

# THE USE OF ICT IN ORGANIZATIONAL LEARNING PRACTICES: A MIXED METHODS STUDY IN A PORTUGUESE ORGANIZATION

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## Abstract

Advanced economies, also known as knowledge-based economies, rely their performance on high skilled workers and quick access to information and knowledge, allowing organizations to react to a competitive, rapidly changing and global environment. Innovation is recognized as a crucial factor for survival, driving the development of new or improved products, services, processes or marketing strategies. Innovation seems to be closely related to organizational learning through which new knowledge is developed, distributed and used.

Several proposals consider organizational learning capability in a multidimensional perspective. Based on these proposals, five dimensions were identified as main driving influences to innovation: idea generation; market and technology surveillance; problem solving; dialogue and knowledge transfer; training and competence development. Recent developments on information and communication technologies (ICT), especially web 2.0 social tools, allow workers a more participatory attitude and control on their learning, promoting collaboration and cooperation between teams and networks. It is important that organizations understand how the use of ICT and web 2.0 may improve the organizational learning capability.

This study aims at understanding how a Portuguese innovative large company uses ICT and web 2.0 tools to enhance learning practices in order to support the discussion of an answer to the driving research question: how are ICT tools being used to promote organizational learning in innovative organizations?. The paper describes relevant theoretical aspects on organizational learning, provides an overview of the use of ICT and web 2.0 tools supporting learning, briefly presents the analysis model and the research methodology using mixed methods, and provides a discussion of preliminary results showing that ICT is proving to promote an effective basis for organizational learning. For each learning practice both organizational and workers perceptions are being studied focusing on: learning activities; supporting ICT tools; understood impact of these practices for the organization and for workers as learners.

Keywords: ICT, Innovation, Organizational Learning, Web 2.0, Mixed Methods Study

## 1 INTRODUCTION

Senge [6] refers to learning organizations as the most prepared for scenarios that require a quick response to the market. The learning organization is described by Garvin [1] as the one skilled at creating, acquiring, interpreting, transferring and retaining knowledge, deliberately modifying its behavior to reflect new knowledge. Often a positive relationship between organizational learning and innovation is referred, although few empirical studies demonstrate it [8].

It is commonly accepted in the specialized literature that organizational learning occurs in individual, group and organizational levels, each level influencing the others. To become organizational, individual and group learning must though be incorporated in the organization in the form of structures, processes, rules and routines [10]. Several proposals consider organizational learning capability in a multidimensional perspective [1, 2, 4, 5, 7, 9]. Based on them five dimensions were identified as main driving influences to innovation: idea generation; market and technology surveillance; problem solving; dialogue and knowledge transfer; training and competence development. Recent developments on information and communication technologies (ICT), especially web 2.0 social tools, allow workers a more participatory attitude and control on their learning, promoting collaboration and cooperation between teams and networks, mixing personal and professional life and interests. Organizations must understand the potential of ICT and web 2.0 in learning practices [11].

## 1.1 Organisational Learning and Innovation Practices

Different definitions establish a close relation between organizational learning and organizational change, whether cognitive, through the construction and acquisition of new knowledge and change in mental models; whether behavioural, reflected in changes in attitudes and behaviour patterns [12-14]. To evaluate the organizational learning capability, different authors propose a set of dimensions, (Table I) sharing a vision of organizational learning including experimentation, team working, problem solving, dialogue or knowledge transfer, and not restricting to training or continuous education programs. This reveals that organizational learning is integrated in daily routines of the organization, occurring mainly in informal and social working dynamics.

TABLE II.  
 ORGANIZATIONAL LEARNING CAPABILITIES DIMENSIONS

Garvin [1]	Experimentation; Learning from best practices of others; Systematic problem solving; Learning from past experiences; Knowledge and skills transfer
Nevis, DiBella [2]	Experimentation; Promotion new ideas at all organization levels; Gathering information on internal and external environment; Identifying gaps in performance; Continuous education
Yang, Watkins [4]	Continuous learning; Inquiry and dialogue; Team learning; Embedded; System Empowerment; Knowledge performance; System connection; Provide leadership; Financial performance
Goh [7]	Experimentation and reward; Teamwork and group problem solving; Effective transfer of knowledge; Clarity of mission and vision; Leadership commitment and empower
Chiva, Alegre [5]	Experimentation; Risk Taking; Interaction with the external environment; Participative decision making; Dialogue
Jerez-Gómez, Céspedes-Lorente [9]	Openness and Experimentation; Systems Perspective; Knowledge Transfer and Integration; Managerial Commitment

