



University of Navarra

LEARNING, KNOWLEDGE AND INTERACTION:
TOWARDS A NEW APPROACH TO THE
LEARNING INTENSIVE ORGANIZATION

Sandra Sieber*

RESEARCH PAPER No 361
March, 1998

* Doctoral Candidate, IESE

Research Division
IESE
University of Navarra
Av. Pearson, 21
08034 Barcelona - Spain

Copyright © 1998, IESE
Do not quote or reproduce without permission

LEARNING, KNOWLEDGE AND INTERACTION: TOWARDS A NEW APPROACH TO THE LEARNING INTENSIVE ORGANIZATION

Abstract

Globalization, deregulation, and the continuous improvement of technologies have created new competitive conditions for firms. Knowledge and learning are nowadays considered one of the main sources of competitive advantage. This paper attempts to gain a deeper insight into the learning phenomenon. It starts by reviewing the existing literature on learning and identifies four basic dimensions of learning: locus, level, source and persistence. As the number of influencing variables is very large, the field has not been able to develop a comprehensive integrative framework. An alternative point of view is therefore proposed, in which the focus is on knowledge. The paper discusses the different types of knowledge that may be relevant for organizational action, and the different processes of knowledge creation and transfer. Finally, it is suggested that a more appropriate unit of analysis of the learning phenomenon would be the “interaction”.

LEARNING, KNOWLEDGE AND INTERACTION: TOWARDS A NEW APPROACH TO THE LEARNING INTENSIVE ORGANIZATION

Introduction

Increasing globalization, the continuous improvement of technologies, and the deregulation of markets have had a profound impact on the competitive structure of markets.

As Galbraith (1995) states, these tendencies have led to an increase in buyer power, a greater variety of products, and a faster rate of introduction of new products onto the markets. Growing dynamism and frequent changes have made the traditional sources of competitive advantage seem no longer sufficient. In order to compete successfully, firms have to go in search of excellence and concentrate on their distinctive competencies. New information technologies support the emergence of new organizational forms. Strategic thinking and a continuous redesigning of the organization are taking the place of strategic planning and fixed structures and systems. The need for change, adaptability and flexibility under uncertain conditions lead to the individual taking on greater importance in organizations. Knowledge and learning become a prime source of competitive advantage.

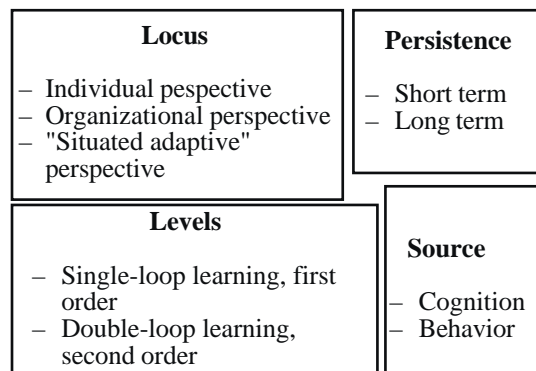
Thus, placing particular emphasis on theoretical knowledge and technical expertise, Bell (1973) describes a society whose economic development is organized around and upon knowledge. Drucker (1993) suggests that over recent centuries there has been a radical change in the meaning of knowledge: whereas, traditionally, knowledge has been seen as applying to work, in order to increase productivity, it is now being applied to knowledge itself. Management is the supply of knowledge to find out how existing knowledge can best be applied to produce results and how to systematically create new knowledge from the available knowledge base of the firm's members.

This action view of knowledge leads to an emphasis on learning, because learning can be seen as the process through which knowledge is acquired and transferred. In this paper, we review the mainstreams of the learning and knowledge management literature, in order to gain a deeper insight into the way knowledge and learning can be a source of competitive advantage. First, we center our attention on the traditional learning literature in order to identify its main concerns. After that, we concentrate on knowledge management as a response to the main weaknesses of the learning tradition. Finally, we propose an interaction-based model as a more comprehensive framework for the learning phenomenon in firms.

I. Learning in organizations

During the last few decades learning in organizations has received a great deal of attention, not only from the field of organization theory, but also from a wider sociological and psychological point of view. In this paper, we shall focus on the organizational view of learning, which has identified four basic issues. First, there is a huge body of literature that discusses the *locus* of learning, adopting either an individual perspective, an organizational learning perspective, or a “situated adaptive” perspective. Second, different learning *levels* have been identified. Third, attention is given to the *source* of learning, mainly discussing the relevance of the behavioral and cognitive effects of learning. Finally, the *persistence* of learning is analyzed in terms of its longevity in firms.

Figure 1. Framework of learning in organizations



A. Locus of learning

The topic of organizational learning has been extensively debated in recent years, but there is little agreement on what organizational learning actually means. The crucial issue is how individual learning is transferred to the organization. As Argyris and Schön (1978) point out, there is a paradoxical relationship between individual learning and organizational learning, because even though the organization is made up of individuals, it is able to learn independently of any specific individual, though not independently of all individuals. This basic paradox has given rise to a huge body of literature over the last 20 years, and in our opinion has still not been resolved.

Crossan, Lane et al. (1995) point out that the question of individual and organizational learning is related to the question of how a firm is defined. If it is assumed that all organizational learning is individual, then the firm is automatically defined as the sum of its parts. On the other hand, the recognition of independent organizational learning implies a definition of the organization as more than the sum total of its members, in which case there has to be some kind of independent organizational learning.

Probably the most influential proponent of the *individual learning view of the organization* is Herbert Simon (1991). He affirms that learning is necessarily individual because the mechanism of learning lies in the individual. Therefore, organizational learning is only possible if: (a) one or more of the organization’s members learn, or (b) the organization ingests new members who bring knowledge that it did not previously have. This

implies that Simon sees the organization as the sum of its parts. He recognizes the importance of the organizational context as a learning-enabler, as individual learning is a social phenomenon. He therefore assumes that the main issues of interest are the recruitment, selection, retention and turnover of personnel.

Along similar lines, March and Olsen (1975) state that “organizations and the people in them learn from their experience” and so they focus on the individual as the basic problem-solver (decision-maker) in the organization. They address the problem of individual learning in various contexts: (a) information exposure, (b) memory, (c) retrieval, (d) learning incentives, and (e) belief structures. Like Simon, they focus primarily on cognitive limitations on rationality, studying in particular the role of learning from past experience and the influence this has on cognition.

From a more behaviorist perspective, Huber (1991) presents an information-processing view of the organization. He states that “an organization learns if any of its units (1) acquire knowledge that is recognized as being potentially useful to the organization”. Therefore, learning depends on: 1) knowledge acquisition, 2) information distribution, 3) information interpretation, and 4) organizational memory (2).

Several other theorists try to analyze group-level learning (Daft and Weick, 1984; Daft and Huber, 1987; Stata, 1989). They argue that the individual is able to generate certain kinds of knowledge only because he has the possibility of sharing information with other organizational members. As Prokesch (1997) points out, stakeholders are also potential partners for knowledge sharing. Daft and Huber (1987), like Simon (1991) and Huber (1991), adopt an information-processing view of learning, but place special emphasis on the importance of group learning. Arguing along similar lines, but from a more behaviorist point of view, Stata (1989) emphasizes the institutionalizing effect of sharing (insights, past knowledge, experience and mental models), which creates certain types of common values and culture that have a significant impact on the learning process. He also assumes that organizations can learn only as fast as the lowest link learns. This assertion is somewhat extreme, and several scholars have seriously questioned the need for all organizational members to learn in order for the organization to progress. Senge (1990), for example, focuses heavily on the role of leaders and maintains that they are the ultimate source of organizational learning, assuming the roles of teacher, designer and steward so as to build a shared vision, surface and test mental models, and enhance system thinking. This system dynamics point of view is shared by Daft and Weick (1984), who note, however, the importance of the interpretative process, assuming that this is something more, in organizations, than any individual interpretation, as organizations have cognitive systems and memories. As they say, accepting Hedberg’s (1981) point of view,

“[i]ndividuals come and go, but organizations preserve knowledge, behaviors, mental maps, norms, and values over time. The distinctive feature of organization-level information activity is sharing.”

-
- (1) Without specifying what is meant by a “unit”. Implicitly, it is made clear that he extends the unit of analysis to a group and organizational level. Notice, however, that he does not enter into any discussion of the basic differences between information and knowledge, using the two terms indiscriminately. In the learning literature, different definitions have prevailed. As we will see later on, the knowledge management literature tries to define more precisely what is meant by knowledge, what are its distinctive traits, and how to differentiate it from information.
- (2) Later on we will study in depth the usefulness of this classification. We believe that an understanding of the main knowledge activities is needed in order to develop a more comprehensive view of learning processes.

