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ARTICLE INFO

Pierre-Charles Pupion (2010). ICT adoption and crisis management: the case of a public education organization. *Problems and Perspectives in Management*, 8(4-si)

RELEASED ON

Tuesday, 07 December 2010

JOURNAL

"Problems and Perspectives in Management"

FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

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ICT adoption and crisis management: the case of a public education organization

Abstract

Information and communication technology has brought a certain number of changes within educational institutions. This paper analyzes the causes and effects of crisis management on the usage of information and communication technology in a context where the government is exercising institutional pressure to have this new technology adopted rapidly. Our analysis of the literature shows that crisis situations experienced by public organizations in the area of information and communication technology would have a short-term beneficial effect on the adoption and development of their use. Crisis is also utilized and amplified by the directors of public organizations to overcome staff resistance to change. The study explains through the case of a public educational institution that the crisis is not only linked to the appearance of an event, but is the result of a cumulative and continuous process of organizational dysfunction, in which the effects make themselves felt long before breaking point. The appearance of the crisis and its management by the organization director exercises a strong effect on organizational learning in the field of information and communication technology. However, while its effects ease as time goes by, the public organization is subjected to a cyclic phenomenon in which only the crisis phase obliges it to deploy organizational learning.

Keywords: information and communication technology, crisis management, e-government, organizational learning, innovation.

JEL Classification: M15, I21.

Introduction

Information and communication technology has brought about a certain number of changes within educational institutions. It modifies management practices, modes of communication, teaching methods, the internal workings of the organization, relations with the environment and most notably with students' parents and local communities. The last phase of development applies most particularly to the government's desire to develop e-government to make public services more accessible to their users and improve their internal functioning. Over the past thirty years, schools have been progressively more open to computer science and information and communication technology. Three major phases can be identified. The first, during the 1970s, consists of "*introducing a new way of thinking algorithmically and organizationally tied to the science of processing information in the education of young secondary students*". The second phase is that of the "*computer science for everyone*" plan, inaugurated in 1985, which equipped 50,000 educational institutions with nano-networks and provided training for a large number of teachers. The third is that of the 1990s and the first decade of 2000 which established the advent of information and communication technology applied to education (ICTE).

This technology offers the possibility of searching, storing, processing and transmitting information in various types of data (text, audio, fixed images, animation) and allows for interactivity between

people, using machines. Since 2004 academic authorities, regions and sub-offices of ICTE of the Ministry of National Education have been collaborated to develop digital working environments in these institutions. The digital work environment (DWE) is an e-government system, a tool for sharing knowledge which is presented in the form of a unique and secure entry (authorized access) in a set of services and modules accessible by the entire educational community (teachers, administrative personnel, pupils and families). The DWE consists of blocks of services and offers users easy access across networks to all the digital services related to the activity of the establishment, such as management or consultation regarding absences, grades, decisions about staff meetings, workbooks and classroom text books; homework schedules; the institution's daily schedule with various events; dissemination and consultation of course backup material and homework; access to digital resources, configurable personal space with use of a messaging system and the possibility of collaborative work.

If certain institutions are developing their use of ICTE rapidly, the gap between the growth in household usage and the infrequent usage of ICT within educational institutions has been widened since the end of the 1990s. Rochet, Keramidis and Bout (2008) note "that in the public sector, crisis management is the principal means of matching technological change and strategy". We are, thus, suggesting an analysis, through the case of St. Loubes Middle School, of the causes and effects of crisis management on the usage of ICT in a context where the government exercises institutional pressure to have

this new technology adopted. We are going to examine to what extent the organization learns from the crisis situation. The term crisis indicates the process of destabilization and abrupt calling into question of modes of functioning and the regulations of individuals, groups and organizations. In the first theoretical Section, the role of the State at the outset of the crisis and of the adaptation of organizations facing NICT is analyzed in a neo-institutional perspective. In a process approach, crisis is perceived as a long incubation process that suddenly manifests itself under the influence of a 'precipitating' event. The acute phase is only the peak of an accumulation of organizational dysfunctions that have existed for a long time but that have been overlooked (Roux-Dufort, 2007).

In the first Section of this paper, we examine ICT adoption on crisis management and its effect on organizational learning. The second Section undertakes the analysis of the case of an educational institution, with the methodological aspects of data collection and results analysis.