Most of the learning dimensions proposed can be found in innovation dimensions. In this study the Portuguese innovation management standard NP4457 was analysed, allowing the identification of five common practices in organizational learning and innovation capability: idea generation; market and technology surveillance; problem solving; dialogue and knowledge transfer; training and skills development. These dimensions were used as the basis to the study.

**Idea generation:** focuses on motivating workers to identify internal problems to be solved, new organizational methods or customer needs. The idea development process, while promoting innovation opportunities, stimulates creativity, promotes unconventional thought, curiosity, imagination, the search for originality and a deliberate focus on problem solving and critical thinking [16]. Sharing ideas with others exposes people to peer judgment, fostering the improvement of the way they express, write and present their thoughts. Innovative organizations should establish procedures to stimulate, capture, analyse and select ideas, promoting a culture of accepting failure [18].

**Market and technology surveillance:** focuses on a better understanding about the organization position taking in consideration its strengths and weaknesses. Through the process of monitoring best/practices and competitors' activities, complementary organizations activity or even activities not directly related to the business, individuals develop new knowledge, while the organization may simultaneously evolve with its changing environment [19]. Innovative organizations should identify activities and actors to systematically contribute to market and technology surveillance [18]. Resulting information should be collected, coded and disseminated by those who might benefit from it.

**Problem solving:** the ability to systematically and quickly solve problems, through the analysis of past practices, promotion of teamwork and participatory decision making towards a solution. Team work promotes knowledge transfer, particularly tacit knowledge [REF. NONAKA]. Documenting problems and solutions and *post-mortem* evaluation improves critical thinking skills, helping to prevent future problems. Innovative organizations should involve workers in problem solving and participative decision making benefiting from motivational effects and organizational commitment [19].

**Dialogue and knowledge transfer:** refers to communication, debate and collaboration between individuals and its teams, aiming at promoting knowledge interaction and transfer. Dialogue is an essential process for building common understanding [20]. It can be internally oriented, e.g. through internal communities of practice, or externally, e.g. regular forums with customers or subject-matter expert collaboration [21]. Innovative organizations should maintain suitable processes for internal and external communication, assuring that knowledge is systematically and efficiently shared [18].

**Training and skills development:** formal training programs help workers developing relevant skills to increase their working performance. Innovative organizations should provide training and appropriate actions, promoting unusual ways of thinking [18].

## 1.2 ICT and web 2.0 tools in learning practices

The evolution of web to a more participative and social platform has offered new opportunities to organizational learning practices. Web 2.0 tools [31] such as blogs, wikis, social networking, social bookmarking, tagging, document sharing, podcast/videocast are producing deep changes in social behavior, allowing digital massive participation. Everyone can now easily post contributions, share discoveries, post questions and doubts, comment on others' posts, produce, select and share contents. From a passive attitude selecting and consuming information provided by others, people are becoming active in its creation, transformation and dissemination, even actively increasingly interfering in the process of designing and customizing products and services, in a prosumer (producer and consumer) attitude [23]. Web 2.0 social tools favors the emergence of non-planned learning and participation, leading to processes opened to innovation [22]. In Table II a list of the main ICT and web 2.0 tools is presented.

Although there is not a unified vision of how web will evolve, web 3.0 is an expression commonly used to refer to the web next generation also referred as the semantic web. Steve Wheeler [30] considers the web 1.0 and the web 2.0 as syntactic web and the web 3.0 as semantic, based on intelligent agents, recommendation systems and intensive use of mobile devices, cloud services, augmented reality and 3D visualization. The growing use of natural language in the process of information classification, especially with the use of folksonomies, and information search with support of ontologies, is nearing people and technology. Information visualization is also being improved by linking and clustering related concepts. The use of mobile devices and cloud services offer the possibility to learn anytime, anywhere in multi-devices, providing an enhanced user experience, either online or off-line synchronized with servers. Most of these web 3.0 features are becoming accessible, offering users more relevant and contextualized information and knowledge.