Nevertheless, they do not explain how these cognitive systems and memories are developed, nor how behavioral mental maps and norms are preserved in the organization. Therefore, these assertions cannot be put into practice, and do not provide a deeper insight into the way companies can obtain a competitive advantage from learning. Garvin's (1993) contribution moves toward a more action-focused definition of learning:

“A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.”

Although this definition seems to be organizational, the five main learning activities Garvin defines in his theory are clearly individual. For him these activities can be either cognitive (systematic problem solving), or behavioral (transferring knowledge quickly and efficiently throughout the organization), or both cognitive and behavioral (experimentation, learning from past experience, etc.).

Fiol and Lyles (1985), Hedberg (1981), Levitt and March (1988), and Shrivastava (1983) give the organization an important role in learning. As can be seen in Figure 2, these authors argue the case for *autonomous organizational learning*.

Figure 2. Definitions of organizational learning

Fiol and Lyles (1985)	“(o)rganizational learning is not simply the sum of each member’s learning. Organizations, unlike individuals, develop and maintain learning systems that not only influence their immediate members, but are then transmitted to others by way of organizations’ histories and norms.”
Hedberg (1981)	“although organizational learning occurs through individuals, it would be a mistake to conclude that organizational learning is nothing but the cumulative result of the members’ learning (...) Members come and go, and leadership changes, but organizations’ memories preserve certain behaviors, mental maps, norms and values over time.”
Levitt and March (1988)	“Organizations are seen as learning by encoding inferences from history into routines that guide behavior. Routines include forms, rules procedures, conventions, strategies, and technologies around which organizations are constructed and through which they operate. It also includes the structure of beliefs, frameworks, paradigms, codes, cultures, and knowledge that buttress, elaborate, and contradict the formal routines. Routines are independent of the individual actors who execute them and are capable of surviving considerable turnover in individual actors.”
Shrivastava (1983)	“Organizational learning is an organizational process rather than an individual process.”

While Fiol and Lyles' definition can be accepted in a certain sense, serious problems arise with the others' definitions, where autonomous organizational learning is defined as a change in established routines, procedures and culture. Changes in the organization are treated like changes in individual cognition or behavior. This is what Jones (1995) calls the anthropomorphic fallacy of organizational learning. In our opinion, organizational learning is fuzzy, and the process through which learning takes place has not been comprehensively defined. None of the authors is able to explain precisely how organizational routines or processes are formed. Consequently, it is impossible to establish how organizational learning takes place, what types of organizational learning there are, and where each type is stored. In other words, we have not yet succeeded in identifying the distinctive nature of organizational learning.

A third approach to learning is the so-called "situated-adaptive" perspective. This school considers that the lack of an integrative framework can be attributed to a failure to consider the socially constructed, distributed, and embedded nature of knowledge and the processes through which the nature of knowledge changes. As Pentland (1995) states:

"The critical point, of course, is to move beyond the anthropomorphic metaphor of organizations as individual cognizers and to treat them as social collectives that construct, organize, store, distribute, and apply knowledge through primarily social means."

He proposes a redefinition of organizational learning that emphasizes the social nature of knowledge in organizations (1). Tyre and von Hippel (1997) regard the organizational context as of vital importance for organizational learning, arguing that people tend to solve problems differently in different settings; learning depends on the social context, the cultural context and the physical setting of the organization. Brown and Duguid (1991) recognize the importance of context and maintain that learning has to be viewed as a bridge between working and innovating. In their opinion, communities-of-practice are the focal units in organizations. They distinguish between abstract and applied knowledge, arguing that the latter is particularly important in organizations; learning only makes sense if one fosters access to and membership of the target communities-of-practice, not if one merely explains abstractions derived from individual practice. The vital connections are practical, not formal.

According to this view, enactment of the organization is important. On the one hand, the organization must be able to recognize its environment and, on the other, it must be capable of recognizing its own identity. Only if these two conditions are fulfilled will the organization have the capacity for continuous reinvention and frame-breaking. One consequence of the existence of communities-of-practice is the appearance of new structural forms (Boland Jr. and Tenkasi, 1995; Weick and Roberts, 1993; Galbraith, 1995). Lateral-flexible forms, which rely on peer-to-peer collaboration to achieve objectives, are a more appropriate means of representing and integrating knowledge than other more traditional forms of organization. Boland and Tenkasi (1995) emphasize the importance of the interactions between multiple communities of specialized workers in the process of knowledge creation. New organizational forms permit overlap in complex and shifting ways, which enable perspective making within, and perspective taking across, different groups. As they state:

(1) Pentland considers that knowledge is always embedded in some social collectivity and is subject to the cultural assumptions, practices, and power relations operating within that collectivity.

“The creation of new knowledge in an organization, however, is often the result of an open system transformation of that organization’s communities of knowing as they question and revise routines and create new processes and relationships among themselves. We argue that perspective taking and perspective making are the basis for transformations within and between communities of knowing and thereby the basis for open system control in knowledge work. “

Thus, perspective taking can be understood as individual cognition, and perspective making as group communication.

As can be seen, in this third perspective a different emphasis is placed on the role of the individual. In general, special attention is given to the role of the group and of communication between communities-of-practice. While Pentland (1995), Tyre and von Hippel (1997) and Brown and Duguid (1991) pay relatively little attention to the learning capacity of the individual independently of his interaction with others, Boland Jr. and Tenkasi (1995) differentiate between the more personal act of perspective taking, in which reflection is important, and the more social act of perspective making.

Even though context is undoubtedly important, the situated adaptive perspective, which takes some of its fundamental ideas from population ecology, virtually denies the importance of the individual person. Pentland establishes the existence of five main knowledge processes: 1) construction, 2) organization, 3) storage, 4) distribution, and 5) application. Significantly, interpretation is not considered to be relevant in organizations.

In summary, the question of the appropriate or actual locus of learning in organizations has still not been solved. In our opinion, individual learning has to be seen as one of the main sources of knowledge creation in organizations, because only the human being has the capacity for pure knowledge creation through creativity, and the ability to interpret existing knowledge. Organizational context and the role of the environment may also be important, although it seems impossible to find a good explanation of what organizational learning actually means. We therefore conclude that the existing distinction between learning based only on individual capacity and learning rooted in organizational routines is not operative. Another differentiation has to be found. We shall come back to this point in the third section of this paper.

B. Levels of learning

The different kinds of learning are another key theme in the organizational learning literature. Argyris and Schön (1978) establish the influential distinction between single-loop and double-loop learning. SLL involves processing errors that are tracked down and corrected within the existing set of rules and norms. It concentrates primarily on a particular activity or direct effect; it is the result of repetition and routine. DLL takes place at a deeper level of human cognition, and brings about changes in the fundamental rules and norms underlying action and behavior. It has long-term effects for the whole organization. This type of learning proceeds by way of cognitive processes and insights. More recently, Lant and Mezias (1990) make a similar distinction, labeling the levels “first order” and “second order”.

Fiol and Lyles (1985) introduce the notions of lower-level and higher-level learning. Lower-level learning is behavior-driven, short-term-oriented, and has only a partial impact on the organization. It is the result of routine and repetition. Along the same lines, Cyert and

March (1963) argue that programs, objectives and decision rules lead to routine-based learning. Duncan and Weiss (1979) call it “behavioral level learning”.

Higher-level learning, in contrast, is based on adjustments to norms and rules. The results are usually long-term modifications whose impact is felt throughout the organization. Empirical evidence (Miller, 1996; Starbuck, 1992) suggests that changes at the higher level are induced by organizational crises. As Senge (1990) and Argyris and Schön (1978) state, under normal conditions most organizations perform reasonably well at the level of single-loop learning, but fail to do so at the level of double-loop learning. This may be because organizational processes lead to individual actions on problems (“normal” solution finding), but not to collective reflection on the problems themselves (1).

C. Sources of learning

The source of learning is another theme treated in the learning literature. The “situated-adaptive” perspective obviously considers that learning is a behavioral phenomenon: learning takes place as a response to environmental stimuli.

The authors that adopt an organizational learning perspective also take a behaviorist point of view. Even though most of them recognize the existence of cognitive elements in organizations, in the form of shared beliefs or mental maps (Stata, 1989; Daft and Weick, 1984; Shrivastava, 1983; Duncan and Weiss, 1979), learning processes in this dimension are not considered to be relevant and are therefore only poorly developed. As Cyert and March (1963) state, “[o]rganizational learning is adaptive behavior of organizations over time”. The emphasis is on change, quality and innovation in organizations. The traditional behaviorist view is that organizational learning occurs if the organization responds differently to the same stimulus. But, as Weick (1991) points out, this sequence of events is rare and difficult to observe. It may be that organizations respond in the same way to different stimuli, or differently to the same stimulus, without having learned. Furthermore, explanations other than learning are difficult to rule out. Many organizational systems, in an effort to absorb uncertainty and environmental variations, tend to produce the same responses to an increasing variety of stimuli.

