# The key might be in the dark zone: How old knowledge can deviate organizational learning

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## Abstract

This paper explores how learning agents actively use an established body of organizational knowledge to situate new learning initiatives. Through an exploratory case study in a knowledge-based context we focus on the early stages of a technological learning. We identify various practices that dominant experts intentionally adopt to oppose the new learning initiative. Doing so, experts benefit from the depth and maturity of the established cognition, as well as the emerging and ambiguity state of the new knowledge. We typify these situating practices into nineteen mechanisms that affect the content, process, context, and outcome of organizational learning. Accordingly, we discuss several potentials of cognitive and practice-based theories to examine the interplay between cognition and action, beyond the routine mode of knowing.

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# 1. INTRODUCTION

Knowledge is power [ii], but what happens if this power is used to dismiss, avoid, postpone, distort, and limit new changes? In many sectors, organizations are increasingly more dependent on knowledge. Hence, rapid technological changes urge them to adapt and renew their existing body of knowledge, leaving managers with the challenge of handling the interactions between the old and the new knowledge. When it comes to shaking the dominant cognition, individuals and groups actively try to protect their established benefits and power. The more expert they are, the more capable they would be to leverage their expertise in order to situate the new learning. However, what is favorable for these learning agents can be less favorable for the whole organization. In this paper we explore the mechanisms through which learning agents play on the existing body of knowledge in order to situate learning initiatives.

These mechanisms have roots in two domains: the domain of cognition where the established knowledge is present, and the domain of practice, where learning actors actively influence the new learning. Therefore, studying this challenge requires looking at two bodies of literature: *cognitive* and *practice-based* views. Examining the characteristics of knowledge and how knowledge can be linked to organizational aspects, cognitive theories try to explain *why* organizations suffer when they try to detach themselves from the established knowledge. However, these views pay little attention to *how* learning agents actively use their knowledge in order to influence learning initiatives. The practice-based view of organizational learning, on the other hand, brings to the fore the active role of learning agents in a collective and situated process. Nevertheless, the detachment of this view from the cognitive view has limited its potential to explain the cognitive roots of these situating practices (Marshall, 2008).

Recent works showed linking cognitive and practice-based views is not only epistemologically possible, but also theoretically insightful. These scholars emphasized the need for empirically exploring the relations between cognition and practice, especially with regard to the role of power (Marshall, 2008; Nicolini, 2010). This research is a response to this call. Doing so, we apply three strategies simultaneously. First, we adopt an *exploratory* mode of inquiry. If cognition is a state of organizational life and if the practices of situating learning are also what happen in the workplace, we must be able to find the actual links between these two aspects if we scrutinize the same reality. Second, we focus on a *situation* where the established cognition and learning practices are visible, which helps us to observe their interactions clearly. Third, concentrating on how existing knowledge is actively used by experts to *distort* new learning, we can better examine the role of power. Distorting practices refer to those actions that oppose, limit, or suppress learning, against what was intended by the whole organization, in a way that serves the interests of some groups, against the overall organizational aims. Regardless of the ultimate outcome of distorting mechanisms, in such situation the opposing interests are vivid; hence, the role of power is bold.

We first review how cognitive and practice-based views examine the role of the established cognition in situating new learning. Showing the potentials of both views to contribute to this issue, we describe how an exploratory approach helps us to identify mechanisms through which the existing cognition is enacted to distort new learning initiatives. Subsequently, we report our case study and the identified mechanisms. The following section is devoted to analyzing how these mechanisms can contribute to the

cognitive and practice-based view. We conclude the paper by commenting on practical implications and future researches.


## 2. Theoretical background

### 2.1. How does cognitive theory approach the established knowledge and learning

The cognitive view of organizational learning, mainly focuses on knowledge and its dynamics as crucial elements of organizational learning (Crossan, Lane, White, & Djurfeldt, 1995; Fiol & Lyles, 1985). However the concept of knowledge is a matter of debate. The early conception of knowledge as *processed information through individual cognitive capabilities* has been extensively criticized. Firstly, knowledge has tacit dimensions (Polanyi, 1966) which makes it difficult to be articulated and codified. Secondly, knowledge involves subjective aspects becausee its content and mode of application can vary depending on the way that agents conceive and interpret it (Nonaka & Toyoma, 2005). Thirdly, knowledge is heterogeneous as it can appear in various forms (Blackler, 1995), with distinguished characteristics. Fourthly, organizational knowledge is a dynamic entity that constantly changes through processes such as creation, acquisition, translation, transformation, integration, and application (Carlile, 2004; Nonaka & Takeuchi, 1995).

As the organizational knowledge changes over time, the distinction between old and new knowledge appears. This distinction is more obvious at the practical levels of knowledge such as techniques. Complex interactions might emerge between the old and the new body of knowledge since they are introduced to each other (Cook & Brown, 1999). Especially when the old knowledge is cognitively distant from the new one and the adoption of the new knowledge requires significant modifications in the established body of knowledge, the tension between the old and the new bodies of knowledge heightens. Moreover, when the existing body of knowledge is deeply established in the individual's mind, organizational structures and routines, shared values, and political settings, it is quite challenging to let it go (Hedberg, 1981). As organizational members are more familiar with the established knowledge, than the new one, the old knowledge possesses a higher level of maturity and stability, as well as a relatively lower level of ambiguity. Finally, the old knowledge is already legitimized and justified in the organization while the new knowledge must still struggle to cope with this challenge (Giroux & Taylor, 2002; Nonaka, 1994).