The use of web 2.0 and web 3.0 tools is improving the integration of working, learning and collaboration supporting individual and group based learning in multiple contexts [24]. The concept of Personal Learning and Working Environments is emerging with the growing use of social software tools for corporate use (e.g. Yammer, Ning, close Facebook groups) or the integration of social features in corporate intranets and LMS. The purpose is to provide tools and services to support individuals in developing their own learning environment and to stimulate collective know-how development, which is expected to contribute to organizational learning, if aligned with organizational strategy and goals.

The complexity of social and technical context of each organization demands different strategies to the use of ICT tools in learning and innovation practices, so a unique recommendation, valid to any context, is therefore not possible. It is important that organizations reflect about how to integrate these tools in daily practices and how to evaluate their impact.

This study reflects how a Portuguese innovative company is using ICT and Web2.0 to support the five learning practices identified, particularly what learning activities are developed, which ICT/web 2.0 tools are being used, and which results they bring to the Organization and to workers, as learners. The analysis model that supports the study and the research methodology are briefly explained below and some preliminary results are presented and discussed at the end of the paper.

## 2 RESEARCH ANALYSIS MODEL

From the research question "How are Information and Communication Technologies (ICT) being used in learning practices in companies oriented to innovation?" two main concepts were identified [25]: the organization profile and the learning practices supported in ICT tools.

### 2.1 Organization profile

This concept pretends to describe the organization context and the profile of participants in the study.

#### 2.1.1 A. Organization description

To understand the organizational context three indicators were used:

A1. Business motivations [26]: What the organization wants to be: Vision and Goals; What the organization has decided to do in order to become what it wants to be: Mission

A2. Organizational structure: City of Head office; Organization size (turnover and number of employees of last 3 years); Organizational structure (departments); Number of employees (last 3 years); Number of employees by level of education, gender, age and contractual situation.

A3. Innovation Profile [3, 27, 28]: Certification in national standard NP4457 (formal innovation processes); Participation on innovation networks (peer recognition and collaboration); Cooperation with scientific and technological partners (relationship with scientific knowledge); Number of new products or services launched in the last three years (capacity to renew portfolio).

### 2.1.2 B. Description of participants in the study

B1. Institutional Responsible: Position; Number of years in the organization; Number of years in current position

B2. Workers: Gender and age; Educational qualifications; Department and position; Number of years in the organization; Number of years as a worker; Contractual situation; ICT conditions in workplace (computer and internet access).

## 2.2 Organizational learning practices supported in ICT

The five learning and innovation practices previously identified were considered as dimensions to study: idea generation; market and technology surveillance; problem solving; dialogue and knowledge transfer; training and skills development.

Many authors agree that organizational learning can only be measured by organizational performance and results. To assess the use of ICT in organizational learning practices, a model was developed, inspired in a quality/performance assessment model - EFQM Excellence Model 2010<sup>1</sup>, which is a self-assessment tool that suggests a cause-effect relationship between organizational results and the means provided by the organization, proposing that results can be improved by means, and these can be improved taking into account the results' feedback in terms of learning, creativity and innovation.

Based on this proposal, a model was designed to assess the Means - activities and ICT resources provided by the organization for the learning practices, and the Results – perception of results of learning practices both for the organization and for workers as learners.

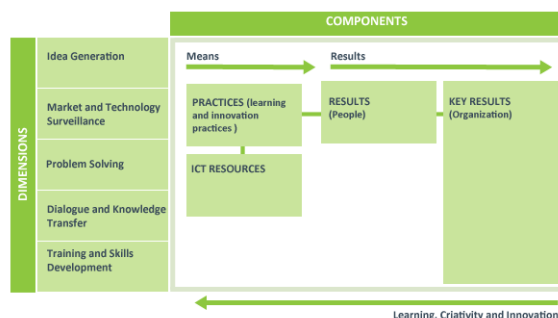


Figure 1 – Adapted Model

## 3 RESEARCH METHODOLOGY

The use of multiple data sources and collection methods ensures, according to Coutinho [29], different perspectives of study participants and allows investigating different aspects of the same phenomenon. The case study rely typically in instruments used in qualitative research, but can also integrate instruments from quantitative research. In this research, a mixed, qualitative and quantitative, case study was conducted in a Portuguese innovative organization.