As Fiol and Lyles (1985) point out, organizations may develop cognitive resources that are not immediately reflected in organizational behavior. This gives rise to difficulties in measuring learning.

In contrast, the individual learning literature adopts a cognitivist perspective of learning. Simon (1991) considers that all learning takes place inside individual human heads. March and Olsen (1975) adopt a more differentiated view. Even though they give great importance to the cognitive operations of seeing, linking and trusting, they also establish a link between behavior and cognition. Cognition influences future behavior, but past behavior (experience) also influences cognition.

Several authors have tried to integrate the cognitive and the behavioral aspects of learning. Garvin (1993) posits five main learning activities (see Figure 3). He argues that

(1) According to this view, collective reflection needs a catalyst. One possibility is an organizational crisis. Another, pointed out by Senge, is the existence of a good leader.

different mind-sets, tool kits and patterns of behavior sustain each type of learning activity. Therefore, the organization has to develop systems and processes to support each activity and integrate it with the firm's other activities. Hedberg (1981) establishes similar learning activities, which he calls experimental learning, learning by imitation, adjustment learning, turnover learning, turnaround learning, and unlearning. He assumes that learning takes place when organizations interact with their environment: each action adds information and strengthens or weakens linkages between stimuli and responses. In the most common interactions, discovered stimuli evoke response assemblies (behavioral component of learning). If substantial changes in organization-environment relationships take place, traditional responses have to be deleted and replaced by new types of responses. This means that, sometimes, unlearning is necessary in order to make new learning feasible (cognitive component of learning).

Figure 3. Relationship between behavior and cognition (adapted from Garvin, 1993)

	Mind-set	Tool-kit	Pattern of behavior
Systematic problem solving	<ul style="list-style-type: none"> - Main issue: how to solve a current problem - The cognitive side is very important. - Scientific method is important - Accuracy and precision 	<ul style="list-style-type: none"> - Fact-based management (data rather than assumptions) - Statistical tools 	<ul style="list-style-type: none"> - How do we know that this is true? - Going for facts.
Experimentation	<ul style="list-style-type: none"> - Main issue: not only current problem solving but also to expand horizons. - Looking for opportunities - Skills of performing and evaluating programs 	<ul style="list-style-type: none"> - Ongoing programs: - Statistical methods, design of experiments, creativity techniques 	<ul style="list-style-type: none"> - A kind of constant search for new opportunities and expanding new horizons. - Be able to keep novel ideas flowing
	<ul style="list-style-type: none"> - Know how is important - Know why is even more important (it captures the underlying cause-and-effect relationships and accommodates exceptions, adaptations and unforeseen events) 	<ul style="list-style-type: none"> - One-of-a-kind demonstration projects 	<ul style="list-style-type: none"> - Learning by doing - Need commitment of the employees - Normally it only has group impact (so we should develop some transfer techniques if we want to pass it to the organization)
Learning from past experience	<ul style="list-style-type: none"> - Memory is important (recognize the value of productive failure as contrasted with unproductive success) 	<ul style="list-style-type: none"> - Case studies - Post-project reviews 	<ul style="list-style-type: none"> - Reflection - Self-analysis
Learning from others	<ul style="list-style-type: none"> - Benchmarking process view: - Thorough search of best practices companies - Continual evaluation of own practices 	<ul style="list-style-type: none"> - Studying practices (not results): uncover, analyze, adopt and implement them - Getting feedback from customers (knowing preferences, services, and patterns of use, getting up-to-date product information competitive comparisons...) 	<ul style="list-style-type: none"> - Systematically analyzing your environment (something like "enthusiastic borrowing") - You have to be receptive: Openness to critiques or bad news - "Cultivate the art of open, attentive listening"
Transferring knowledge	<ul style="list-style-type: none"> - Depending on what kind of knowledge is transferred 	<ul style="list-style-type: none"> - Reports - Site visits - Personnel rotation programs - Education and training programs - Standardization programs 	<ul style="list-style-type: none"> - Spread knowledge quickly and efficiently throughout the organization

According to Garvin, individual learning activities support organizational learning, which can be traced through three overlapping stages. The first stage is cognitive: individuals are exposed to new ideas, which expand their knowledge and make them think differently. This leads to behavioral changes: members begin to internalize new insights. And finally, changes in behavior lead to performance improvement. Therefore, as both cognitive and behavioral improvements precede changes in performance, all three have to be present in organizations. This integrative view of learning is also expounded in Senge's *Fifth Discipline*. In Senge's view, the impulse to learn is an impulse to be generative, to expand capabilities, create shared vision, and surface and test elemental models. But being generative is not sufficient, as nowadays organizations also have to adapt effectively to environmental change, translating creative changes into behavioral improvements.

Argyris (1967; 1977) also believes that both cognitive and behavioral aspects are at work. He argues that learning is both error detection (cognition) and error correction (behavior). Kim (1993) develops a model based on Argyris' work in which he distinguishes between "know how" (what is learned) and "know what" (how this knowledge is used). These two levels are defined in terms of "operational" and "conceptual" learning. Operational learning is learning at a procedural level and is rooted in routines (at both the individual and the organizational level). Conceptual learning involves thinking about the underlying causes of required actions, as a result of which conditions, procedures and concepts are discussed and new frames of reference are created. Therefore, the individual learning model consists of a cycle of conceptual and operational learning that is fed by individual mental models, while at the organizational level a collective mental model (the so-called "Weltanschauung") operates. Kim not only relates different sources of learning, but also different levels of learning. He sustains that changes in individual frames of reference can change the collective frame, the organization's "Weltanschauung". If an organization's "Weltanschauung" changes, it will necessarily be as a result of individual learning. Organizational learning does not necessarily cause learning in every individual, but at least in one person.

In summary, both cognitive and behavioral effects can be seen as sources of learning in organizations. While cognitive changes are individual, behavioral changes of one individual may influence either the cognition or the behavior of others. Both learning sources operate in organizations, and an appropriate model of learning should be able to explain the relationship between pure cognitive learning and more applied changes in behavior, as well as the effect of learning on other agents in the organization.

D) Persistence of learning. Long run vs short run

Another important issue with regard to learning is its persistence. Even though the long-run acquisition of knowledge seems desirable, the speed of change and the variety of information may favor the short-term incorporation of knowledge into the organization in order to guarantee flexibility.

Empirical studies of organizational learning (Argote, Beckman et al., 1990; Argote, 1993) have shown that organizations not only learn, but also forget. A number of components of loss of knowledge have been identified. First, personnel turnover can significantly affect an organization's knowledge base (Simon, 1991). Second, recent experience is more valuable than older experience, partly because of the changing nature of the environment. Changing conditions can make older skills and information less useful for problem solving. Knowledge

becomes obsolete. As Hedberg (1981) states, unlearning is necessary in order to facilitate the absorption of up-to-date knowledge.

Making relevant knowledge available to the organization's members is critical. Both access to and the appropriate application of knowledge have to be ensured. Therefore, attention has to be paid to the storage and distribution of knowledge both within the organization and outside it. There has been a growing interest in the role of organizational memory (Daft and Huber, 1987; Huber, 1991; Simon, 1991; Walsh and Ungson, 1991).

Simon conceives of the organizational memory as the sum of individual memories, admitting only a distributional function of the organization. Other authors, such as Huber (1991), argue that organizational culture, organizational structure, physical structure, and all the transformations that involve guidelines for managing work processes, form part of the organizational memory.

More generally, the individual learning perspective concedes only a secondary role to organizational memory, whereas organizational learning theorists maintain that most learning is stored in some kind of organizational memory, which they see as going beyond the widely accepted notion of organizational memory as consisting of databases and manuals. They also include organizational culture, norms and values as knowledge repositories. In this sense, Huber and Daft (1987) consider that

“the product of learning experience resides in memory for relationships between encoded stimulus information and behavioral dispositions. In the information-processing approach one probes more deeply into what the individual is doing while learning is taking place. The goal is to construct a theoretical representation of the sequence of events that occur while stimulus information is transformed by perceptual and cognitive operations into the encoded forms that are preserved in organized memory.”