How does the old knowledge influence new learning? Traditionally, cognitive studies have focused on the rational processes taking place in individuals' cognition (Rorty, 1979). They try to show how the dominant mental models can limit the scope of search around the old ideas, create cognitive blindness, bias views towards old ways of thinking (Bettis & Prahalad, 1995), and limit the cognitive capabilities in understanding and processing alien information (Argyris, 1999; Walsh, 1995). However, this view approaches the established cognition as the content of the individual's mind, at the expense of overlooking the tacit and social dimensions of knowledge. In addition, the role of the knowing agent is passive (Marshall, 2008). In fact, the way in which the established knowledge affects the new learning, in this view, is through natural cognitive processes that automatically take place in the mind of actors. Some strands of cognitive view tried to model cognition at collective level, for example through routines (Nelson & Winter, 1982) and shared mental models

(Kim, 1993). Even in these works, the role of actors is confines to enactment *according to* the established cognition. Hence, it is difficult to explain the active role of learning agents in shaping practices beyond the established cognition.

To conclude, the cognitive view sheds light on the characteristics of the established knowledge, but the conception of knowledge as something which agents *possess* or a *state* in organizational dynamics makes it difficult to see knowledge as something that is inherently dynamics and malleable (Marshall, 2008). Furthermore, this view does not consider the active role of knowing agents who can collectively enact the established knowledge in order situate new learning. These practices are beyond natural cognitive mechanisms that take place in the individuals' minds and passive submission to the established organizational routines. As a result, we need a view that puts cognition into a framework that brings to the fore the active power of learning agents in a socially situated context.

### 2.2. Practice-based view and the role of the existing knowledge

The focal element of the practice-based view is what actors perform in the very daily realm of organizational life (Geiger, 2009; Nicolini, 2010; Orlikowski, 2002; Whittington, 2006). Geiger's (2009) showed that a rich conception of practice goes beyond "what actors do" or "organizational processes and routines". Practice, also, straddles two other dimensions: epistemic and normative (Geiger, 2009). In this view, although practice refers to what actors perform, it has roots in knowledge and directs towards institutionalizing specific norms or values (Gherardi & Nicolini, 2000). However, the link between cognition and practice in this view is a matter of debate. On the one extreme, some scholars dismiss knowledge as a "static embedded capability or stable disposition of actors" ((Orlikowski, 2002): 249). For them, the only thing that exists is *knowing*, which is "an ongoing social accomplishment, constituted and reconstituted as actors engage the world in practice" ((Orlikowski, 2002): 249). In fact, they reduce knowledge into a mode of practice, hence, leaving no room to discuss the relation between cognition and practice. It is difficult to reduce everything that has been crystallized as cognitive maps or cognitive states of agents into *knowing* (Orlikowski, 2002), although they can be enacted and changed *through* the practice of knowing. To illustrate, when experts of an engineering department *know* that the force is the product of mass and acceleration (Second Newton's law), it is not something that they *constitute* everyday in their practice, although they *use* it and even modify it through some sort of practices.

On the other hand, more moderate views admit the conception of knowledge as a state of capability that social actors can possess. Instead, they emphasize the inextricable links between knowledge and practice. For them, practice is a core element in constituting, manifesting, sustaining, and modifying knowledge (Nicolini, 2010). This view stresses that the very practice of knowing is a "social expertise and collective knowledgeability" which is "situated in the historical, social, and cultural context" (Nicolini, 2010).

However, the practice-based view has other potentials in explaining the link between cognition and action that are less developed (Marshall, 2008). Firstly, this view is dynamic because time and change are inherently embedded in the very notion of practice. Secondly, examining what *actually* takes place in the organizational life, this view is realistic. Thirdly, considering the fact that practices are socially embedded, this view avoids an individualistic approach. We think the social dimension of practice-based theory can be expanded, especially in studying the cognition-action link. Although scholars in the practice-based field stress that agents perform their practices in a social context, the link

between cognition and action is social also in the sense that each agent can deal with the cognition of other agents. More specifically, agents not only perform their actions in the light of their own cognition in a social context, they also establish social interactions by leverage the knowledge of each other in their practices. Fourthly, framing practice as the domain of realization of agentic power, this view can explain the *emergent* practices that go beyond normal practices (Blackler & Regan, 2009; Marshall, 2008). More specifically, most of the works in this strand focus on routine modes of practices. We believe this view can be insightful in examining how some practices are deeply rooted in the established cognition, but they appear in emergent forms, even against normal knowing practices and organizational routines.

Finally the practice-based view is a powerful framework for studying the political aspects of cognition-action interactions (Lave & Wagenr, 1991). Although the state of established cognition somehow reflects the power relations between agents, the very actions adopted by agents reflect the power game going on during the learning process. We believe that the normative aspect of practice can reveal the political aspects in the relation between cognition and action. For instance, not only practice can create and sustain knowledge, the political concerns can direct some learning practices towards *avoiding* or *limiting* knowing.


## 3. Research framework

Our research question is how actors involved in the process of learning try to use the established knowledge in order to distort new learning initiatives. Starting from a stable and established state of cognition which is rather objectively identifiable, and then looking at how actors practice these elements of cognition we can better scrutinize the link between cognition and practice (Marshall, 2008).

