of mass education characterized by:

- A relatively passive and anonymous student considered as a recipient of learning materials that are delivered to him/her.
- A body of knowledge that is dominantly of theoretical/conceptual nature and largely independent from any particular situation, aiming at the transfer of ‘generic’ knowledge with a potentially large range of applicability even in the long term.

Of course, other pedagogical models exist and are applied successfully in several disciplines. For instance in management education, more actively engaging (learner as discussion partner, learner as ‘doer’) and context-specific approaches (through the use of realistic situations) like in the Case Method [7] or through the use of Simulation Games, and other even more sophisticated experiential and collaborative learning methods, have emerged over the last few years, partially enabled by the advances in computer, networking and software technology. Nevertheless, the (virtual) classroom & (virtual) lecturing approach remains the pre-eminent model of education, and many obstacles remain for the adoption of more active learning approaches and systems [8].

Is the traditional learning model still adequate for fulfilling the training needs of the knowledge-intensive organization and of the “life-long learning” worker of this organization?

2.1. Addressing the learning needs of knowledge-intensive organizations

Whilst the traditional classroom approach may to some extent be considered as acceptable for training a large number of inexperienced learners (such as students at the undergraduate level) whose needs and expectations are not yet totally defined, it definitely falls short in accommodating the needs of companies for which knowledge has to be quickly and directly applicable to specific problems and situations. From what we discussed in section 1, it is evident that knowledge-intensive organizations need instead solutions and systems which are able to take into account the specific situations in which individuals and teams operate, and which support explicitly the generation/acquisition, transfer and use of highly innovative and unique knowledge to be able to continuously differentiate their market offer and compete successfully.

In line with the second point discussed in section 1, another important objective and need of these organizations is to help their employees become more proactive and socially competent. Indeed these skills are very important for facilitating the coordination between employees who are more autonomous but also work more collaboratively than in the past. These are definitely skills, behaviors and attitudes which are difficult to acquire through traditional lectures.

2.2. Addressing the needs and the aspirations of adult learners

The traditional approach shows some serious shortcomings when it comes to fulfill the expectations of the adult knowledge workers, who are under increased pressure to become more productive and proactive, aspiring at the same time to follow modes of learning that they control and that they consider to be the most effective.

Adult learners have very different learning objectives and psychological profiles than less mature individuals (theory of andragogy [9]), and in particular typically require the learning process and content to be more related to the large reservoir of experiences that they have accumulated, demanding at the same time that the result of training is more directly applicable to their specific situation and challenges. Indeed these students do not just passively take in knowledge, but actively construct it on the basis of their prior knowledge and experiences [10], which the traditional methods most of the time simply ignore.

Adult learners also attach more importance to the development of their social skills, since they realize that social competency (social network) represents one of their most valuable assets within and beyond the organization(s) they work with [11]. As indicated previously, traditional methods (and lectures in particular) are not very adapted to the teaching of these soft skills, for which direct experiences and contextual immersion provide far better solutions.

All these elements, as well as the lack of motivation that might result from using inappropriate methods, make traditional approaches rather inadequate for supporting learning in knowledge intensive organizations sustainable.

3. Reintegrating the context in the new approaches to learning and training
One of the most promising directions of research aimed at addressing the limitations of the traditional learning methods consists in reincorporating the ‘context’ in which learners operate within the educational process. This reincorporation can be done at three different levels:

1. at the level of the learning process;
2. at the level of the organization;
3. at the level of the individual learner.

In the following section we discuss in more detail these three levels of contextualization, and how they are being operationalized within the e-Learning system developed in the context of the LIP (Learning In Process) research project.

3.1. The LIP project: A system providing Contextualized Learning

LIP (http://www.learninginprocess.com/) is the name of a research project funded by the European Community, which aims at designing an e-learning system addressing the specific needs of knowledge-intensive organizations, as discussed in the previous two sections.