### 3.1 Sampling

Unlike massive studies in which the sample is a random choice, choosing a case must take into account relevant criteria that allow the researcher to select one, within the many that exist in real life. Based on the research question, the selection of the case was supported in three criteria:

- Guidance for Innovation: companies certified in NP4457 (Portuguese Innovation Management Standard), for over three years and having launched new products or services in the last three years;

<sup>1</sup> More information about this model is available at <http://www.efqm.org/en/>.

- Area of expertise: companies operating in the development of technologies and services for information management. This favors the selection of companies with high digital skills, and a positive attitude towards the use of ICT.

According to these criteria the following case was identified: Large Portuguese Company working in Telecom sector, certified in NP4457 since 2007, with new products launched in the last 3 years.

### 3.2 Data Collection

The data collection was done in an iterative process, which allowed the improvement of instruments. The first stage, qualitative or positivist was focused on the characterization of the organizational context, processes and ICT resources to supported learning as well as on the perceptions of institutional leaders over their results. It started from a documental analysis of the organizational website, quality manual and some data kindly supplied by the organization. This analysis contributed to the construction of the semi-structured interview script to the institutional leader responsible for training and innovation areas. The interview aimed to identify processes related to different learning practices and the ICT resources to support them; and to collect the perceptions regarding learning results for People (employees) and for the organization. The interview was record in audio format, and later transcript. Finally a set of meetings aimed to observe the identified ICT resources, their features, limitations and integration in daily routines. They were recorded in audio format and later transcript.

The second phase, quantitative or positivist, focused on the collection of practices and perceptions of employees, through the application of an online questionnaire. The questionnaire was implemented through Limesurvey tool (<http://www.limesurvey.org/>) and validated through a pilot test, which alerted to interpretation issues, unclear aspects of the analysis model; the need to improve explanations and to change questions typology. The questionnaire was released through an e-mail send by the Leader.

Table II illustrates the different instruments used for data collection.

TABLE II.  
Concepts, dimensions and data collection

Concept	Dimension	Component	Data Collection
Organization Profile	A. Organization Description	Business Motivations	Documental Analysis
		Organizational Structure	Data provided by organization
		Innovation Profile	Public information
	B. Participants in the study	Institutional Leader	Interview
Employees		Questionnaire	
Organizational learning practices supported in ICT	C. Idea Generation	Practices	Interview
	D. Market and technology surveillance	ICT Resources	Interview
			Employees' questionnaire
	E. Problem Resolution	Results for Workers	Direct Observation
	F. Dialogue and knowledge transfer		Interview
G. Training and skills development	Key-Results for the Organization	Employees' questionnaire	

## 4 PRELIMINARY FINDINGS

### 4.1 Organization Profile

#### 4.1.1 A. Organization Description

**Business Motivations:** This organization develops telecommunications technology to the market since 1999, through the design and development of innovative solutions for the access network (fixed and mobile), transport network, network architectures and next generation services and platforms. Its activity is supported in innovation and knowledge, to develop new products, implement new processes and create new markets.

**Organizational Structure:** The company has more than 600 researchers and specialists in telecommunications technologies, organized in 10 departments, both in Portugal, Brazil, Angola and

Morocco. It is part of a major Telecom Group. Around 79% are male, 66% are less than 40 years old and more than 88% have permanent contract; more than 550 hold an higher education degree.

**Innovation Profile:** Since 2007 the organization is certified in national innovation management standard NP4457. During the last year 5 new products were released. It is partner of national and international organizations related to innovation (e.g. COTEC Portugal) and maintains a strong relationship with several universities and research centers in national and international R&D programs.

#### 4.1.2 B. Participants in the study

**Institutional Leader (IL):** a semi-structured interview was applied to the director of innovation and training (IL1), who is in the company for about 27 years, and took over this function since 2011.

**Employees:** an online questionnaire was delivered to 429 employees and 52 completed answers were collected, representing about 12% of the population. In this sampling there are represented employees from all departments, age groups, qualifications (from secondary education to PhD), managers and employees and from both gender, in a proportion similar to the entire population.