1. ICT adoption and crisis management in public organizations

ICT is an innovation in the sense defined by Rogers, which is to say the ideas, practices or objects perceived as new by an individual or organization. The intention here is not to conduct an analysis of the diffusion of technology in terms of "acceptability" of the technology, but to analyze the innovations as social constructs and to study their acceptance by an organization and its members while putting crisis management at the center of the analysis. It is, therefore, necessary to identify the factors explaining the crisis in French educational establishments with regard to the adoption of ICT and to show that crisis management is a powerful enabler for organizational learning.

In the educational domain, use of ICT can be classified in reference to the act of teaching/learning (the role of the computer in teaching, the learner's degree of autonomy, etc.), to the cognitive characteristics of a learner (motivation to learn, steps in the learning process) or finally to the various activities taking place in an organization (teaching, management, teacher/user relationship, etc.).

1.1. Institutional pressure for the adoption of ICTE and organizational crisis. At the end of the first decade of the year 2000, the French State created strong external pressure to force educational organizations to adopt a strategy oriented toward ICT. Selznick' work (1949) showed evidence that the behavior and structure of organizations depend not only on internal forces, but also on cultural and

social forces. According to the neo-institutional theory (NIT), there is a group of values, norms and organizational models exterior to organizations that influence their behavior, management methods and accepted structures (Meyer, Rowan, 1977). The organization is subordinate to forces of its organizational field, defined as an ensemble of organizations which "in aggregate, create an institutional life, i.e. producers, consumers of resources and products, regulatory organizations, other organizations producing similar services, and also governmental organs, professional associations, public opinion, economic press, etc." (Powell and DiMaggio, 1991). These coercive (laws and regulations), normative (professional or implicit norms defining appropriate behavior) and mimetic (copying other organizations) norms will regulate their evolution and render organizations uniform. Organizations have a general tendency to become isomorphic, or similar, to each other in the same "organizational field".

ITC provides evidence of the interaction in work between the transformation of the institutional environment and the responses developed by different economic actors. As part of ICT, organizations are subjected to the *quick evolution* of political and regulatory pressure and to the enactment of professional norms. If until the 1990s, the projects to introduce ICT in national education were at the origin of an occasional meeting between teachers in search of new methods and "modern and interesting" techniques (Puimatto, 2006), the end of the 1990s is marked by a crossover between a strong institutional prescript with voluntary speech and regulations obliging their usage.

This *institutional pressure* has generated a process of destabilization and drastic calling into question of modes of functioning, described as a crisis situation.

The introduction of ICT requires a profound change in administrative practices and in educational life from the different members of the educational community. In the most successful case, such as DWE, the pupils and parents have access to the services of scholastic life (class schedules, consultation and grade management), organizational life (school trips, associated activities) and communication tools (forums). The range of these applications represents a considerable challenge for organizations and individuals who implement them. The event can be described as a crisis in the sense that it is applicable outside of organizational routines and that it leads to a questioning of the status quo, by shaking foundations and the logic of actions which are the foundation of the existence of the organization and of the legitimacy of its members. In the field of pedagogy, it changes the relation between the teacher and those taught (at the disposal of educational

resources, tutelage, distance teaching) and is a source of fear for teachers, fear of not mastering these tools and not being capable of conceiving of new educational *scenarios*.

Institutional pressure has been reinforced by organizational fear of losing legitimacy with users in a social context of growing Internet usage. Legitimacy is a social judgment (Zimmerman and Zeitz, 2002) accorded to the organization by its stakeholders, which is socially constructed and extends back to the values and the dominant standards in society. Thus, an organization can lose its legitimacy if its means and purposes do not seem to correspond with social standards, the values and expectations of society (Parsons, 1960; Ashforth, Gibbs, 1990). The beginning of the 21st century is marked by an explosion in the social demand for new technology and of parents' and students' expectations in terms of the use of ICT.

The school director is subjected to forces of change resulting from the environment which obliges him to adapt the organization to preserve its legitimacy and conversely he is confronted with internal resistance forces. These inertia forces correspond to difficulties in changing routines and equipment, and staff resistance to change. From the confluence of

strong environmental pressure and developing internal factors of inertia which prevent any rapid change in public organizations leads to crisis, that is:

- ◆ a highly ambiguous situation where effects are unknown (Dutton, 1986; Quarantelli, 1988);
- ◆ pressure which strongly impacts on organizational behavior by calling into question the various processes of the organization (teaching, learning, managing and developing documentation resources) and, in particular, its standard procedures (Dutton, 1986; Forgues and Roux-Dufort, 1998);
- ◆ pressure which emotionally affects the stakeholders by generating a fear of not knowing how to use these new tools (Raphael, 1986);
- ◆ a situation calling for an urgent answer to respond to the orders of government policy.