We use a wide definition of organizational learning as "a process of change in thought and action both individual and shared—embedded in and affected by the institutions of the organization" ((Vera & Crossan, 2004): 224). We distinguish between the four aspects of organizational learning: *content, process, context,* and *outcome* (Naot, Lipshitz, & Popper, 2004). The content of learning reflects the specific *solution* that is going to be applied (= *what* is learned). This solution can refer to a specific knowledge, structure, or behavior that is going to be developed or implemented (Fiol & Lyles, 1985; Naot et al., 2004). Learning process constitutes a *series of actions* performed by learning agents in order to materialize the learning content (Elkjaer, 2004). The learning process happens in a specific *context* which is the combination of all factors that influence the courses of actions taking place in the process of learning. Finally, the results of these three dimensions are what actually turn out as learning outcomes. Learning outcomes might be intended, such as cost reduction (Argote & Epple, 1990) and improved quality (Lapre, A. S. Mukherjee, & Wassenhove, 2000), as well as unintended, such as threatening the organizational resilience and creating new barriers toward organizational dynamics (Repenning & Sterman, 2002). Accordingly, we formulated more specific research questions based on how learning actors use the established knowledge in order to situate the content, process, context, and outcome of new learning.


## 4. Research setting and methodology

Adopting an interpretative research approach (Schutz, 2005) we can examine the subjective aspects of cognition and practice. Also, we can interpret the meanings and purposes of situating practices in a social context. In order to understand the dynamics of situating mechanisms, we rely on a qualitative longitudinal case study (Easterby-Smith, 1997). We adopt an exploratory mode of case study (Yin, 2002) in order to better explore various mechanisms of using established knowledge for situating learning.

The context of the field study should highlight the role of established cognition and situating practices. Hence, we focus on the early stages of a learning process where radically new technical knowledge is introduced to the existing knowledge. Selecting a highly knowledge intensive company, and a rather technical learning initiative, we would be sure that the role of knowledge is visible. Moreover, focusing on the early stages of learning process, the tension between the established knowledge and the new learning is more severe and it is more likely to observe bold situating reactions that learning agents adopt to play on the established knowledge.

The selected case is a medium size microelectronics company, with an annual turnover of around 10 million US\$ and around 500 employees, which we refer to as ABC[iii]. Founded in 1998, ABC has been involved in designing and producing customized and complex microelectronics systems such as national TV broadcasting systems. More than 80% of ABC employees are technical engineers and university professors in different fields such as microelectronics (30%), radio frequency and microwave (30%), telecommunication systems (10%), mechanical engineering (20%), and software engineers (10%). The significant growth of ABC (30% annual turnover growth rate) over the last decade has gone hand in hand with the rapid pace of technological changes in this sector, pushing ABC to pursue significant learning initiatives.

Design process is the core activity at ABC, which constitutes of analyzing, coding, simulating, testing, debugging, and implementing stages. The design process, traditionally, starts when a team composed of the head of specialized departments, project manager, and a technical team from clients analyze customer's need and specify the overall functions and architecture of the system, by. In the second stage, the project is divided into sub-projects based on different system components to be designed and tested by specialized departments. The last stage constitutes integrating the developed components, testing, debugging, and installing the whole system. The recent involvement of ABC in more complex projects and the new market conditions have created a situation where ABC have to assure timely delivery of complex systems at a high level of accuracy and quality. As a solution, ABC set out to switch from low-level approach (LLA) to high-level approach (HLA) [iv] in designing systems.

We examined this change during eleven months, since its early stages in June 2009. The research team included four researchers, of whom three had backgrounds in electrical engineering. The involvement of an ABC project manager in the research team enhanced our access to key informants, related documents, and informal information. Team members attended a series of off-site workshops in order to grasp the characteristics of the old knowledge and technical aspects of the learning. Then, we conducted a series of interviews with all ten key players involved in this process, such as project managers, the heads of specialized departments, technical engineers, and technical deputy of ABC. Interviews were conducted in a semi-structured and face-to-face format, lasted from 45 to 90 minutes. We ran on-site observations on the process of system design in both LLA and HLA. These observations helped us to make sense of technical issues and be involved in the social interactions and debates. We were regularly informed about events and related decisions. Considering the friendly climate of the design divisions, various informal contacts in the

form of friendly chats provided us with information on political debates and relations which would otherwise be hardly attainable. We analyzed related documents and dealt with artefacts such as software packages. With the aim of triangulation of sources, selected informants covered a wide range of 1) technical experts, 2) project managers, and 3) ABC middle managers. We intentionally collected data from both opponents and defendants of the new learning to examine opposing views and debates.

All interviews were transcribed verbatim and combined with data from other sources. As a preliminary analysis, two researchers presented contradictory and ambiguous findings to a group of ABC informants to check the validity of findings. After a series of complementary interviews, final data were analyzed through an exploratory thematic analysis (Boyatzis, 1998), using ATLAS.ti software. In the first round, two parallel researchers coded data to identify practices that experts used to distort the learning initiative. Discussing the conflicts and resolving them, we went through a process of logical analysis to purify the identified practices and typify them according to their similar contents.


## 5. Learning story and old knowledge at ABC

Facing the challenge of designing large complex systems in a short period of time, a project manager discovered the capabilities of HLA in February 2009. He tried to pose the idea of using HLA in some divisions by showing its main potential benefits. At this point, middle managers, who were rather familiar with the subject, became well informed and after considering the merits of HLA, they enthusiastically asked the project manager to continue his exploration. As a critical test, he suggested testing the new approach by redoing an old project. Technical deputy introduced this idea to the designers and project managers in a formal meeting which caused a lot of disagreements and resistance among experts.