March and Olsen (1975) stress the relationship between behavior and short-run effects, on the one hand, and cognition and long-run persistence, on the other. They state that past experience normally influences behavior in the long run. On the other hand, current cognition has an impact on the future development of actions in the organization. Along these same lines, March (1991) stresses the importance of the relationship between the exploitation of old certainties (experience) and the exploration of new possibilities, as one of the main trade-offs in organizations. The exploitation of old certainties, in the form of knowledge encoding and transfer and therefore of individual knowledge diffusion throughout the organizational community, implies a greater emphasis on the organization's short-run performance. Nevertheless, exploring new possibilities involves a special emphasis on the individual's creativity, and therefore on the cognitive side. The effects of these explorations normally appear in a firm's long-run performance.

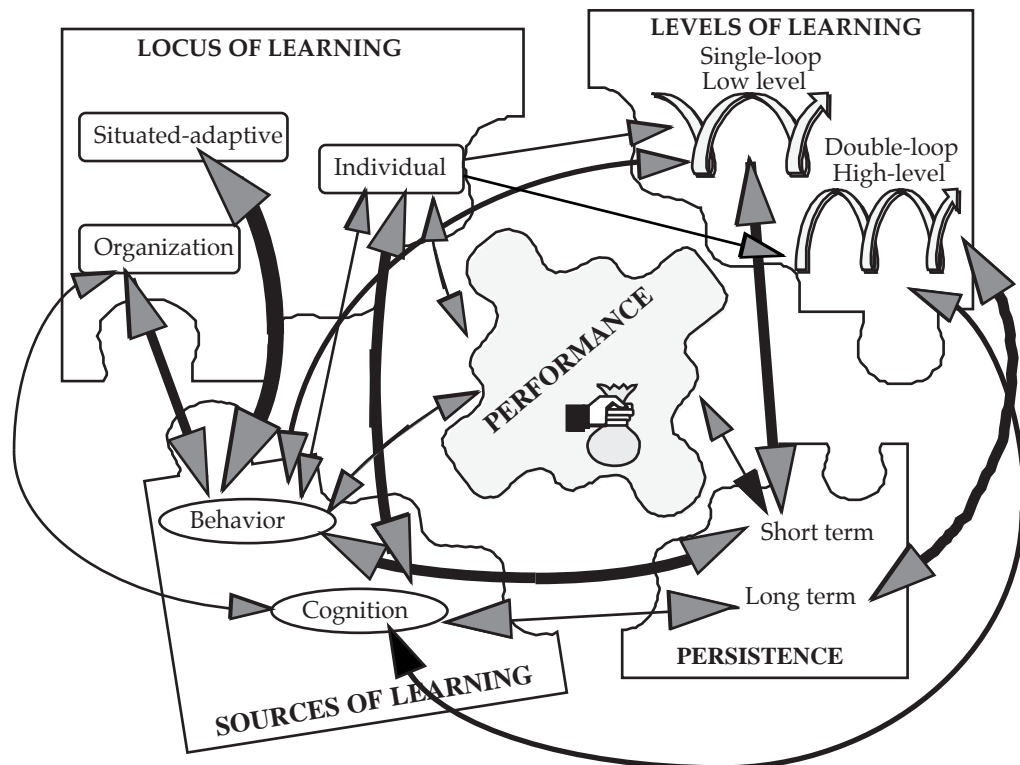
Some preliminary conclusions

At the present time, there is little agreement about the appropriate levels of analysis or the main learning activities, and even less about how the conditions for learning are created. Consequently, different models of learning processes have been developed.

As we have seen, the learning literature has identified four large dimensions that are relevant for learning.

The first dimension is the locus of learning, in which three mainstreams have been developed: individual, organizational, and communities-of-practice. A second dimension is the level of learning, which includes single-loop and double-loop learning. The third dimension is the source of learning: people can learn by abstraction and reflection or by experience, and both can translate into performance improvements. Finally, it is possible to detect both short-term and long-term effects of learning.

Figure 4. Learning dimensions and the connections between them



The huge number of influencing variables may be the main reason for the failure to develop an integrative learning framework. Learning has been shown to take place in different forms, entities, times and intensities. Multiple relationships between dimensions have been identified. As can be seen in Figure 4, the individual perspective of learning in organizations relates strongly to the cognition and long-term effects perspectives, if we consider that the relevant level of learning is double-loop learning. The “situated adaptive” perspective, on the other hand, generally adopts a behaviorist point of view, establishing only narrow links to the relevant levels of learning. Finally, the organizational learning perspective, even though it grants individual cognition a certain influence, relies on the importance of changes in behavior and routines. Changes in behavior are usually regarded as single-loop learning. Although Argyris and Schön (1978) have studied the link between single-loop and double-loop learning, the connections between cognition and behavior are still unclear. Both single-loop learning and changes in behavior are normally considered to be of short duration, while changes in cognition and double-loop learning are seen as having long-term effects.

However, the connections between locus, level, source and persistence of learning, on the one hand, and organizational performance, on the other, have been studied only narrowly,

and there is a general lack of means of measuring learning. Existing learning models also fail to explain how organizational learning takes place, and why it is significantly different from individual learning. As a consequence, the resulting map of the organizational learning landscape is confusing and suggests the need for an alternative approach to the problem.

Why could knowledge be a better alternative?

As we have seen in the preceding sections, while organizational learning is a very popular concept, it is rather difficult to explain. One of the main reasons for this difficulty could be that insufficient attention is paid to the input and output of the learning process: knowledge.

Several authors have stated the need to replace the traditional view of organizational learning “with a definition that is tied more closely to the properties of organizations” (Weick, 1991, p.121).

Several approaches seem to offer a good starting point for constructing a new vision of organizational learning. First, a clear definition of knowledge as the main process input and output should be developed. Duncan and Weiss (1979) define organizational learning as

“the process within the organization by which knowledge about action-outcome relationships and the effect of the environment on these relationships is developed.”

Notice that this definition not only refers to knowledge, but also focuses on action-outcome relationships. It avoids a purely behaviorist vision of learning, since the repetition of the same action on the part of the organization does not necessarily imply an absence of learning, as sometimes a change in the organizational knowledge base makes behavior changes unnecessary.

Other authors maintain that organizations should be viewed as knowledge systems (Holzner and Marx, 1979; Brown and Duguid, 1991; Pentland, 1995). According to this approach, knowledge and the processes through which it changes are socially constructed, distributed and embedded in the organization (1). Even though this exclusive focus on the social construction of knowledge may be excessive, the starting point these authors propose seems very useful for purposes of analysis.

The complexity of the learning or knowledge transfer phenomenon as a whole makes it impossible to carry out comprehensive study. The problem has to be simplified by breaking the whole down into different knowledge processes. It needs to be borne in mind, however, that the different processes are often interrelated. Interdependencies have to be identified and evaluated.

(1) Notice that the view of organizations as social systems, embedded in a certain environment, automatically assumes that the organization is more than the sum of its parts, because knowledge is only created and transferred inside of this social context.

Knowledge in organizations

Before we enter into the study of the main views of knowledge systems in organizations, we have to understand what is meant by knowledge and knowledge management. Academic notions of knowledge have traditionally been split between psychologists, technologists, and organization theorists. In the face of increasingly radical and discontinuous change (1), and in order to study the critical issue of organizational adaptation, survival and competence in an appropriate manner, a more systematic interpretation of knowledge and knowledge management has to be developed. All three views need to be considered together. It is no longer sufficient to solve problems concerning the data and information-processing capacity of information technologies (2), or to focus solely on human beings' creative and innovative capacity. Only the conjoint analysis and establishment of organizational processes that ensure a synergistic combination of these issues will effectively address the key questions facing today's organizations. Hamel and Prahalad (1994) suggest that the relevant dimensions are:

“the structure of knowledge, types of knowledge, and levels at which it is generated, accumulated, stored, and deployed as well as how it can ... enhance corporate performance.”

In our opinion, two basic dimensions can be identified. First, it is important to define the different types of relevant knowledge in organizations. Even though the boundaries of each type of knowledge are not very clear, general agreement exists about the existence of different types of knowledge. These types of knowledge are generated, transferred, accumulated and stored in different ways. Therefore, each needs different structures and modes of coordination in order to flow effectively throughout the organization. Second, once we have defined the different types of knowledge present in organizations, the transformation processes have to be carefully determined. We presume that an organization's knowledge system can be divided into a number of subprocesses. Owing to the complexity of the problem, segregation of the main component parts may be desirable. It has to be borne in mind, however, that existing interdependencies are more difficult to observe and determine. Therefore, a separate analysis has to be carried out to monitor these issues.

Types of knowledge

A first approximation to the field of knowledge requires a thorough grasp of what is meant by knowledge.