The organization director can reinforce or attenuate the perceived crisis by the different members of the organization, by his role as interface with the environment; he can manage proactively through anticipation (i.e. anticipate events and react rapidly) of the crisis, or reactively (waiting for events to clearly take shape in order to respond to them).

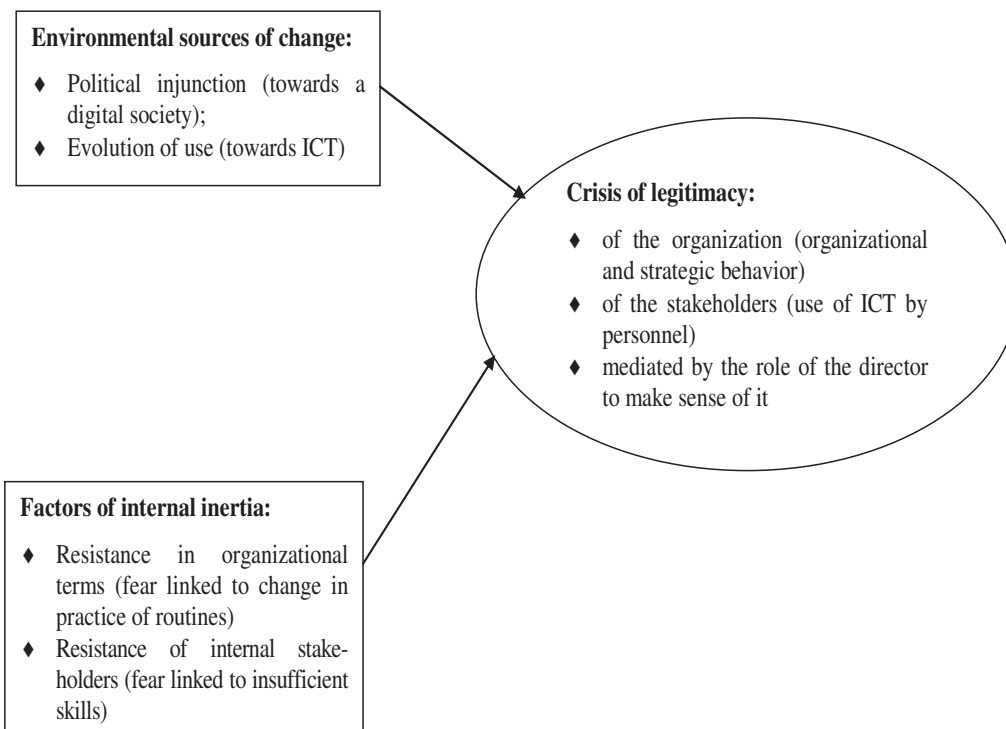


Fig. 1. Sources of the crisis

The crisis is created by the supervisory authority in order to move beyond the strong resistance of public organizations, unused to the laws of the market, to change. The head teacher can amplify the crisis by reinforcing the notion of urgency, by building and sharing a vision of the environment which high-

lights the loss of legitimacy of the organization and its personnel. But what interest do the State and the head teacher have in promoting a crisis situation?

1.2. Crisis management and organizational learning in the field of ICT. Changes in public organizations being very slow, a considerable gap builds up

at a given point between practices and expectations of the users and the society which decides to legislate and require them to change quickly. The leaders of the public organization are going to create a crisis situation from this state of urgency, which will permit rapid adaptation of their organization to new technology.

Several authors postulate that constructing and then resolving organizational crises can be an effective means of opportunistic learning (Nonaka, 1988; Pitt, 1990). Organizations tend to engage in major changes mainly after they have been confronted with crises (Miller and Friesen, 1984; Linsu, 1998).

Organizational learning is not the simple sum of individual learning (Hedberg, 1981), it is the process whereby knowledge is created, distributed across the organization and communicated among organization members. Organizations learn when individual insights and skills become embodied in organizational routines, practices, and beliefs (Attewell, 1992). Nonaka and Takeuchi (1995) developed a spiral model of organizational learning by differentiating “tacit knowledge” from “explicit knowledge” and by describing a process of alternating between the two. Tacit knowledge is a personal, context specific, subjective knowledge, whereas explicit knowledge is codified and formal. The tacit knowledge within the organization can be made explicit, codified in manuals, and incorporated into new processes. This process is called “externalization”. The reverse process (from explicit to implicit) is called “internalization” because it involves employees internalizing an organization’s formal rules, procedures, and other forms of explicit knowledge. They also use the term “socialization” to denote the sharing of tacit knowledge, and the term “combination” to denote the dissemination of codified knowledge. According to this model, organizational learning takes a path of different stages: socialization, externalization, combination, internalization, socialization, externalization, combination.