In parallel, a technical deputy of ABC, who had a background in system design, started examining the new approach aiming at convincing experts to look at the new approach as a potential substitution for LLA. For example, he selected a project manager, he believed was unbiased, to design a new project using HLA and report the results to all experts and managers. Despite being busy with managerial tasks, the deputy also conducted some competitions among experts in the company to design the same project applying both the old and the new approach. On the other hand, he ran some training programs to increase the level of familiarity with the new approach among experts.

However, these initiatives proved unsuccessful in short term and both overt and hidden resistances persisted. After all, they couldn't convince a large body of experts to look at HLA more optimistically. After one year and a half, the learning process is still ongoing in a patchy way. Most of the early plans have yet to be implemented. Some peripheral actions in replacing the LLA with HLA were suppressed in their early steps. Moreover, the sensitivity of experts in opposing this change made managers postpone this learning project to a later date.

As the LLA has been the dominant design approach for around one decade, various skills, specializations, routines, and processes have been shaped based on LLA knowledge. Experts not only know the process of design in this approach, but also, they master different tools and tricks needed to effectively apply it. Even some basic design concepts are specific to LLA. Although some basic knowledge about microelectronics is still viable in HLA, the new approach needs various shifts in the established knowledge. For instance,

in LLA, designers had to write a long list of detailed instructions, while in HLA, the overall functions and architecture of the system is introduced by drawing a schematic using previously available components. Once these high-level components are selected and graphically connected together, the design would be easily tested and implemented. Comparing the established knowledge of LLA with the emergent state of HLA, the old knowledge is much more stable, mature, and legitimized than the new one. Moreover, the knowledge around HLA suffered from a high level of ambiguity and uncertainty. For example, during our investigation, different versions of HLA emerged in the market.

## 6. How did the old knowledge situate the new learning at ABC

We found nineteen situating mechanisms that experts actively shaped to distort the content, process, context, and outcome of learning HLA. All these mechanisms are clearly rooted in the established knowledge of LLA. We first present these mechanisms separately and then we comment on their interactions.

### 6.1. Situating the content of learning

The deep and mature state of LLA knowledge influenced the content of new learning, the knowledge of HLA. Firstly, experts who were deeply specialized in LLA tried to *reinterpret* and *revitalize the old knowledge* in a way that sustains LLA. For example, they tried to detect and uphold characteristics of LLA, helping them to argue that the existing approach potentially has all the merits of the new one. Some of these characteristics have not been recognized and used even by mostly expert designers in LLA. Even when reinterpretation of the LLA failed in some cases, LLA designers tried to improve the old knowledge in order to compete with HLA. For instance, one of the unquestionable advantages of HLA is the ease of documentation and the readability of them. As a response, LLA designers tried to create new visual documents attached to their LLA designs and force it to designers.

Secondly, the new knowledge was *devaluated* by showing its potentially problematic nature, unreliable content, uncertain behavior, and inconsistencies with other parts of organizational knowledge. Experts of LLA could take advantage of their deep and detailed knowledge in order to cast numerous doubts on the cognitive foundations of HLA. For instance, they often mentioned examples of practical challenges that they could solve in LLA, arguing that

"such an emergent and immature approach, HLA, must have most of these problems"
(stated by a technical expert).

Thirdly, various ways were adopted by LLA experts to cause *deviation* from the suggested learning content. For example, they tried to suggest some alternative solutions rather than the specific suggested knowledge (HLA) in order to avoid or delay its learning. A technical expert stated that

"who said that this is the only or even the best version of HLA? I heard about many other alternatives. Why don't we consider other solutions?"

Fourthly, some ABC designers tried to play on the emerging state of the new knowledge in order to *reinterpret* it in a way that requires little change into or departure from the old

approach. For example, some experts tried to uphold the possibilities of adopting a mode of HLA which is more compatible with LLA. This mode of using HLA required many interpretations based on the old logic of hardware design, something that some advocates of HLA referred to as "low-level reading of HLA".

Fifthly, the new approach towards design consists of a range of different knowledge areas such as using graphical schematics, finding proper elements, and testing the design. All these areas of knowledge could be learned at different levels of depth. For example, the knowledge of testing can be learned superficially by knowing how to use a few basic tools, or it can be learned by mastering all the related tricks and options. Some old experts tried to *limit the scope and depth* of the HLA knowledge that is going to be learned.

> "I believe that we should learn just how to sketch the overall design without using prepared devices. I will ask my designers not to spend time on the other features. Even for drawing schematics, they don't need to know how to fix signal mismatches in detail. We would better just use this new tool for a graphical representation", stated a project manager.

Finally, and based on previous mechanisms, advocates of HLA tried to *integrate* LLA as a subset of HLA, while opponents of HLA suggested another configuration where HLA is used as a substitute or at least an imperative for LLA.

## 6.2. Situating the process of learning

The process of learning HLA at ABC comprised of a series of scattered and patchy activities. Firstly, opponents of HLA tried to situate this process by affecting what learning activities should take place. There was an overall attempt to *limit the scope* of learning process to a specific category of products, a specific department, and a few stages of design process. For instance, it was strongly suggested that the learning process should be pursued in products which require a low level of customization.