## 4.2 Organizational learning practices supported in ICT

### 4.2.1 C. Idea Generation

#### Practices and ICT Resources

The organization implements different activities supported in ICT tools to develop and collect new ideas, both internal and externally.

Box of Ideas: internally developed tool, aims at collecting ideas from workers to products and processes. Everyone can insert new ideas anytime, staying available for consultation. A committee evaluates the ideas and those considered interesting are implemented. Feedback is provided through this tool. The tool doesn't offer social functionalities, so people cannot comment or vote, but new ideas can be created based on previous ones.

Ideas Marketplace: this platform is used to stimulate inter-organizational idea sharing between the different companies of the Group. A commission inserts monthly challenges, so people can concentrate in specific themes. The commission validates, mashing or filtering proposals, before they are released. After publishing employees can comment and vote (positively or negatively), using a limited plafond of points. Best-rated proposals are evaluated by a committee and the best ideas are implemented. Workers can also rate their peers with a star system, as an informal recognition method. The interaction with the tool results in points that can be redeemed for prizes.

Crowdsourcing Innovation Portal: this web portal aims at collecting ideas or solutions from external contributors. The organization launches regular challenges to universities, companies or freelancers, and people can submit their proposals and additionally map their skills. After the submission period proposals are evaluated and the winner gets a prize. This tool allows, simultaneously, identifying potential partners or workers, with an exceptional participation. It offers social networking mechanisms and activity feeds, allowing the analysis of who is contributing more or most answered challenges.

#### Results for its People and for the Organization

Leader Perspective: Idea generation is stimulating workers' involvement with the organization. The use of ICT is allowing the better collection of ideas, although some workers still have difficulties formalizing their ideas, preferring to share them directly with their leaders and coworkers. For the Organization the leader perception is that idea generation has great impact in innovation capability and continuous improvement. *"We realize that it has had great impact in the organization, the ideas that appear every day and are implemented, a great number of them."*

Employee's Perspective: Mostly consider that the generation of new ideas helps them to develop new knowledge and the use of ICT facilitates the expression of their ideas and the development of ideas in a group. About 30% of respondents consider that a more regular feedback to the ideas shared in the "Idea Box" is needed and that they should use more appropriate ICT to develop their ideas. For these reason more than 80% consider that the organization should help them to use the available ICT resources to idea development. Also more than 80% considers that sharing ideas improves team collaboration and internal knowledge transfer.

#### 4.2.2 D. Market and technology surveillance

##### Practices and ICT Resources

The organization considers market and technology surveillance one of the most important internal knowledge factors. Every 3 years, a senior team is focused on evaluating trends and producing a guide of technologies that should be addressed and new paths to explore. In a daily basis each department has the responsibility to make continuous surveillance, although there aren't formal processes or activities to address this issue. It is a very informal process based on individual initiatives of following discussion groups, scientific publications, finding information about competitors and technologies or participating in conferences and webinars. Results are mostly shared informally in regular meetings or through e-mail or blogs, but seem difficult to be formalized. To stimulate sharing results of surveillance activities, the organization provides either a documental repository, where people can share documents, either a blog system, where people maintain certain topics.

Documental Repository: used for sharing articles, reports or other relevant documents. Everyone can access but only authorized people can submit docs, which are then formally classified and released.

Internal Blog: used to allow employees to share information about relevant topics, promoting an update state of art.

##### Results for its People and for the Organization

Leader Perspective: surveillance is considered one of the most important activities and ICT are fundamental to allow people to know what is happening in the world. *"Here people have to keep themselves updated in terms of knowledge, otherwise quickly get out of work line. All our knowledge and its evolution come from surveillance. People need to know that when anything is to be done out there, we also have to implement it."* As for the Organization, this practice is considered to contribute to a better understanding of players and organization positioning. *"That is a critical activity for us"*.

Employee's Perspective: People generally consider that surveillance activities help them acquire new knowledge and that ICT facilitates it. However, more than 20% of respondents feel that they are not updated in relation to developments of their working area and more than 40% have doubts about how to perform surveillance activities. Almost 30% is not sure about what ICT tools they should use to help them perform surveillance and actually more than 90% considers that the organization should help them with it. About 75% consider that sharing surveillance results improves the maintenance of internal knowledge and helps the organization a better understanding of market players. However, 45% considers that the organization doesn't stimulate the sharing of surveillance activities.