One can distinguish between two different processes of organizational change that are associated with organizational learning:

- ◆ adaptive learning, i.e. changes that have been made in reaction to changed environmental conditions;
- ◆ proactive learning, i.e. organizational changes that have been made on a more willful basis.

In general, it is assumed that adaptive learning comes about with a lower degree of organizational change but this is not the case here. The crisis situation makes it necessary for the organizational adaptation to the environment, postponed for such a long time, to be immediately taken over by the State injunc-

tion more or less accentuated by the head teacher. In such cases, the institution must invest heavily in the acquisition of a new tacit and explicit knowledge as well as in knowledge conversion activities to overcome the crisis in the shortest possible time.

The link between a crisis situation and organizational learning in public organizations in terms of ICT can be understood from the dynamics linking both constituents, by their absorptive capacity (namely, the prior knowledge base) and the intensity of effort (Cohen and Levinthal, 1990). The ability to make sense of and to assimilate and use new ICT depends on accumulated prior knowledge. The intensity of effort represents the amount of energy expended by organizational members to solve problems and to engage in interaction with other members of the organization in order to facilitate knowledge conversion and creation at the organizational level. If the crisis situation is derived from an insufficient use of knowledge in the past because of inertia factors, it will facilitate organizational learning by stimulating the efforts to resolve the problems. The shared sense of the internally constructed crisis among organizational members intensifies their efforts to expedite learning, elevating the absorptive capacity of their organization.

However, this crisis adaptive learning is seen as more automatic and less cognitively induced than proactive learning. The effect of learning will only be short term. The inferiority of adaptive learning compared to proactive learning is also expressed by the different labels which have been used to describe these two types of OL: “single-loop versus double-loop learning” (Argyris and Schön, 1978), “tactical versus strategic learning” (Dodgson, 1991), “adaptive versus generative learning” (Senge, 1990).

However, certain authors consider that single-loop learning of the crisis can give way afterwards to a double-loop learning and in-depth changes, rendering the organization still more adaptable (Meyer, 1982).

Our analysis of the literature shows that crisis situations experienced by public organizations in the area of ICT would have a short-term beneficial effect on the adoption and development of its use. Our qualitative study prolongs this work by studying the origins and the consequences of crisis management over the long-term organizational adoption of ICTE.

2. The case of St. Loubes Middle School: crisis management and ICTE adoption

We will first present the methodology used in this case study before presenting its main results.

2.1. Methodology. A case study is a “*description obtained directly from a managerial situation, from interviews, from archives, from observations or*

from quite another information source, created to report the situational context in which the behavior applies" (Bonoma, 1985). This case study, which concerns an educational organization, was conducted on the basis of the observations gathered by the assistant head teacher Vincent Gorse in charge of ICT from 2000 to 2007, through interviews which occurred over the period of 2007-2009, document analysis corresponding to the case (analysis of both projects of the organization corresponding to the period, the analysis of both academic projects, the analysis of the DWE platform, access to the national indicators of the information center on schools), confronted with the analysis of official documents on State policy and observation of families' behavior. Based on bibliographic and documentary research, on the interviews and the observations made during the course of this work, the collected data produced a triangulation (Yin, 2003). It allowed for the approach to the problem from two complementary angles: that of the appropriate dynamics of the crisis of the St. Loubes Middle School which joins a more global crisis of educational organizations facing ICT.

The case of St. Loubes Middle School, examined over the period of 1998-2009, was chosen not for its specificity, but for its representativeness. Created in 1974 the Middle School welcomed more than 1000 pupils in 2008 and the social characteristics of the pupils are close to the average in France, in particular in 2008: 23.6 % from high income families and 31 % from low income groups for a respective national average of 23 % and 33,9 %. The teaching staff structure is also close to the average. Examination of the activities reports of the ICTE resource teacher shows that the history of computer science and new technology in this secondary school is symptomatic of relations maintained between the school and these innovations (Gorse, 2007). Some rather determined teachers, who were much involved in the appropriation of this technology, were in close contact with the majority of the staff who, while begrudgingly acknowledging the wealth offered by this tool, kept it at arm's length. The institution turned a blind eye to their attitude.