Secondly, the learning process was situated by affecting *who* should learn. Having a strong background knowledge in design, old experts argued that they are the most privileged actors for learning the new approach as they know how to properly deal with unexpected anomalies of HLA. On the other hand, the difference between the logic and skills required for using HLA and their existing knowledge made it difficult for them to detach themselves from LLA. As a result, old experts benefited from these two opposite mechanisms, getting the learning process under their own control and passing the learning ball to the fields of others, to influence the learning process.

Thirdly, some mechanisms were adopted to *influence the timing* of learning by procrastinating the learning process, modifying the sequence of learning activities, and delaying them. To illustrate, opponents of the learning process suggested that in a trial practice, a pilot project should be executed by both LLA and HLA simultaneously, before they start using the new approach in their actual projects. Once such a competition finished in favor of HLA, they easily argued, based on their expertise, that this task was very simple and could not represent the complexity of their actual projects. Hence, they urged the managers to redo this exercise on a real project. With all these activities, they not only postponed learning process in their departments, but also slowed down the overall learning process.

## 6.3. Situating the context of learning

HLA was introduced in a situation in which ABC has grown significantly due to the successful application of LLA. At the same time, experts and managers were suffering from an overloaded working condition. However, given the technical nature of design tasks and the dominance of young and ambitious experts in this department, technical learning has been culturally accepted. Our analysis revealed several mechanisms through which experts tried to use the old knowledge to influence the learning context. We classify these mechanisms into structural, cultural, and political categories.

*Structural*: LLA is based on a clear distinction between abstract and detailed levels of design. The abstract level requires systemic thinking and considering managerial concerns, but during detailed design of components, specialized teams focus on optimizing sub-systems. This characteristic of old knowledge has shaped a structure with clear distinction between managerial and technical levels. Accordingly, these hierarchical levels have been created and *optimized* in order to properly exploit the knowledge of LLA. However, HLA basically removes this distinction, requiring a fundamental restructuring of the way in which tasks are organized.

Apart from this natural structuring process, *formalizing and reinforcing structural boundaries* were other mechanisms enacted by some learning opponents. For instance, the structure of task and responsibilities around LLA had been tentative and malleable. In many previous projects, several inter-departmental committees were shaped and the allocation of tasks to specialized departments was done by circumventing structural boundaries. However, when learning HLA required reconciling some boundaries between organizational levels and specialized departments, it was strongly opposed by experts emphasizing formal structures and defined responsibilities. For instance, a project manager, who was strongly against this learning, refused to ask his team to spend part of their time in examining the capabilities of HLA arguing that our job is to design specified components, not to learn HLA. Enacting the logic of design associated with LLA, old experts could uphold structural barriers and constraints to make learning HLA more difficult.

*Cultural*: ABC has a technical culture which values perfect and deep knowledge, something well reflected in the technical discourses. Analyzing the content of dialogues showed that the language shaped around LLA is rich, well specified by exact classifications and terminologies, and consistently shared in related communities. On the contrary, the discourse on HLA is quite tenuous, weird, and controversial. Take two exemplary quotes from a middle manager: talking about LLA, he stated that

> "here, "clock" is a core concept. Everyone knows what it means in the design. You should be careful about not mixing clock with timing. Timing has many other aspects …",

while talking about HLA, he said

> "here we have something else which is still vague for us. When you write instructions here, it is neither exactly concurrent, nor is exactly sequential, it is something in between".

More interestingly, the language shaped around the old approach reflects a high level of certainty and confidence about its characteristics and functionalities as it is full of strong notions such as "no doubt" and "obviously". Nevertheless, hedges, like "maybe" and "somehow", are rife in the language used for HLA, to stress its uncertainty and ambiguity. Although this state of organizational discourse partly reflects the actual characteristics of

the subsequent bodies of knowledge, in some cases, a strong mechanism of *discourse shaping* was adopted by those who wanted to devaluate the new learning.

Another mechanism for shaping the cultural context of learning based on the old knowledge was creating and enacting a specific value system. LLA requires that designers have a detailed sense of design and what exactly goes on at the level of hardware. In a technical proverb, ABC designers proudly announce that

> "It is as if we are walking inside chips with electrons when we design our components".

This level of detailed knowledge has been strongly appreciated among design experts. Accordingly, it has been highly appreciated that systems be designed in a highly optimized way. As part of daily discussions, designers have often gloried in breaking the records of other designers by suggesting a more optimum design. These values, however, have no position in the HLA approach. Instead, in HLA, rapid and iterative process of design is praised. This conflict between the value systems of the old and new approach has hindered the learning process in ABC. Actually, proponents of the old approach sometimes exploited the established values in order to devaluate new learning. For example, there are famous stories at ABC about extraordinary designs. For instance, a project manager said

> "we still remember that design by Mr. BBB. It was a record, I think, even in the world. No one before could compress such a complex algorithm in such a few number of instructions".

Apart from the knowledge content of these stories, they are powerful cultural elements that maintain what is valued in the framework of LLA. As a defensive mechanism against new learning, some experts tried to continuously remind others of these stories. The last cultural dynamic was upholding and fighting over culturally accepted role models. Defendants of LLA tried to highlight examples of *famous* competitors which haven't switched to the new approach. In some cases, this mechanism helped LLA experts to justify their position in spite of strong technical arguments in favor of HLA.

*Political*: In the knowledge-intensive context of ABC, the main source of power is technical expertise. In this setting, a series of political dynamics mediated the influence of the established knowledge on the political aspects of learning. Perhaps the most obvious power dynamic was *creating coalitions* around the old and new approaches. During our inquiry, there was always a clear distinction between "we" and "they" coalitions, referring to proponents of LLA and HLA, respectively.