#### 4.2.3 E. Problem solving

##### Practices and ICT Resources

Learning through errors and problem solving is an internal daily concern and different ICT tools are provided to address it: operational tools to organize work, sharing of lessons learned or problem reporting systems.

Project Management: this tool (Plan View) is used to ensure the planning of activities, times, sequence of tasks, resource allocation and monitoring of project development. It is designed to allow a macro view of the project and additionally a complementary tool (Jira) is used for managing in micro-level.

Wiki: for each existing development project, a Wiki system is created, where the project team has access to technical information, in an informal and simple format, allowing collaborative edition.

Documental repository: for each project is also set up an area in SharePoint as document repository where all team members can share relevant information. This is only accessible to the team.

Lessons Learned Repository: lessons must be compulsory inserted at the end of each project, indicating problems, solutions and impacts. This procedure is being evaluated because at the end of a project often people do not remember exactly what happened.

Problem reporting system to support activities: a reporting system is used to help people ask for help in supporting activities (e.g. regarding hardware). External clients can also report problems through this system. For customers that have a specific reporting system integration is made in order to allow them report through their own system. Problems are analyzed in order to prevent their repetition.

CRM (Customer Relationship Management): a commercial CRM tool ensures consistency of customer interactions and information between client managers, business managers and directors of operations.

To improve daily operational performance three systems have been integrated: a product portfolio database, with the identification of all products; a CRM, with all the information of products acquired by clients; and Project management, with all information of the process necessary to develop the product.

#### **Results for its People and for the Organization**

Leader Perspective: Daily problem solving contributes to the development of internal competencies and knowledge transfer, develops team spirit, improves the performance and helps to reduce the incidence of future problems. The perception of the Institutional Leader is that people feel comfortable to discuss and share problems and difficulties, both with coworkers and leaders, easing informal learning and taking advantage on ICT tools. However, the leader considers that *"this has to do with learning from mistake and I think that we still haven't solved the whole problem. I don't know if we reflect enough about the mistakes we make."* The knowledge captured through lessons learned promotes critical thinking, although people aren't using this source very frequently.

Employee's Perspective: People generally agree that problem solving helps them develop their knowledge. They feel comfortable asking for help to their peers or managers and they consider that the use of ICT helps them to find quicker solutions and to share them amongst their team. Almost 20% though feel unappreciated for finding solutions to daily problems and more than 30% considers that the actual activities are not able to minimize errors occurrence and a better performance.

#### **4.2.4 F. Dialogue and knowledge transfer**

##### **Practices and ICT Resources**

Organizational perception is that its flat structure fosters open dialogue between colleagues and with directions. Several strategies are implemented to improve internal and external communication, such as regular meetings, corporate television, a scientific journal that publishes workers' contributes or even testimonials in informal coffee sessions. Communication is also supported in different ICT tools that improve formal and informal daily dialogue.

Internal Communication tools: e-mail, newsletters, corporate TV, live broadcasting of internal events, internal repository of photos and videos of events, trimestral webcast from the administrator, institutional blog, intranet, Skype and WebEx.

External Communication tools: e-mail, newsletters, corporate website, open innovation portal, open events to external partners, publication of an annual journal with paper from employees, Skype and WebEx,

##### **Results for its People and for the Organization**

Leader Perspective: Communication is facilitated by the flat organizational structure, promoting collaboration within and between teams. ICT facilitate internal communication because the company has a large number of geographically dispersed employees who can be easily reached through these tools. Although some people complain that there is too much information shared. As for the Organization results, communication improves workers involvement in decisions and helps to consolidate organizational culture. ICT tools are fostering participation and involvement of providers, partners and clients. The Leader believes that these initiatives promote knowledge transfer from outside the organization and reinforce a strong image of the organization to the market.

Employee's Perspective: People consider that the most important actors to which they maintain dialogue and that contribute to the development of their knowledge are their working colleagues, more than other external actors. They consider ICT tools might improve the way they communicate both internal and externally but about 30% doesn't see a greater involvement of clients, providers or partners due to ICT resources. 20% of respondents consider that internal communication instruments don't allow a complete understanding of organization decisions. Almost 100% consider that the organization should help people to a better use of ICT to maintain internal and external dialogue.

