A search for new methodology to create a learning organization

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Abstract: The most successful corporation of the 2000s will be something called a learning organization. The society is an excellent example of complex adaptive systems, whose crucial properties are (1) multiple agents, (2) building blocks, (3) internal models, and (4) perpetual novelty. The problem of ambiguity is conspicuous and change has become both pervasive and persistent. The rate at which individuals and organizations learn may be the only sustainable competitive advantage. The challenge, then, is to discover new management tools and methods to accelerate organizational learning. Based on several case studies analyzed using my double-loop learning model, I claim that policy exercise, a managerial support system using gaming/simulation, can prove to be a powerful methodology in creating learning organization. Policy exercise can provide interactive learning environments based on systems thinking, which is essential for organizational double-loop learning.
Keywords: competitive advantage; double-loop learning; learning organization; management tool; policy exercise; systems thinking.

The ability to learn faster than your competitors may be the only sustainable competitive advantage in today's environment where nothing is constant or predictable. The most successful corporation of the 2000s will be something called a learning organization. However, it is still not clear how to realize a learning organization. Learning is a typical problem in quadrant four of the Armstrong's (1995) theory that requires intuitive and uncalibrated approach. In this quadrant four, there has been no established methodology so far. Policy exercise seems to be the only possible solution, because it provides safe environment for interaction and experiential learning which facilitates double-loop organizational learning.

1. Learning Organization

According to Senge(1990), "learning organizations" are organizations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together. To discover new management tools and methods to create a leaning organization, we need to clarify first the theoretical meaning of the learning organization.

1.1 Single-loop and double-loop learning
Learning is defined as occurring under two conditions (Argyris and Schön, 1978). First, learning occurs when there is a match between its design for action and the actuality or outcome. Second, learning occurs when a mismatch between intentions and outcomes is identified and it is corrected; that is, a mismatch is turned into a match. Single-loop learning occurs when matches are created, or mismatches are

corrected by changing actions. Double-loop learning occurs when mismatches are corrected by first examining and altering the governing interpretative framework and then the actions.

Double-loop learning is extremely difficult because interpretative frameworks are resistant to change (Tsuchiya, 1998). Since what has happened is not always obvious, and the causality of events is difficult to untangle, outcomes can be interpreted in various ways. Individuals and organizations seldom acknowledge mismatch between intentions and outcomes that can only be corrected by altering governing interpretative frameworks. They often seem to be able to reinterpret their objectives or the outcomes in such a way as to make themselves successful even when the shortfall seems quite large. Even when they admit mismatch, they try to develop stories in support of interpretations that sustain governing frameworks. Therefore, learning is almost always single-loop, which reinforces the governing interpretative framework.

Organizations as well as individuals develop their interpretative frameworks through learning by experience, or through making sense of the outcomes of their decisions and actions (Argyris & Schön, 1978; Bartunek, 1984; Levitt & March, 1988). Interpretative frameworks are the frames of reference within which individuals and organizations interpret their experience (Polanyi, 1958). They form and implement decisions and actions based on their knowledge, and knowledge creation is regulated by their frameworks because their frameworks distort, exaggerate, minimize, or even ignore any information or data. Thus the four stages, knowledge creation, decision and action, interpretation, and development of framework are interconnected through a feedback loop.

To make double-loop learning, organizations have to break this loop. Organizations as well as individuals make decisions and actions based on knowledge in the broad sense that includes instinct and intuition. The interpretation of their outcomes depends on the governing interpretative framework. Therefore, the best way to break the loop is by creating new knowledge free from the limitations of the governing framework. Based on the new knowledge, the organization can make new decisions and actions, and evolve its interpretative framework by interpreting the outcomes.

1.2 Four modes of frameworks

Interpretative frameworks can be categorized into four modes using two key dimensions: (1) beliefs about the analyzability of the external environment, and (2) the extent to which individuals and organizations intrude into the environment to understand it (Daft and Weick, 1984). The four interpretation modes are undirected viewing, conditioned viewing, discovering, and enacting.