> "In that meeting, we were five, and they were just two. We simply conquered and concluded that we shouldn't switch" (stated a project manager).

Even each party actively tried to attract new members, especially from the opposite side. Although these coalitions were shaped *around* the two domains of knowledge, a strong reason behind them was increasing the political pressure to influence the learning process.

*Engaging in political debates* was another mechanism for leveraging the established knowledge in order to shape the learning context. While champions of new learning were active in blaming the weaknesses of LLA, members of "we" community were enthusiastically defended their position by showing the immaturity of the new approach. Although these debates were formulated based on technical arguments, they intentionally chose rhetorical tools to serve their political aims. For instance, a project manager who was defending LLA argued that

"it is funny that they are suggesting something that they haven't tested it even in a single project! Someone raised an idea, and a few others went crazy about it".


## 6.4. Situating learning outcome

At ABC, we found two mechanisms that experts used to influence the outcomes of this learning initiative. The first mechanism refers to *devaluation of desired learning outcomes* of HLA based on the existing design logic. Particularly, old experts continuously questioned the merits of some learning outcomes and their priorities. For example, some project managers repeatedly argued that

"this new approach is just useful for a specific type of projects which hardly constitutes more than 20% to 30 % of our work".

Secondly, some learning opponents could take advantage from the depth of their knowledge about the process of learning to *highlight possible undesirable outcomes of the new learning*. For instance, they focused on a design software suggested for HLA saying that

"new software packages always have strange anomalies which can be detected and avoided just through working with them for a long time. We have no idea about the anomalies of this new package … what happens if it crashes during a critical project?"

A summary of these mechanisms is presented in Table 1.

Table 1: How old knowledge can situate new learning

| Learning dimension | Situating Mechanisms |
|---|---|
| **Content** | • Reinterpreting, revitalizing, and improving the old knowledge<br>• Devaluating new learning content<br>• Deviating from the suggested solution by suggesting alternative learning contents<br>• Reinterpreting new knowledge to be more favorable to the existing situation<br>• Limiting the scope and depth of the new learning content<br>• Suggesting various ways for integrating old and new knowledge |
| **Process** | • Affecting learning *activities* by limiting the scope of learning activities to specific products, practices, and departments<br>• Influencing learning *actors* by passing learning ball to the field of others<br>• Affecting the *timing* of learning process by procrastinating, slowing down, and changing the sequence of the learning process |
| **Context** | Structural context<br>   • Shaping and optimizing organizational structure based on the logic of old knowledge<br>   • Formalizing and reinforcing structural boundaries<br>Cultural context<br>   • Shaping language and discourse<br>   • Shaping value system and upholding its elements<br>   • Fighting over socially accepted role models<br>Political Context<br>   • Forming political coalitions<br>   • Shaping political debate and blame game |
| **Outcome** | • Limiting new learning outcomes for example by reducing the possibility of achieving new learning outcomes<br>• Devaluating desired learning outcomes for example by questioning the importance, timing priority, task priority, and the scope of applicability of new learning outcome |

| Learning dimension | Situating Mechanisms |
| --- | --- |
| | • Highlighting negative impacts of the new learning by emphasizing on possible problems of new learning or emphasizing on outcomes that are not properly achievable in case of new learning |

Two points are worth mentioning regarding these mechanisms. First, these mechanisms were built on the depth and dominance of the existing knowledge and the most influential actors in performing them were those who were mostly specialized in LLA. In addition, the relative uncertainty and immaturity of the new knowledge facilitated the emergence of some situating mechanisms such as political debates. Not only did some actors try to distort the new learning by hiding behind its uncertainties, they tried to uphold this relative uncertainty by suggesting alternative learning contents and scenarios.

Second, although we analyzed and presented situating mechanisms separately, they were interacting in a complex and dynamic way. Some mechanisms, such as "devaluation of new learning outcomes" and "suggesting alternative learning contents", simply took place simultaneously while some other mechanisms were pursued sequentially. For example, experts firstly tried to reinterpret the new learning content, and then they could suggest a limited scope of the learning process. Moreover, some mechanisms such as "discourse shaping" and "engaging in political debates" co-evolved with each other, as each one paved the way for the other one. Furthermore, the conditioning effect of each mechanism was not deterministic. For instance, some mechanisms just limited the scope of learning scenarios whereas some others facilitated the selection of some scenarios over the others.


# 7. Implications for theory and practice

We think this study can contribute to both cognitive and practice-based theories, as well as their interactions. Cognitive theories have clearly examined different characteristics of organizational knowledge and the possible impacts of established cognition on new learning (Hedberg, 1981; Newstrom, 1983). However, these impacts are confined to either individual cognitive processes or natural limiting impacts of organizational routines. Our study highlighted another category of situating mechanisms rooted in the established knowledge; mechanisms that are actively shaped by knowing agents to affect new learning initiatives. For instance actors can (ab)use the depth of the established knowledge and the subjectivity and ambiguity of the new knowledge to situate organizational learning.