#### **4.2.5 Training and skills development**

##### **Practices and ICT Resources**

A large investment is done to develop workers knowledge and skills, including skill gaps analysis, career plan, training needs analysis, face-to-face and e-learning training development, pedagogical content development and training assessment. Different ICT tools support this processes.



Face-to-face training is the most relevant training method, followed by e-learning self-administered. Blended-learning has almost no expression, because it is not compatible to ask people to physically move to a face-to-face session, then go back and do e-learning, and then move physically again later.

Skills Management system: this tool defines the skills map of each person and it is used to make an analysis of the important skills for development of the organization and innovation. Based in these tools gaps are identified and training needs are identified.

Learning Management System (LMS): a self-developed tool is used to manage blended-learning and e-learning training, both for internal workers, as for certification programs for clients and partners. Most training actions are e-learning, self-administered without tutor.

Training Management System: a self-developed tool is used to manage training, especially face-to-face, with aspects like classrooms, administrative documentation, etc.

Interactive contents and serious games: some e-learning interactive contents scorm compliant are internally developed for specific subjects. A serious game was developed to welcome new employees, explaining daily routines and processes of the organization through challenges.

### **Results for its People and for the Organization**

Leader Perspective: Training, especially e-learning courses are allowing workers a better control on their learning with more flexibility and autonomy. The organization invests a lot in training and skills development activities, but sometimes gets the perception that these efforts are not improving performance as expected. *"I have many doubts about the effectiveness of training. I believe in training when people have a clear goal (...) we spend too much money on training, sometimes with little impact on the organizations' life."* ICT are considered very important to training and there is a very relevant investment in e-learning, both in infra-structure, content development and supporting team. The organization relates e-learning benefits with efficiency of the process because a growing portfolio is quickly available to more people at once, avoiding loss of travel time and transportation costs.

Employee's Perspective: More than 80% considers that the use of ICT in training gives them more flexibility and control over their learning path, but more than 30% considers that it is not offering a more motivating, significant or collaborative learning. Also more than 30% considers that their training plan is not aligned with their personal needs. In what concerns to organizational results, more than 75% of respondents consider that the provided training improves workers skills and performance. However about 90% considers that the organization should help internal trainers and workers to better use ICT in their training and self-learning activities.

## **5 DISCUSSION**

The presented case study shows how an innovative company, who needs to constantly develop new products and be continuously updated against competitors, is using different ICT tools to foster different learning practices, both formal and informal, related to idea generation, technology and market surveillance, problem reduction, participative decision making, errors prevention, lessons learned capture, internal and external dialogue, training and skills development.

By promoting organizational processes, providing ICT tools to support them and stimulating an engaging environment, the company seems to be developing the ability to create, capture, retain, manage and transfer new knowledge (exploration) and use it with the existing one (exploitation) [13], walking towards the learning organization and strengthening its innovation capability. Working environment seem to play an important role observed in aspects such as: workers' freedom of expression, workers' involvement in changing processes, teamwork, formal and informal learning valorization, and a positive attitude towards the use of ICT and web 2.0 tools.

However some difficulties in formalizing workers' knowledge were found, which doesn't seem to be related to ICT competences, once workers have strong digital skills, but deriving from the fact that some of these learning practices doesn't seem to be naturally integrated in daily routines. Also some feelings arise from the analysis of workers perceptions: little feedback to their ideas, little incentive to sharing surveillance results, little value for finding solutions to daily problems, unaligned formal training with real learning needs or e-learning self-administered, as it is implemented, is not promoting a more collaborative and interesting learning experience.

The organization is investing in the development of an organizational consciousness that reveals the importance of producing and sharing knowledge oriented to serve other workers' interests and needs,

creating real value to the organization. After mandatory experiences, such as registering lessons-learned at the end of projects, a new intranet portal is being developed integrating social tools which the organization expects to promote a more natural participation and knowledge sharing, allowing users to follow one another's, to share more easily ideas or to comment and vote. Based on this new internal social platform some suggestions to promote a more participatory inclusion could be the development of internal curators (both from HR and technical departments) producing more permanent dissemination of surveillance activities, promoting performance groups that could support and continue formal training; easing document sharing based on folksonomy; integrating knowledge sharing as part of work flow.

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