The undirected viewing mode reflects both a passive approach and the assumption that the environment is unanalyzable. Individuals and organizations characterized as "undirected viewing" take passive approach to the environment, and do not rely on hard, objective data because the environment is assumed unanalyzable. They act on limited, soft information to create their perceived environment.

Individuals and organizations characterized as conditioned viewing assume an unanalyzable environment and are not intrusive. They tend to rely on established data collection procedures, and the interpretations are developed within traditional

boundaries. The viewing is conditioned in the sense that it is limited to the routine documents, reports, publications, and information systems that have grown up through the years.

The discovering mode assumes that the environment is analyzable. Therefore, although it reflects an intrusive approach, the emphasis is on detecting the correct answer already present in an analyzable environment. Carefully devised measurement probes are sent into the environment to relay information back. Formal data determine interpretations about environmental characteristics and expectations.

The enacting mode also reflects an intrusive approach, but individuals and organizations construct their own environment because they assume unanalyzability of the environment. They gather information by trying new behaviors and seeing what happens. They experiment, test, and simulate, and they ignore precedent, rules, and traditional expectations. They are test makers (Weick and Daft, 1983).

1.3 Commensurability of frameworks
Commensurability is that aspect of Kuhn's doctrine that deals with the cognitive compatibility of concepts, problems, facts, and assertions. It is a kind of common denominator of interpretative frameworks (Murakami, 1992). The chief consequence of incommensurability -- or, if one takes a different stand, its chief cause -- is the impossibility of translating from the language of one conceptual framework into the language of another conceptual framework (Pearce, 1987). Communication breakdown regularly characterizes discourse between participants holding incommensurable points of view (Kuhn, 1970).

Organizations can hardly learn if the interpretative frameworks of the organization and its members are incommensurable. One reason is that the new knowledge of a member is not likely to be accepted by other members of the organization when it conflicts greatly with their governing frameworks. If new knowledge raises issues beyond those included in the framework, involves new environmental factors, or specifies radically different kinds of action-outcome relationships, its acceptance will require major changes in the framework. Another reason is that the same data or information can be interpreted differently within the organization. Incommensurability prevents the organization and its members from sharing knowledge that is the most important condition for organizational learning.

1.4 Learning organization
Using my learning model, I can now define a "learning organization" as an organization that makes double-loop as well as single-loop learning consistently at every level of the organization.

Commensurability of frameworks is indispensable for a learning organization Although organizational learning occurs through individuals, it would be a mistake to conclude that organizational learning is nothing but the cumulative result of their members' learning. Organizations learn through individual learning of its members, but organizational learning occurs only when the new insights, knowledge, and mental models of the individuals are shared in the organization.

In addition, to make double-loop learning, the interpretative frameworks of a learning

organization have to be in "enacting mode" of Daft & Weick (1984). Organizations learn through joint discussion and interpretation of events, and through gradual changes in the assumptions, symbols, and values of participants. Therefore, trials and errors, or actions and outcomes, are important means of organizational learning.

Organizational learning provokes individual learning, which stimulates organizational learning in turn. Organizations and their individual members make mutual learning.

2. Search for New Methodology

The interpretative frameworks of a learning organization have to be commensurable and in "enacting mode." Therefore, one possible way to forward is to find new management tools and methods to develop commensurable and enacting interpretative frameworks in the organization through double-loop learning.

2.1 Traditional techniques

Most scientific techniques available for managers are in the rational-calibrated quadrant of Armstrong (1995). Operations research including model building, mathematical analysis, and computer simulation are some examples. In the rational-uncalibrated quadrant, we find systems analysis, sensitivity analysis, and fact finding. Behavioral studies are places in the intuitive-calibrated quadrant.