As for the practice-based theory, this research confirms that there is no need to dismiss or ignore cognition, as a state of organizational life, in order to reap the potentials of the practice-based view (Marshall, 2008). Instead, considering organizational cognition as a crucial element in shaping learning practices (Cook & Brown, 1999; Nicolini, 2010), we can better understand the nature of situating practices in the learning process. Starting from a bold state of established knowledge, and focusing on a proper context where learning practices are deeply rooted in such cognition state, we could typify various situating practices. Second, departing from the routine process of knowing (Orlikowski, 2002) we can better examine the active role of agents in shaping practices *beyond* routine organizational practices. In this line, agents not only enact normal knowing practices (Orlikowski, 2002), but also, use their knowledge even to *avoid* knowing. Ironically, practice is a "site of *knowing*" (Nicolini, 2010), as well as a site of *not-knowing*. Various examples in our data testify to the capability of smart experts in resisting the enactment of new knowledge, in their zeal to safeguard their established rents. In spite of some original

insights, the potential of the practice-based view in explaining this type of practices requires more attention. Given that organizational learning is a complicated game which can be affected by intentional interventions (Fudenberg & Levine, 1998), the potential of practice-based theory is not confined to the domain of routine mode of knowing. Third, and related to the previous point, practice-based theory can contribute to explaining political aspects of organizational learning. On the one hand, power does not confine itself to the static state of social setting, rather, it "is something that is exercised" ((Gherardi & Nicolini, 2006): 59). On the other hand, practice inherently involves normative aspects. Therefore, focusing on practice as the unit of analysis, we can observe political dynamics. We tried to stress this potential by identifying three mechanisms in shaping the political context of learning.

Finally, typifying conditioning practices in a highly knowledge based context showed how active agents leveraged the characteristics of organizational knowledge. Although the potential linkage between cognitive and practice-based view has been suggested by philosophical analysis (Marshall, 2008), our exploratory inquiry opens another way to do so. The ultimate message is if we adopt an inclusive framework, and we choose an appropriate context where both domains of cognition and practice are bold, we should be able to observe the interaction between cognition and practice.

Concerning practical implications, this study warns managers about how learning agents can actively benefit from the established knowledge to distort organizational learning. The more the new learning requires significant changes in the established cognition, the more divers and stronger could be these situating mechanisms. In fact, smart experts, as key learning actors, won't wait till their established sovereignty is shattered. Our results showed that these practices can appear in a wide range of mechanisms directed towards the content, context, process, and outcome of new learning. Hence, if managers need to lead a learning process through all these challenges, they would well advised to examine the cognitive roots of such practices in order to deal with them.


## 8. Conclusions

In this paper, we identified mechanisms that learning agents actively enact to oppose unfavorable learning initiatives. We focused on a knowledge-based context where the established body of knowledge is threatened by new knowledge. We could identifying nineteen situating mechanisms that experts actively shaped to leverage different characteristics of the existing knowledge.

On the one hand, these mechanisms showed how organizational cognition can affect the new learning, beyond the dominant views of cognitive theory (Bettis & Prahalad, 1995; March, 1991). On the other hand, these mechanisms, as typified sorts of practices, revealed the cognitive roots of learning practices. The agency power of experts in avoiding their routine knowing practices can be observed in such situations. Adopting an inclusive empirical inquiry and focusing on an appropriate situation, we can examine the links between cognition and practice without reducing each domain to the other.

We believe that this study is just a preliminary step in recognizing the role of old knowledge in situating organizational learning. Although the adopted framework helped us to identify different situating mechanisms, the characteristics of the selected case might have prevented us from identifying other mechanisms, calling for further comparative studies with focus on other sectors. In addition, we invite researchers to focus on each

category of situating mechanisms, especially the political one, in order to acquire a more detailed level of understanding about these mechanisms.

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ii. Mentioned by Francis Bacon
iii. ABC is a pseudo-name used for confidentiality reasons.
iv. This approach is also known as "system-level design" approach (Keutzer, K., Malik, S., Newton, A. R., Rabaey, J. M., & Sangiovanni, A. 2000. System-Level Design: Orthogonalization of Concerns and Platform-Based Design. *IEEE Transactions on Computer-Aided Design Of Integrated Circuits And Systems*, Vol. 19(No. 12): pp. 1523-1543.)

# 9. References

Argote, L., & Epple, D. (1990), "Learning Curves in Manufacturing", *Science*, Vol. 247(No. 4945): pp. 920 - 924.

Argyris, C. (1999). *On organizational learning*: Wiley-Blackwell.

Bettis, R. A., & Prahalad, C. K. (1995), "The dominant logic: Retrospective and extension", *Strategic Management Journal*, Vol. 16(No. 1): pp. 5-14.

Blackler, F. (1995), "Knowledge, knowledge work and organizations: an overview and interpretation", *Organization Studies*, Vol. 16(No. 6): pp. 1021-1046.

Blackler, F., & Regan, S. (2009), "Intentionality, Agency, Change: Practice Theory and Management", *Management Learning*, Vol. 40(No. 2): pp. 161-176.

Boyatzis, R. E. (1998), *Transforming Qualitative Information: Thematic Analysis and Code Development*, Thousand Oaks, CA: Sage Publications.

Carlile, P. R. (2004), "Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge across Boundaries", *Organization Science*, Vol. 15(No. 5): pp. 555-568.

Cook, S. D. N., & Brown, J. S. (1999), "Bridging Epistemologies: The Generative Dance between Organizational Knowledge and Organizational Knowing", *Organization Science*, Vol. 10(No. 4): pp. 381-400.

Crossan, M. M., Lane, H. W., White, R. E., & Djurfeldt, L. (1995), "Organizational learning: dimensions for a theory", *The International Journal of Organizational Analysis*, Vol. 3(No. 4): pp. 337-360.