The targeted e-Learning system is articulated around the three main components:

- **Learning Materials** to be proposed to the learner
- **Domain Knowledge** able to capture the context of the organization
- **User Context** modeling the characteristics of the learner.

LIP focuses on the fact that context matters, and that in a working context, the learning process is successful only if knowledge is provided at the moment when it is really needed and in a manner adapted to the worker's context. The system therefore is designed to take into account the specific domain knowledge determining the context of an organization as well as the specific profile of users, in order to be able to deliver **contextualized learning** with the maximum of impact.

Like in the majority of e-Learning solutions, Learning material is organized in small, modular and reusable Learning Objects. Learning Programs can then be built/assembled from smaller units to satisfy the needs of each user and situation. For instance, the LIP system supports users and trainers to import and export SCORM-compatible learning material. In this way organizations are supported both in creating their own learning materials as well as in using or integrating content developed and provided by third parties.

Within the LIP system, Domain Knowledge is hierarchically structured in Knowledge Areas. These areas are related to competencies, which establish the needed link between the user context and the learning material that covers an emerging knowledge gap. Furthermore, a number of system components within the LIP system support the automatic or interactive capturing of different dimensions related to the user context, including basic user profile (demographic characteristics, preferences, ...), technical constraints (location, bandwidth, supported media, ...), organizational aspects (roles, tasks, ...) and process-related aspects (current tasks being carried out). User context will be extracted both explicitly (from user preferences and organization directories) and implicitly, using context-listening mechanisms.

3.2. Situated learning: integrating context at the educational process level

Incorporating the context at the level of the educational process consists in 'situating' the learning by embedding the knowledge that needs to be delivered into a set of situations/scenarios (real or specially recreated).

Situated learning has been investigated in the literature both at the cognitive and at the sociological level. At the cognitive level [12], studies related to situated learning typically investigate how human knowledge develops in the course of a given activity/task, and how people create and interpret descriptions (representations) of what they are doing. Other studies investigate learning as a socially situated process [13]. In fact, there is no doubt that people acquire knowledge via their social network, and learn via their participation in different types of networks and communities (e.g. Communities of Practice [14]). By now, many companies have established so-called learning networks, operating within or across company boundaries [15] in an attempt to emphasize socially situated learning and change the way people learn and share knowledge related to their job.

Finally, experiential learning represents a particular category of situated learning that consists in immersing learners in a specific situation/ scenario in which they will have the opportunity to (inter-)actively acquire and experiment with knowledge. Experiential Learning conceives learning as a four-stage cycle addressing four learning modes: concrete experience, reflective observation, abstract conceptualization and active experimentation [16].

Which are the design principles applied within the LIP project to situate the learning process according to...
a pedagogical perspective? Thanks to its integrated authoring tools, the LIP e-Learning system provides organizations with the possibility to create learning materials which reflect and integrate directly the specific knowledge and processes of the organization. LIP also offers some collaborative mechanisms supporting collaborative learning, as well as tools for facilitating and accelerating the circulation of knowledge amongst learners (socially situated learning), and the construction of a shared understanding of problems or opportunities. Finally, the possibility to import easily SCORM-compatible external material provides the possibility for the users to access advanced pedagogical materials such as simulations and computer-based role-playing games.

3.3. Organizationally situated learning

A second way of situating learning processes consists in relating and aligning the knowledge to be delivered and acquired to the organizational context, mapping (1) the domain knowledge and processes of the organization; (2) its cultural profile and (3) its strategic orientation.

By connecting and integrating them to the information infrastructure of the organizations (knowledge management systems, human resource management systems, virtual community systems, etc.), e-learning systems are no longer isolated from the main operations of the organizations, but enhance the working processes of the employees on the job, on a when-needed basis, and take into account the culture of the organization and its strategic orientation (through the connection to the company’s goal alignment system).