Davenport and Prusak (1998) distinguish between data, information and knowledge. They define data as “discrete, objective facts about events, ... structured records of transactions”. Information, on the other hand, is a message that moves around the organization. It has a sender and a receiver and is meant to change the way the receiver perceives something, thus having an impact on his judgment and/or behavior. Knowledge is considered to be

-
- (1) Brian Arthur (1996) considers that we are entering “new world”, in which organizations have to “re-everything”.
 - (2) The popular business and management press, in particular, centers its attention almost entirely on the technological notions of knowledge management in organizations.

“a fluid mix of framed experience, values, contextual information, and expert insights that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms.”

Although this definition is very complete and intuitive, we believe that it encompasses different types of knowledge, and can therefore lead to confusion. Different academic fields have treated different types of knowledge in depth, and in recent centuries there has been a shift in the importance given to each type. The sudden interest in knowledge and knowledge consulting, and the conviction that knowing about knowledge is critical to business success, relates not to all knowledge, but only to certain types of knowledge.

In this sense, Drucker (1993) suggests that nowadays a shift is taking place in the relationship between knowledge and wealth creation (see also Figure 5). He argues that during the 18th century knowledge was applied basically to tools and products. Taylor, in the 1920s, introduced a new notion of knowledge, which was applied to human work, with an emphasis on productivity. Nowadays, “knowledge is being applied to knowledge itself”. As a consequence, in knowledge-based organizations, workers own the organization’s means of production (knowledge).

Figure 5. Evolution of the occupational distribution of the workforce in the U.S.
(In percentage)

Year	Production workers	Personal service	Managerial and Administrative	Technical and Professional
1900	73.4	9.0	13.3	4.3
1940	57.2	11.7	23.6	7.5
1980	34.2	13.3	36.1	16.1

Source: U.S. National Bureau of Standards.

Drucker’s account of the evolution of relevant knowledge in organizations can be compared with a very common typology of knowledge. What he calls “knowledge applied to tools, processes and products” is commonly referred to as *embodied knowledge*. It has been treated especially by technologists and technicians and is commonly known as “know-how”, a form of “practical thinking”. It is action-oriented and only partially explicit. Zuboff (1988) says that it depends on people’s physical presence, on sentient and sensory information, physical cues and face-to-face discussions, is acquired by doing, and is rooted in specific contexts. Kogut and Zander (1992) consider that firms’ critical know-how is made up of individuals’ skills and accumulated expertise.

At the beginning of the 20th century, knowledge applied to human work became more and more important. The emphasis on productivity, diversification efforts, and the emergence of complex interconnections within firms aroused the interest of organization theory researchers, who investigated what they called *encultured* or *embedded knowledge*. This type of knowledge is rooted not in organizations’ formal systems, but in the informal and social means and in the personal relationships between individuals. There has been an

emphasis on socially constructed meaning systems –developed within “communities of practice” which shape collective interpretation schemes, collective sensemaking, and shared understandings– and on the importance of organizational culture (Ouchi, 1980). Encultured or embedded knowledge also includes knowledge that resides in individual or organizational routines, usually referred to as “capabilities”. Granovetter (1985) proposes a theory of economic action in which economic behavior is intimately related to social and institutional arrangements. Levitt and March (1988) develop the notion of organizational routines, suggesting that these make the lessons of history accessible to later members of the organization. Prahalad and Hamel (1990) refer to this type of knowledge as “organizational competencies”. Henderson and Clark (1990) distinguish between the knowledge of specialist elements of an organization (“component knowledge”) and knowledge about how such elements interact (“architectural knowledge”). Architectural knowledge is often submerged within an organization’s taken-for-granted routines and interactions. Nonaka (1991; 1994) discusses this type of knowledge in *The Knowledge Creating Company*. Spender (1994) calls it collective knowledge:

(it is) implicit and embedded in organizational practice, ... a powerful source of competitive advantage. It is context specific, shaped by the particular uncertainties and possibilities of the situation which management faced. It is firm-specific since it is an internally generated solution to a particular set of conditions. It is unlikely to have value or relevance to other organizations or to other times. Thus it is probably highly perishable.”

Notice that Spender and Granovetter highlight the importance of cultural and intangible elements, while Levitt & March and Henderson & Clark mainly consider organizational routines and other procedures (1).

The type of knowledge receiving attention from today’s organizations is *embrained knowledge*. Increasing competitiveness and complexity require continuous innovation on the part of firms, and thus creativity on the part of their individual members. As Senge (1990) points out, it is no longer enough to copy; firms have to be able to generate in order to survive. Generation is highly dependent on conceptual skills and cognitive abilities. Embrained knowledge is non-conscious, difficult to articulate, and decisively affects decision making in firms. It has often been referred to as intuition (2¹) and has been studied especially in Psychology. It corresponds to abstract and conceptual knowledge. Argyris (1977) refers to the modification of this type of knowledge as double-loop learning. The importance of embrained knowledge has been widely recognized. Sveiby (1998) refers to it as the capacity to act in a wide variety of situations to create both tangible and intangible assets. Davenport and Prusak (1998) argue that the knowledge that exists in people’s heads and within communities of knowers is becoming more important than structured knowledge in document or computerized form. And Nonaka and Takeuchi (1995) highlight the need for internalization, the need to make explicit knowledge implicit.

(1) In Collins’ (1993) typification the former correspond to encultured knowledge, while the latter are called embedded knowledge. We feel that this distinction is confusing, especially because Granovetter’s (1985) definition fits better in the first category, although he is one of the main theorists of “embeddedness”.

(2) Dreyfus and Dreyfus (1986) place emphasis on the role of the expert’s intuition, stressing that intuition is not guessing but an underlying, internalized pattern of decision making. It is not a substitute for rational, analytical thinking, but a kind of “seeing beyond obvious patterns”. Experts are highly intuitive, as the following comment by a Japanese master of martial arts, quoted in *The Brain* by Richard Restak, illustrates: “There can be no thought, because if there is any thought, there is a time of thought, and that means a flaw ... If you take the time to think, ‘I must use this or that technique’, you will be struck while you are thinking.”

Finally, the importance of *encoded knowledge* has been widely recognized in management literature. One of the main reasons for the existence of the firm is the distribution and integration of knowledge (Hayek, 1945). Therefore, knowledge has to be encoded, i.e. fully articulated and conveyed by signs and symbols. This type of knowledge is commonly referred to as “information” (Kogut and Zander, 1992). As information technology produces tools of ever greater information-processing capacity, its role has become particularly important in the storage and transfer of this type of knowledge. In this sense, Zuboff (1988) analyses the “informating” power of IT.

The importance and advisability of encoding knowledge has been widely discussed in recent years. A first stream of researchers, especially those coming from a BPR and operational tradition, considers that all types of knowledge have to be encoded and stored in organizational databases. In contrast, a second stream, coming from an organizational learning tradition, considers that it is neither possible nor desirable to encode all kinds of knowledge. Embrained knowledge is, by definition, not codifiable. And as it is stored inside individuals, it is very difficult to imitate. Obviously, this is both an advantage and a disadvantage for firms. Non-imitability makes any competitive advantage derived from embrained knowledge more sustainable, but it also hinders the dissemination of that knowledge throughout the organization. Accordingly, the degree of codification, although partly beyond the firm’s control, has to be regarded as one of the main decisions facing organizations.

Nonaka and Takeuchi (1991; 1995) propose a different typology of knowledge. Starting from Polanyi’s (1962) definition of tacit knowledge (1), they make a distinction between “tacit” and “explicit” knowledge. In our opinion, this distinction, although very intuitive, is not appropriate for analyzing knowledge in organizations. The technical skills of individuals, collective preferences, and conceptual and abstract knowledge typically consist of both tacit and explicit knowledge. The proposed typology of embodied, embedded, embrained and encoded knowledge fits better with the main knowledge processes present in organizations.