2.2. The results of the analysis of crisis management effects on ICT adoption. We will introduce the crisis trigger mechanisms before examining to what degree crisis management allows an organization to learn in the field of ICTE.

2.2.1. A crisis as the result of a process. The situation in 2000 is that of an organization with a history rich in experimenting in new technology but that the teaching community has only tentatively accepted. The organization faces double institutional pressure:

an explosion of social demand and a government's determined policy on the adoption of ICTE.

The rate of computer equipment in French households has grown from 19% in 1998 to 65% in 2008 and the rate of home connections has increased from 2% in 1999 to 16,7% in 2001 and to 62% in 2008. This evolution accentuates the pressure on the organization which cannot evade the stakes in the development of digital technology, both from the point of view of imparting knowledge to pupils and of the relationship to users and students' parents.

The political push to develop ICTE is driven by a determined policy on technology and assignment of obligations. *"The action of the government pursues two objectives: permitting students, teachers and parents to benefit from the provision of innovative technology in the educational area; contribute, through the school, to the building of a "Numerical Republic" (Plan 2000 for a Numerical Republic in the Information Society). The institution of B2i (the Computer and Internet Brevet) for the start of the 2002 school year has created an urgent situation "by specifying skills which the students will have to acquire as a part of the ordinary activities of taught disciplines... and as a means of validating knowledge acquisition on the part of the students concerned" (note No. 2000-206 from 16 November, 2000).*

A crisis occurs, not only as a result of the injunction to use ICTE, but also due to the wide gap between institutional pressure and the organizations' practices which, in turn, emerge from the staff's lack of training, from the limited user access to tools and from computer equipment investment policy.

The deficiency of resources in terms of equipment is blatant; teaching material is insufficient and outdated: *"in 1999, 800 pupils and a hundred staff have difficulty sharing use of about thirty machines that are from 8 to 10 years old"*. Only the administration has access to a network and from computers that have followed the technological evolution. As a security measure, there is only one point of access to Internet on one of the school library computers. These failings result paradoxically from proactive management, from anticipation of institutional requirements. The organization conducted a policy of investment using their own capital, which thus permanently kept one step ahead of the major equipment programs developed by the State and local authorities. This self-financed equipment is insufficient and the organization does not benefit from an adjustment plan since it is systematically classified on a non-priority list at the time the inventory is undertaken.

From the staff point of view, B2i puts teachers in a very uncomfortable position of teaching a subject they have had no prior training for, and for which they lack the skills. From the annual study, ICTE, led by ACICTE (academic center for ICTE) on the use of ICTE in organizations, it emerged that only a dozen teachers used IT (information technology) in a professional capacity (18 % of the teachers) and about the same number were equipped in a personal capacity. The setting up of the B2i brought about a sense of emergency and a destabilization of teachers, rendered more acute in that they were not provided with adequate time to train and assimilate this new tool. Kotter and Schlesinger (1979) note a weak tolerance to change in people due to fear of not being able to develop the expected new skills and appropriate behavior.

Crisis also results from past organizational choices, from the absence of clear instructions and collective thought upon the use of ICT before the year 2000. Equipment is set up and organized by partly self-taught "expert" resource people who ensure the maintenance, service and access to this equipment, while the rest remain at a distance from it. *"Thus, in the administrative domain, the secretaries and the accountant use computers installed in a specific office, next to their workstation ..."* (Gorse, 2007).

The crisis is not only linked to the occurrence of an event but it is also the ultimate demonstration of a long period of incubation. It is the result of a cumulative and continuous process of organizational dysfunction, in which the effects make themselves felt long before breaking point. In this process approach, crisis is perceived as a long incubation process that suddenly manifests itself under the influence of a 'precipitating' event. Supporters of this approach defend the idea that crises develop in phases: warning signals, an acute stage, amplification and resolution (Turner, 1976; Mitroff and Pearson, 1993; Rosenthal, 2003).

2.2.2. A wish to amplify the crisis to develop ICT use. The discrepancy between what is sought and what is achieved can be clearly felt: staff awareness of their skills confronted with what the users (pupils and families), and of political authorities expect from the public service. In 2001 a revision of the school project, and the need for renovation work following the great storm will provide the opportunity to review the development of the ICTE strategy and to plan for investment accordingly.

The assistant head teacher in charge of ICTE made the deliberate choice of exaggerating the crisis. *"One has to "unbalance" the educational community in order to exploit the energy created by the*

organization to find a new balance. The accompaniment of this imbalance should lead to the reduction of the already perceptible tension during debates with staff. In this way, it will constitute the main pilot of the change". He reinforced the crisis by forcing personnel to use ICT.