Double-loop learning of an organization requires an intuitive and uncalibrated approach. In this quadrant, there have been no established techniques available for managers to build "learning organizations." In a typical organization there are many valuables and many decision makers with different interests. Humans make decisions and actions based on their values and world views, which science has vigorously excluded so as to be objective. One key problem is that real human beings are neither perfectly rational nor perfectly predictable. In my opinion policy exercise seems to be the only possibility in this quadrant where there exist many valuables and many decision makers.

2.2 Policy exercise

Policy exercise can be defined as a managerial support system that uses gaming/simulation and other methods to assist with organizational decision making of ill-structured problems. Policy exercise is a direct descendant of military war games; these were employed because they provided the best technique for dealing with a messy environment in which important decisions needed to be made. Gaming/simulation is defined in this paper as simulation that works wholly or partly on the basis of players' decisions. Simulation is an operating model entailing abstraction and representation from a larger system.

A key benefit of policy exercise is that it provides a shared image of the complex system under investigation. This enables participants to communicate more effectively about the issues, appropriate strategies, and the probable impacts of decisions. A policy exercise typically involves extensive preparation and analysis of the system being addressed as well as setting the stage for a workshop where expert participants work through scenarios from various stakeholder perspectives.

The primary innovation that sets the policy exercise apart from traditional forums,

such as workshops and informal planning processes, is a simple but elegant structure that provides:

    (1) a shared model and lucid metaphor of the system under investigation that enables participants to communicate more effectively about the issues, their strategies to address the issues, and the impacts of their decisions in a complicated technical and policy environment,

    (2) a visual dynamic, and highly interactive forum that provides a risk-free environment with an element of fun to draw all participants into co-exploration of an issue, thus facilitating the necessary communication, and

    (3) a mechanism for integrating research results, expert assessments, and multiple stakeholder perspectives.

In sum, the policy exercise methodology is a unique and innovative mechanism that facilitates collaboration in complex environments involving many stakeholders. The products of a successful policy exercise are a shared image of a complex system, a fresh understanding of relationships between stakeholders, a new willingness to cooperate on the part of stakeholders, and recommendations for action on issues of concern. Policy exercises allow people to discover and solve many potential problems without spending large amounts of money, time, and other resources.

3. Case Studies

Using several examples in the real world, I try to clarify that policy exercise can be an effective methodology facilitating double-loop organizational learning.

3.1 The Great Lakes
This case study shows why International Joint Commission on the Great Lakes employed Simulation and Gaming technique, and how The Great Lakes Policy Exercise could help the decision making process. This case study is based on "The Great Lakes Policy Exercise –A Tool for Environmental Planning in the Age of Multi-Media Networks," "Participant Handbook for Ecosystem Framework Policy Exercise," and "Seminar Results Report."

(1) Background
In 1990, Congress authorized five years of funding to support research on the effects of zebra mussels. Zebra mussels have spread at an alarming rate since the late 1980's and have created many problems. Their rapid spread has caused

    "... a serious threat to water supplies for municipalities, industry, and for cooling off power plants." (Great Lakes Environmental Laboratory, 1994)

Commercial and recreational boats have experienced reduced efficiency and even engine failure due to accumulations of mussel shells on the hulls of vessels and on water cooling intakes. The aesthetic quality of bathing beaches has deteriorated due to the cluttering of shells. Perhaps the most troublesome problem is the large impact of the zebra mussel upon the Great Lakes Ecosystem.

The Council of Great Lakes Research Managers held a series of meetings in an effort to determine how best to achieve the objectives of International Joint Commission. Several meetings were held specifically to address how best to establish an ecosystems framework; these were in 1989, 1990, and 1991. From meeting to meeting they better understood the complexity of the problem; they came to realize that it

could not be addressed by Armstrong's Quadrant I type techniques alone (there were abundant scientific studies of the lakes). They started to understand that they had an illstructured problem with many variables and many decision makers.

As a consequence of these meetings, the Council of Great Lakes Research Managers decided to develop a "framework exercise" under contract with the University of Michigan. This exercise was to combine an ecosystem game-simulation and a policy seminar to improve communication among groups in the policy and research communities about the needs within the Great Lakes system.