Knowledge processes in organizations

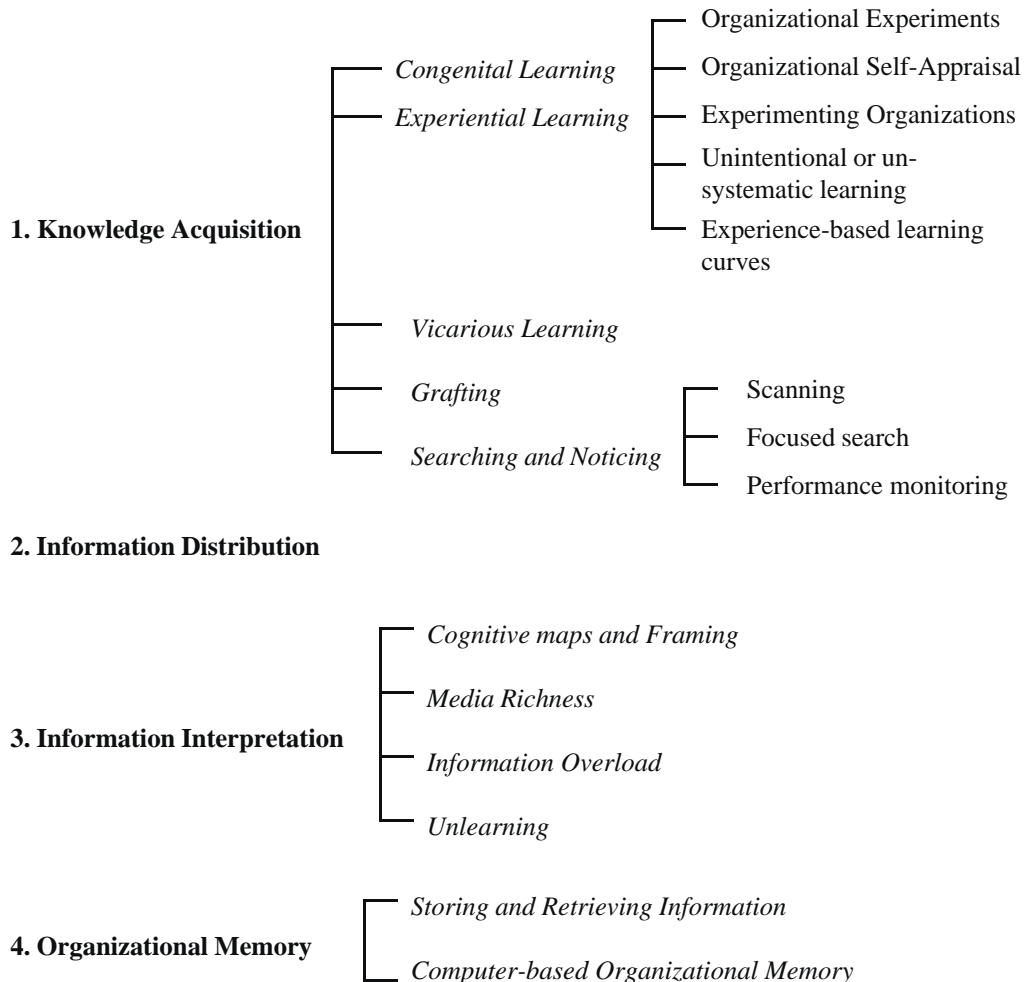
It is necessary to establish a typology of knowledge in organizations in order to study the main knowledge processes. Having defined the possible inputs and outputs, we are now in a position to analyze the main knowledge transformation processes in organizations (2).

In the learning literature some attention has been paid to learning activities. Huber (1991), who understands learning as an information process, summarizes the main contributions of the information-based view of learning. He emphasizes four aspects of information processing:

(1) Polanyi: “People know more than they say”.

(2) These transformation processes are organizational learning, but we try to avoid this terminology so as not to create confusion with the traditional usage of the learning literature.

**Figure 6 (1). Constructs and Processes associated with Organizational Learning
(adapted from Huber, 1991)**



As we have already mentioned, this treatment is incomplete, because it does not take into account the input and output of the activities. As a consequence, the impact on organizational performance cannot be determined.

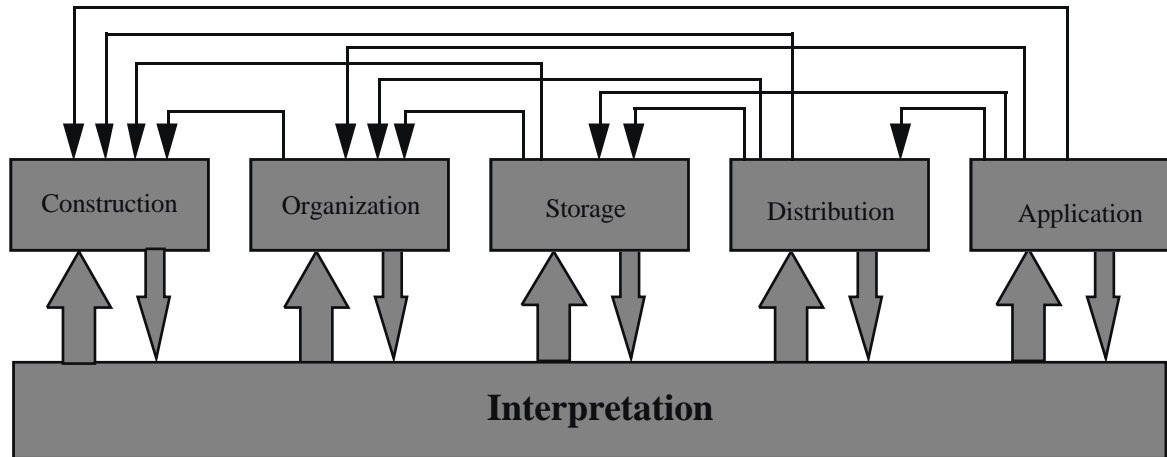
Taking a more sociological point of view, Pentland (1995) identifies five main knowledge processes: 1) construction, 2) organization, 3) storage, 4) distribution, and 5) application of knowledge in organizations (2). Even though we recognize the importance of social context, we also believe in the existence of genuine individual learning, particularly as reflected in human beings' capacity for abstraction. We therefore consider that a more complete analysis of knowledge processes in organizations has to take into account both the social and the individual dimension of knowledge.

(1) Huber does not differentiate between knowledge and information.

(2) Pentland does not consider individual interpretation and reflection, arguing that no knowledge can be created without taking into account the social context and the embeddedness of the individual in his environment.

The complete knowledge process is composed of six subprocesses:

Figure 7. Knowledge processes in the organization



1. Construction

This consists of adding or replacing material within the collective stock of knowledge. Trial and error learning and experience (either direct or benchmarking) have been cited as important sources of knowledge construction in firms (Garvin, 1993). Huber (1991) speaks of congenital knowledge, which is inherited at the conception of the organization and strongly determines the organization's learning capacity in later stages of its development (Schein, 1993). In recent years, strategic actions such as collaborative ventures, takeovers and imitation of practices have been shown to be increasingly important forms of knowledge construction in firms (Page, 1997).

2. Organization

New knowledge has to be related to other knowledge, classified and integrated into the existing body of knowledge in order to be useful to the organization. Therefore, another important knowledge process that has to be properly managed is that of establishing and maintaining the relationships between existing and newly constructed knowledge. It is important to note, however, that both formal and informal structures are needed in order to back up high levels of knowledge organization.

3. Distribution

Knowledge has to be distributed to the places where it is needed and can be applied. Here, communication plays a critical role. Distribution processes therefore have a major social component (Manning, 1992). The exchange of information and knowledge has learning effects, and affects the breadth of learning processes. The importance of information distribution is widely recognized. Even the pure "individualists" recognize the role of the organization as a knowledge distributor (see Simon, 1991).

4. Storage

Socially ratified knowledge has to be stored somehow. Walsh and Ungson (1991) claim that the effectiveness of storage mechanisms has to be mediated by social processes. Huber (1991) also regards storage as one of the main information processes.

5. Application

Knowledge has to be applied in order to obtain the kind of performance improvement that is a characteristic of learning (1). Changes in behavior are obvious signs of the application of new knowledge. Long-term applications are more difficult to determine, owing to changes in mental models and frames and in organizational culture.

6. Interpretation

Interpretation is the process through which information acquires meaning. Different interpretations increase learning. Huber (1991) maintains that different interpretations are enhanced with: 1) no uniform frames of reference, 2) media richness, 3) the organization's information-processing capacity (and how to avoid overload), and 4) unlearning (Hedberg, 1981).

Several authors have dealt with the interpretation of information, both from an individual and from an organizational point of view. Interpretation affects the whole knowledge system and can be considered as the main distinctive component. In this sense, Daft and Weick (1984) consider that interpretation is "the process through which information is given meaning and actions are chosen". The main activities of information construction, organization, storage and distribution can be carried out without interpretation, but they only make sense if the information is properly interpreted. Interpretation means not only applying given frames or decision rules (this is what computers do), but also comparing new information with existing information, evaluating the two, and accepting or refusing information. This part of interpretation is a purely human activity and cannot be automated. It is deeply rooted in individual frames and mental constructs of reality (2), and so cannot be imitated.

Contributions and weaknesses of the knowledge approach to learning

The view of learning as a knowledge process not only centers attention on the learning phenomenon, but also takes the input/output relationship into account. It thus remedies some of the basic failures of the traditional learning literature. Establishing six subprocesses of knowledge creation and transfer clarifies the sources of learning in organizations. At the same time, persistence is better explained, because the process view affords a deeper understanding of the temporal impact of different learning processes.