"We seek to amplify the crisis among the teaching personnel by forcing them to adopt IT in administration, particularly via forced adoption of a special software for grading; it is through the sharing of its use and by demonstrating its interest with the users during meetings that we are going to generate the need for computing among the entire staff" (Gorse, 2007). In other words the external institutional pressure is strengthened in-house by imposing the use of management software for grades and student assessments which allows a follow-up of the students on a daily basis, gives statistics and useful graphs for staff meetings and allows teachers to undertake downloads at home.

Parallel to this, access to the administrative network is open to teachers, the workstations (Internet and office) are available to personnel and use of e-mail is encouraged. The middle school mobilizes its "experts" to conduct training to a mixed group of end users (teaching, administrative and maintenance personnel).

The only constraint is the obligation on the teachers to provide and access all information in a digital manner. As the assistant head teacher adds: *"This announcement does not enthuse anyone. We'll have to wait for the first difficulties on the eve of the first class meetings to appreciate the discontent which is brewing. The teachers object to the difficult access to computers of which there are simply not enough. The date of the first meetings is drawing a protest movement in which the main demand is to complete the school reports by hand "just this once" and "only for those who do not type fast"*. This situation corresponds to the case of inertia where people make it understood that they accept the change but try to postpone its application. This policy of crisis reinforcement will induce a generalization of the use of ICT and a modification of the organization with the beginnings of shared use between the school office, school activity services and teaching staff. *"The first class meetings animated by video projections showing graphs of the students' results, is appreciated by parents and students alike, thus creating irreversibility"* (Gorse, 2007). A transformation takes place, *"from the phase of passive observation and even of resistance in large numbers, we have noticed adaptation here and there to the new requirement"* states the assistant head teacher. Large numbers of teachers adopt the system of in-

putting from home, some equip themselves with computers to counter the network's overload. There is a distinct change as to the use of video projectors and computerized spreadsheets.

This first crisis, connected to the introduction of ICTE, did not permanently modify learning conditions over the period of 2006-2009. So, the DWE "Ilias" proposed by the academy was abandoned as a result of the academic server coming to a halt for four months, and despite having aroused the interest of the educational community at the time of its launch. The advent of the Influenza A crisis in 2009 was the trigger for access to the academic DWE "Ilias" (with a professional discovery module) to be reopened. One of the brakes to the adoption of this last ICT is, according to the new assistant head teacher, *"the fear teachers have not mastering ICT skills and have no adequate time for converting to the tool, whose benefits will only be revealed in the long term"*. Nevertheless the pupils and parents do have access from home, through the Argos system, to grades although not to the class notebook, nor to the time table, although these functions are planned by the *"scolnet"* software. The site informs them about the establishment's activities and there are pages on academic subjects which provide some educational elements but only one teacher in sixty uses the blog made available to them to provide updates to his course and to propose resources, even though training was organized previously. The forum set up for teachers is not used because of a security problem. Here again we find certain characteristics which lead to the first crisis in 2000.

We feel that crisis management as a factor facilitating organizational learning in terms of ICT, subjects the public organization to a cyclical phenomenon with:

- ◆ a phase of in-depth learning at the time when the crisis peaks, during which there is a deployment of learning capacity;
- ◆ a phase following the crisis where the rhythm of learning drops;
- ◆ a phase where the forces of inertia take over and where organizational learning disappears, this phase lasting until the time when the gap is such, that it creates state institutional pressure which imposes urgent change and gives rise to a crisis.

Conclusion

The State can, through its statutory policies and its speeches, create institutional pressure which will drive the change, and lead to the adoption of ICT. The review of literature demonstrated why the crisis appears and how the crisis allows for the strengthening of organizational learning when, in particular, it is utilized and amplified by heads of public organizations in order to surmount resistance and fears of staff facing change. Using crisis management as a factor facilitating organizational learning of ICT subjects in the short term, forces the public organization, in our opinion, into a cyclic phenomenon whereby phases of resistance to change alternate with phases of serious crisis where the organization displays strong individual and collective learning, and phases where the rhythm of learning decreases until the time when the gap between organizational practices and the expectations of the users and society will impose urgent change and give rise to a crisis.

It would be interesting to delve deeper into this work by showing the general impact of this cycle linking crisis and learning, which makes crisis a stage in the life of organizations having to face technological innovation.

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