Easterby-Smith, M. (1997), "Disciplines of Organizational Learning: Contributions and Critiques", *Human Relations*, Vol. 50(No. 9): pp. 1805-1113.

Elkjaer, B. (2004),"Organizational Learning The 'Third Way'". *Management Learning*, Vol. 35(No. 4): pp. 419-434.

Fiol, C. M., & Lyles, M. A. (1985),"Organizational Learning", *Academy of Management Review*, Vol. 10(No. 4): pp. 803-813.

Fudenberg, D., & Levine, D. K. (1998), *The theory of learning in games*,The MIT Press,USA.

Geiger, D. (2009),"Revisiting the Concept of Practice: Toward an Argumentative Understanding of Practicing", *Management Learning*, Vol. 4(No. 2): pp. 129-144.

Gherardi, S., & Nicolini, D. (2000),"The Organizational Learning of Safety in Communities of Practice", *Journal of Management Inquiry*, Vol. 9(No. 7): pp. 7-18.

Gherardi, S., & Nicolini, D.( 2006), *Organizational Knowledge: The Texture of Workplace Learning*. Oxford, UK: Wiley-Blackwell.

Giroux, H., & Taylor, J. R.(2002),"The Justification of Knowledge Tracking the Translations of Quality", *Management Learning*, Vol. 33(No. 4): pp. 497-517.

Hedberg, B. (1981), 'How organizations learn and unlearn', In P. C. Nystrom, & W. H. Starbuck (Eds.), *Handbook of Organizational Design, volume 1*,Oxford University Press, New York, pp. 3-27.

Keutzer, K., Malik, S., Newton, A. R., Rabaey, J. M., & Sangiovanni, A. (2000),"System-Level Design: Orthogonalization of Concerns and Platform-Based Design". *IEEE Transactions on Computer-Aided Design Of Integrated Circuits And Systems*, Vol. 19(No. 12): pp. 1523-1543.

Kim, D. H. (1993), "The link between individual and organizational Learning", *Sloan management review*, Vol. 35(No. 1): pp. 37-50.

Lapre, M. A., A. S. Mukherjee, & Wassenhove, L. V. (2000)," Behind the learning curve: Linking learning activities to waste reduction", *Management Science*, Vol. 46(No. ): pp. 597-611.

Lave, D., & Wagenr, E. (1991), *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, New York, NY.

March, J. G. (1991), "Exploration and exploitation in organizational learning", *Organization Science*, Vol. 2: pp. 71-87.

Marshall, N. (2008), "Cognitive and Practice-based Theories of Organizational Knowledge and Learning: Incompatible or Complementary?", *Management Learning*, Vol. 39(No. 4): PP. 413-435.

Naot, Y. B.-H., Lipshitz, R., & Popper, M. (2004),"Discerning the Quality of Organizational Learning", *Management Learning*, Vol. 35(No. 4): pp. 451-472.

Nelson, R. R., & Winter, S. (1982), *an evolutionary theory of economic change,* Belknap press, Harvard University, Cambridge MA.

Newstrom, J. W. (1983), "The Management of Unlearning: Exploding the "Clean Slate" Fallacy", *Training and Development Journal*, Vol. 37(No. 8): pp. 36-39.

Nicolini, D.( 2010), "Practice as the site of knowing: insights from the field of telemedicine", *Organization Science*, forthcoming.

Nonaka, I. (1994), "A Dynamic Theory of Organizational Knowledge Creation", *Organization Science*, Vol. 5(No. 1): pp. 14-37.

Nonaka, I., & Takeuchi, H. 1995. ***The Knowledge Creating Company***. New York: Oxford University Press.

Nonaka, I., & Toyoma, R. (2005), "The theory of the knowledge-creating firm: subjectivity, objectivity and synthesis", *Industrial and Corporate Change*, Vol. 14(No. 3): pp. 419–436.

Orlikowski, W. J. (2002), "Knowing in Practice: Enacting a Collective Capability in Distributed Organizing", *Organization Science*, Vol. 13(No. 3): pp. 249–273.

Polanyi, M. (1966), *The Tacit Dimension*, Routledge and Kegan Paul Ltd, London.

Repenning, N. P., & Sterman, J. D. (2002), "Capability Traps and Self-Confirming Attribution Errors in the Dynamics of Process Improvement", *Administrative Science Quarterly*, Vol. 47(No. 2): pp. 265-295.

Rorty, R. (1979), *Philosophy and the Mirror of Nature*, Princeton University Press, Princeton, NJ.

Schutz, A. (2005), "Common-Sense and Scientific interpretation of Human Action. In N. Stehr, & R. Grundmann (Eds.), *Knowledge Critical Concepts*, Vol. Vol2: Taylor & Francis.

Vera, D., & Crossan, M. (2004), "Strategic Leadership and Organizational Learning", *Academy of Management Review*, Vol. 29(No. 2): pp. 222-240.

Walsh, J. P. (1995), "Managerial and organizational cognition: Notes from a trip down memory lane", *Organization Science*, Vol. 6(No. 3): pp. 280-321.

Whittington, R. (2006), "Completing the Practice Turn in Strategy Research", *Organization Studies*, Vol. 27(No. 5): pp. 613–634.

Yin, R. K. (2002), *Case Study Research: Design and Methods*. Newbury Park: SAGE Publications.