-
- (1) Note that this view also avoids giving a clear definition of learning and how learning is developed. Like most of the traditional learning approaches, it centers attention on learning activities, but without explaining the conditions and mechanisms that have to be present at each stage.
 - (2) Individual frames and mental constructs of reality are often not articulable, and form part of the embrained knowledge of an individual.

Figure 8. Comparison of the two approaches

	Organizational Learning Literature	Process Interpretation of Knowledge
Locus of learning	Individual or organization	Locus is the interaction; purely individual or organizational level is not very meaningful
Types of learning	Operational or strategic	It is a question of each type of knowledge in the different processes
Source	Single or double loop Experience (internal) or example (external) or abstraction	Construction, organization, distribution, storage, application and interpretation
Persistence	Long or short term	Failures in the long-term memory result from failures of storage or distribution, as well as changing relevance or interpretation

When we compare the traditional view of the learning organization with the knowledge approach to learning, it becomes apparent that the process view avoids the distinction between individual and organizational learning, because the focus is on the activity that is being performed. It is implicitly assumed that the locus of learning is the interaction (see Figure 8). On the other hand, the type of learning that takes place depends on the type of knowledge that is being transformed in each process.

Even though there is an extensive literature on the different types of knowledge in other academic fields, the applications of this research to the field of organizations have focused mainly on encoded knowledge. Much of contemporary knowledge management literature is concerned with the acquisition, storage and distribution of encoded knowledge, and the codification of embrained, embodied and embedded knowledge. However, codified knowledge is easy to transfer and therefore imitable. This implies that codification is not necessarily desirable. From a resource-based view, to be sustainable a competitive advantage has to fulfill three conditions. First, it has to be inimitable (Collis and Montgomery, 1995; Peteraf, 1993). Second, developing the advantage must require a long-term commitment of resources (Teece, Pisano and Shuen, 1997; Ghemawat, 1991). And finally, the internal value of the resource has to exceed its value in the market or inside other firms (Peteraf, 1993). Hall (1993) considers that intangible resources, in particular, such as employee know-how, culture, reputation, networks and databases, are the most important resources that lead to sustainable competitive advantage. Along similar lines, Dierickx and Cool (1989) consider that valuable resources have a high tacit dimension and are socially complex. More generally, embrained, embodied and embedded knowledge can be seen as resources that are inimitable, need commitment over time, and are more valuable inside the firm than in the market. As Connor and Prahalad (1996) state,

“a resource-based view of the firm is the essence of the resource-based perspective. The central theme that is emerging in the strategic management literature is that private knowledge is a basic source of competitive advantage.”

This implies a shift in the importance of embrained knowledge. It is considered to be one of the main sources of creativity, if not the only one. Therefore, the need to boost creativity and generate a flow of embrained knowledge throughout the organization is becoming a major theme in the knowledge management literature, in which the emphasis is not on the tools that foster the transfer of encoded knowledge, but on the human being as a genuine knowledge creator.

However, the link between genuine knowledge and the creation of a competitive advantage has not been dealt with explicitly in the knowledge management literature (1), which has identified the main processes and tools of knowledge integration, organization, distribution and storage.

Knowledge management scholars have also failed to establish a link between the appearance of new organizational forms and the importance of knowledge processes. It is widely recognized that the focus on knowledge leads to new organizational forms, which are supported by intensive use of new information technologies. Quinn (1992) argues that a possible explanation for the emergence of new organizational forms is a shift in the importance of knowledge in organizations. He argues that in “the age of knowledge” both knowledge and abilities are key elements in a firm’s success. Boland and Tenkasi (1995) relate the existence of communities of knowers to the emergence of new organizational forms. In general, however, links are established somewhat intuitively; formal developments are rare. Future approaches to learning and knowledge should therefore seek to provide an explicit explanation for the emergence of new organizational forms as a consequence of firms’ greater knowledge requirements.

The need for real collaboration and communication and the role of IT-based tools have been cited as determining factors in knowledge creation and transfer. However, a conceptual framework that takes the relationships between knowledge, communication, collaboration and IT-based tools into account has still to be developed (2). In our opinion, the reason for this is the failure to find the appropriate unit of analysis for the learning problem. The knowledge system approach, while recognizing implicitly that the locus of learning is the interaction, does not in fact emphasize interactions at all.

Several authors, especially practitioners, have already stated the importance of interactions in learning-intensive organizations. Butler, Hall et al. (1997) talk of a “new age of interactions”, in which the convergence of technologies enhances our capacity to interact and generates new ways to configure businesses and organize companies, thus having far-reaching effects on the competitive dynamics of industry. In the same direction, John Browne, CEO of BP, points out that, in order to foster learning, breakthrough thinking processes have to be developed. One of the main factors that enable breakthrough thinking is personal interaction.

An interaction-based view can improve our understanding of the learning phenomenon because: 1) it takes into account both the input/output relationship and the process; 2) it considers the existence of different types of agents; 3) the indirect effects of one

-
- (1) Scholars of the “Resource-based view of the firm” have studied this relationship in depth. However, they are interested mainly in explaining the main factors of a firm’s performance and pay relatively little attention to the knowledge process.
 - (2) An exception is a model provided by Andreu and Ciborra (1996), who propose an organizational learning model based on the RBVF, and use it to derive guidelines for management action aimed at improving IT effectiveness in organizations.

interaction on others can be modeled; and 4) the focus is clearly on action, so it should be relatively easy to derive practical implications from theoretical expositions.

This view is also consistent with the extensive use of information technologies for communication. These tools make feasible interactions that were not possible in the past, because they eliminate geographic and physical barriers and reduce the amount of time needed to interact. Thus, more interactions can take place in less time. Future research should therefore set out to model organizational interactions.

References

- Argote, L. (1993), "Group and organizational learning curves: Individual, system and environmental components", *British Journal of Social Psychology*, 32: 31-51.
- Argote, L., S. Beckman, et al. (1990), "The persistence and transfer of learning in industrial settings", *Management Science*, 36: 140-154.
- Argyris, C. (1967), "Today's problems with tomorrow's organizations", *Journal of Management Studies*, 1: 31-55.
- Argyris, C. (1977), "Organizational Learning and Management Information Systems", *Accounting*, 2(2): 113-123.
- Argyris, C. and D. A. Schön (1978), *Organizational Learning: A Theory of Action Perspective*, Reading: Addison-Wesley.
- Arthur, Brian (1996), "Increasing Returns and the New World of Business", *Harvard Business Review*, 74(4): 100-109.
- Bell, D. (1973), *The coming of post-industrial society: A venture in social forecasting*, New York: Basic Books.
- Boland Jr., R. J. and R. V. Tenkasi (1995), "Perspective Making and Perspective Taking in Communities of Knowing", *Organization Science*, 6(4): 350-372.
- Brown, J. S. and P. Duguid (1991), "Organizational Learning and Communities of Practice: Toward a unified view of working, learning, and innovation", *Organization Science*, 2(1): 40-57.
- Butler, P., T. W. Hall, et al. (1997), "A revolution in interaction", *McKinsey Quarterly*, (1): 4-23.
- Collins, H. (1993), "The structure of knowledge", *Social Research*, 60: 95-116.
- Collis, D. and C. Montgomery (1995), "Competing on resources; strategy in the 1990s", *Harvard Business Review*, July-August: 118-128.
- Connor, Kathleen R. and C. K. Prahalad (1996), "A Resource-based Theory of the Firm: Knowledge versus Opportunism", *Organization Science*, Vol. 7, No. 5: 477-501.
- Crossan, M. M. and H. W. Lane, et al. (1995), "Organizational Learning: Dimensions for a theory", *The International Journal of Organizational Analysis*, 3(4): 337-360.
- Cyert, Richard M. and James G. March (1963), *A Behavioral Theory of the Firm*, Englewood Cliffs, N.J.: Prentice-Hall.
- Daft, R. L. and G. P. Huber (1987), "The Information Environments of Organizations". In *Handbook of Organizational Communication*, by F. M. Jablin, L. L. Putman, K. H. Roberts and L. W. Porter. Newberry Park, Sage: 130-164.
- Daft, R. L. and K. E. Weick (1984), "Toward a Model of Organizations as Interpretation Systems", *Academy of Management Review*, 9(2): 284-295.
- Davenport, T. H. and L. Prusak (1998), *Working knowledge: how organizations manage what they know*, Boston: Harvard Business School Press.
- Dierickx, I. and K. Cool (1989), "Asset stock accumulation and sustainability of competitive advantage", *Management Science*, Vol. 35: pp. 1504-1511.