Which are the design principles applied within the LIP project to situate the learning process according to an organizational perspective? First, LIP integrates a set of easily editable ontologies capturing the structure of the organization. These ontologies provide the basis for “indexing” the learning material in a way that is consistent with organizational processes. Within LIP, ontologies are also used to map and capture flexibly information on user profiles and organizational roles, as well as tasks being carried out. They can be therefore exploited to provide personalized learning interventions aligned with organizational needs. In addition, the system integrates an assessment/diagnostic tool used to identify competency gaps between existing vs. desired or required competencies of individuals. Finally, collaborative mechanisms contribute to the diffusion and adoption of ideas in the organization and to its gradual cultural transformation.

3.4. Individually situated learning

The third dimension along which learning can be situated is the individual perspective of the learner. As outlined in the first two sections, knowledge workers (for whom life-long employment has disappeared) are supposed to set objectives on their own, i.e. beyond the specific objectives of their organizations. Modern learning approaches also need to take into consideration that individuals have different personalities and profiles and are driven by different motivational factors. E-learning systems can take these aspects into account in a variety of ways: first, through in-depth modeling of the specific characteristics of learners (style, preferences, interests, motivations, personal goals, current psychological state/mood, etc.) which can and should be taken into account when delivering personalized learning; second, by letting users keep control of their learning process, avoiding the temptation to impose too strict a supervision. Learners should in particular not be too constrained by the structure of the e-learning system and have the possibility to orient the learning process according to directions they agree with.

Which are the design principles applied within the LIP project to situate the learning process according to an individual perspective? As indicated, LIP supports the definition of elaborated user models capturing the characteristics of learners as well as their specific working contexts. This information can be successfully used to provide diagnostics related to individual competency gaps, to suggest and stimulate learning trajectories related to organizational needs and ultimately help learners to pilot their development and career. LIP also gives a maximum control to users, suggesting rather than imposing, and letting them decide to accept or to decline proposed material and learning trajectories.

4. Conclusion

Even if empirical evidence from usage of the LIP e-Learning system is still limited (the system is currently under evaluation in 3 European knowledge-intensive companies), the objective of this paper was to show that the concept of Context in e-learning systems covers a variety of dimensions and promises to change significantly the way we design e-learning systems. In particular, this paper has identified several promising contextualization dimensions, ranging from (1) ‘context’ according to an educational perspective, and hence relating to situated learning (cognitive, social
and experiential), to (2) ‘context’ according to an organizational perspective, and hence related directly to the particular characteristics and needs of an organization, to (3) ‘context’ related to an individual perspective, which is strongly connected to the specific characteristics of individual learners.

The experience of applying these concepts to the design of an e-learning system targeting the needs of knowledge-intensive organizations has revealed that all these dimensions are relevant in generating value for both individual learners and their organizations. If confirmed, we can expect the next generation of e-learning systems to significantly differ from systems that we know today, and to be designed reflecting more organizational as well as individual characteristics.

Finally, it should be kept in mind that this paper has only presented one facet of the whole problem, as the adoption of new approaches to corporate training poses a broader set of challenges which would deserve further investigation on their own such as:

(1) Overcoming the barriers and resistance to adoption of new e-learning systems [17]: This challenge will require employees as well as professionals operating in the training departments to develop new competencies and attitudes [18] which is often associated with a significant cultural change and threat.

(2) Psychological Aspects: Motivating online learners still poses more difficulties than motivating them in traditional settings [19]. In addition, the effectiveness of e-learning systems to address deep behavioral and attitude transformation still needs to be demonstrated.

(3) Integration with the existing Information Infrastructure of an organization (KM systems, HR systems). For instance, in the LIP project we have experienced that the suitable connection between e-learning and HR management systems still seems a difficult challenge, also given the low level penetration of human resource systems in the companies [20].

(4) Measurement of the value generated: Better metrics need to be elaborated to assess the substantive benefit (quantitative or qualitative ROI) of such systems and their actual impact on a companies’ performance [21].

5. References