- Dreyfus, H. and S. Dreyfus (1986), "Why computers may never think like people", *Technology Review*.
- Drucker, P. (1993), *Post-capitalist society*, Oxford: Butterworth-Heinemann.
- Duncan, R. and A. Weiss (1979), "Organizational learning: implications for organizational design", *Research in Organizational Behavior*, 1: 75-123.
- Fiol, C. M. and M. A. Lyles (1985), "Organizational Learning", *Academy of Management Review*, 10(4): 284-295.
- Galbraith, J. (1995), *Designing Organizations*, San Francisco: Jossey-Bass.
- Ghemawat, P. (1991), *Commitment: The Dynamic of Strategy*, New York: The Free Press.
- Granovetter, Michael (1985), "Economic Action and Social Structure: The Problem of Embeddedness", *American Journal of Sociology*, 91: 481-510.
- Hall, Richard (1993), "A framework linking intangible resources and capabilities to sustainable competitive advantage", *Strategic Management Journal*, Vol. 14: 607-618.
- Hamel, G. P., C. K. Prahalad (1994), *Competing for the Future*, Boston, MA: Harvard Business School Press.
- Hayek, F. A. von (1945), "The Use of Knowledge in Society", *American Economic Review*, 35: 519-530.
- Hedberg, B. (1981), "How Organizations Learn and Unlearn". In *Handbook of Organizational Design*, by P. Nystrom and W. Starbuck. New York: Oxford University Press: 1-27.
- Henderson, R. M. and K. B. Clark (1990), "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms", *Administrative Science Quarterly*, 35(1): 9-30.
- Holzner, B. and J. Marx (1979), *Knowledge application: The knowledge system in society*, Boston: Allyn-Bacon.
- Huber, G. P. (1991), "Organizational Learning: The Contributing Processes and the Literatures", *Organization Science*, 2(1): 88-115.
- Kim, D. H. (1993), "The Link Between Individual and Organizational Learning", *Sloan Management Review*, 35(1): 37-50.
- Kogut, B. and U. Zander (1992), "Knowledge of the Firm, Combinative Capabilities and the Replication of Technology", *Organization Science*, 3(3): 383-397.
- Lant, T. K. and S. J. Mezias (1990), "Managing Discontinuous Change: A Simulation Study of Organizational Learning and Entrepreneurship", *Strategic Management Journal*, 11: 147-179.
- Levitt, B. and J. G. March (1988), "Organizational Learning", *Annual Review of Sociology*, 14: 319-340.
- Manning, P. K. (1992), *Organizational communication*, New York: Aldine de Gruyter.
- March, J. G. (1991), "Exploration and Exploitation in Organizational Learning", *Organization Science*, 2(1): 71-87.
- March, J. G. and J. P. Olsen (1975), "The uncertainty of the past: Organisational learning under ambiguity", *European Journal of Political Research*, 3: 147-171.
- Miller, D. (1996), "A preliminary typology of organizational learning: Synthesizing the literature", *Journal of Management*, 22(3): 485-505.
- Nonaka, I. (1991), "The Knowledge-Creating Company", *Harvard Business Review*, 69(6): 96-104.
- Nonaka, I. (1994), "A Dynamic Theory of Organizational Knowledge Creation", *Organization Science*, 5(1): 14-37.
- Nonaka, I. (1995), *The Knowledge-Creating Company*, New York, NY: Oxford University Press.
- Ouchi, William (1980), "Markets, Bureaucracies, and Clans", *Administrative Science Quarterly*, 25: 129-141.

- Page, G. (1997), "Communicated knowledge as a learning foundation", *International Journal of Organizational Analysis*, 5(1): 25-58.
- Pentland, B. T. (1995), "Information Systems and Organizational Learning: The Social Epistemology of Organizational Knowledge Systems", *Accounting, Management and Information Technologies*, 5(1): 1-21.
- Peteraf, M. (1993), "The cornerstones of competitive advantage: a resource-based view", *Strategic Management Journal*, vol. 14: 179-191.
- Prahalad, C. K. and G. Hamel (1990), "The Core Competence of the Corporation", *Harvard Business Review*, 68(3): 79-91.
- Prokesch, S. E. (1997), "Unleashing the Power of Learning: An Interview with British Petroleum's John Browne", *Harvard Business Review*, 75(5): 146-168.
- Quinn, J. B. (1992), *Intelligent Enterprise: A Knowledge and Service-based Paradigm for Industry*, New York: Free Press.
- Schein, E. H. (1993), "How Can Organizations Learn Faster? The Challenge of Entering the Green Room", *Sloan Management Review*, 34(2): 85-92.
- Senge, P. M. (1990), *The Fifth Discipline: The Art and Practice of The Learning Organization*, New York, NY: Doubleday.
- Shrivastava, P. (1983), "A Typology of Organizational Learning Organizations", *Journal of Management Studies*, 20(1): 7-28.
- Simon, H. A. (1991), "Bounded Rationality and Organizational Learning", *Organization Science*, 2(1): 125-134.
- Spender, J.-C. (1994), "Organizational Knowledge, Collective Practice and Pensrose Rents", *International Business Review*, 3(4): 353-367.
- Starbuck, W. H. (1992), "Learning by Knowledge-Intensive Firms", *Journal of Management Studies*, 29(6): 713-740.
- Stata, R. (1989), "Organizational Learning – The Key to Management Innovation", *Sloan Management Review*, 30(3): 63-74.
- Teece, D., Pisano, G. and A. Shuen (1997), "Dynamic capabilities and strategic management", *Strategic Management Journal*.
- Tyre, M. J. and E. von Hippel (1997), "The Situated Nature of Adaptive Learning in Organizations", *Organization Science*, 8(1): 71-83.
- Walsh, J. P. and G. R. Ungson (1991), "Organizational Memory", *Academy of Management Review*, 16(1): 57-91.
- Weick, K. E. (1991), "The Nontraditional Quality of Organizational Learning", *Organization Science*, 2(1): 116-124.
- Weick, K. E. and K. H. Roberts (1993), "Collective mind in organizations: Heedful interrelating on flight decks", *Administrative Science Quarterly*, 38(3): 357-381.
- Zuboff, S. (1988), *In the age of the smart machine: The future of work and power*, New York: Basic Books.

IESE**DOCUMENTOS DE INVESTIGACION - RESEARCH PAPERS**

No.	TITULO	AUTOR
D/345	La motivación en el trabajador a través de una empresa de trabajo temporal: Fase POSTETTOS. Julio 1997	Pin, J.R. Suárez, E.
D/346	Consejos de administración en empresas familiares: Características de composición y funcionamiento. Niveles de utilidad. Julio 1997	Gallo, M.A. Cappuyns, K.
D/346 BIS	Boards of directors in family businesses: Characteristics regarding membership and functioning. Levels of usefulness July 1997	Gallo, M.A. Cappuyns, K.
D/347	The contribution of the neo institutional school to organizational theory: Paving the way to the political hypothesis. September 1997	Alvarez, J.L.
D/348	To do or not to do? Non-cooperative behavior by commission and omission in inter-firm ventures. October 1997	Ariño, A.
D/349	Survey of theories employed in business ethics. October 1997	Torres, M.
D/350	Volatilidades, betas y alfas de empresas españolas. Períodos 1990-1996 y 1986-1989. Octubre 1997	Fernández, P.
D/351	The employment debate: Employment performance and institutional change. October 1997	Gual, J.
D/352	Crecimiento y empleo en España ante la moneda única: ¿Cuál puede ser el papel de las reformas estructurales? Octubre 1997	Gual, J.

IESE**DOCUMENTOS DE INVESTIGACION - RESEARCH PAPERS**

No.	TITULO	AUTOR
D/353	Incorporación de graduados universitarios a la empresa familiar. El aprendizaje. Octubre 1997	Gallo, M.A. Cappuyns, K.
D/353 BIS	Bringing university graduates into the family business. Learning. October 1997	Gallo, M.A. Cappuyng, K.
D/354	Banks as shareholders: Do they matter? January 1998	Canals, J.
D/355	La teoría de los stakeholders y el bien común. Enero 1998	Argandoña, A.
D/355 BIS	The stakeholder theory and the common good. January 1998	Argandoña, A.
D/356	A process model of strategy and human resource management: The ownership transference model January 1998	Sánchez-Runde, C. Koch, M.J.
D/357	A conceptual approach to the creation and early development of human resource management departments. January 1998	Sánchez-Runde, C.
D/358	Ethical decision-making models. February 1998	Torres, M.
D/359	Building and generating a creative and flexible work force: Key competencies. February, 1998	Múñoz-Seca, B.
D/360	Understanding trust bo build strong relationships in organizations. February, 1998	Portales, C. Rosanas, J.M. Ricart, J.E.