(2) The Great Lakes Policy Exercise
The Great Lakes Policy Exercise was designed out of the need to create research priorities. Funding for this project has come from a number of sources, including Congress. The goal of the policy exercise is to establish research priorities for implementing an ecosystem approach.

The Great Lakes Policy Exercise consisted of three primary components They were a series of schematic drawing which had the purpose of providing an overview of the ecosystem; an Ecosystems Philosophy Game to assist the group in the articulation of a consistent philosophy; and an Issue Seminar to improve the decision making process as it pertained to specific problems that had to be addressed.

The first official run of the Great Lakes Policy Exercise was hosted in January 1995 for members of the Council of Great Lakes Research Managers. On the morning of the first day, experts presented a synopsis of the problem and provide the attendees with the best "state-of-the-art" knowledge available. In the afternoon of the first day, the Ecosystems Philosophy Game was played. The objective being to induce the participants to consider how their understanding of science was best integrated into the political context of the problem at hand.

On the morning of the second day, the Issue Seminar addressed the selected problem (e.g. the zebra mussel invasion); all participants adopted a defined perspective and entered into a structured communication process which was designed as a "safe environment" to foster candid discussion of the issue. The afternoon was devoted to a debriefing of the Issues Seminar; during this time "real-world" concerns were emphasized as the participants resolve the problem at hand.

(3) Results
Only after they played the Great Lakes Policy Exercise, the Council was able to create research priorities.
- The Great Lakes Policy Exercise improved communication in a complex environment through the creation of a meta-model to serve as a framework for decision making. This was achieved by using an on-going process and artifact base to illustrate (model) how the integration of issues, information, and actions might be achieved.
- The Great Lakes Policy Exercise provided and coordinated access for policy-makers to networks of research expertise which could be tailored to provide answers to broad based (world view) ecosystem policy questions and to link relevant research to policy activities.
- The Great Lakes Policy Exercise addressed all aspects of ecosystem behaviors

in a comprehensive, coherent and communicable way, such that problems (i.e., virtual elimination) were viewed in a multidisciplinary manner and the research approach taken was interdisciplinary, transdisciplinary and responsive to the management needs of the policy maker.

3.2 City of Ann Arbor

This case study shows how the Balancing the Budget Policy Exercise provided interactive learning environment and facilitated the city officials and council members focus on the incorporation of long term financial perspective in the annual budgeting process of the City of Ann Arbor. This section is based on my experience as a designer and a facilitator when I was a visiting professor of the University of Michigan.

(1) Background
The Strategic Financial Planning Team of the City requested the University of Michigan to design a policy exercise to build awareness regarding the need for coordinate, long range financial planning among the city mayor, council members, officials, and other stakeholders.

The City was facing a financial situation that was potentially serious. Without proper planning and appropriate coordinated action by the City Administrator, Department Heads, and the City Council, services might be discontinued or disrupted, employees laid off, and the reputation of the City might suffer. It was easier for city decision makers to push these concerns into the background than it was to confront them. As a consequence, insufficient attention was being effectively focused on this problem.

(2) Balancing the Budget Policy Exercise
A University of Michigan graduate school class undertook this project and designed a policy exercise following the 24 steps of Professor Duke. A schematic (a drawing of the financial system) was prepared. It shows the major components (e.g. actors, processes, data files, etc.) and the primary relationships between them. The class visited more than ten city officials and council members with their draft schematic asking for comments, based on which they made many revisions. The process of creating the schematic was very useful for clarifying assumptions and perceptions of key decision makers and actors. Through this process, the city officials and council members obtained a "big picture" of the problem being addressed. It served as a starting point of building a new shared mental model among them.

The first official test run of the prototype was hosted at the University of Michigan in December 1997 for city officials and a city council member. They played fourteen roles of the Exercise: Budget Director, City Administrator, City Planner, Mayor, four Council members, three Stakeholders (Business, Government, and Citizens), and three Department Heads (Public Works, Public Safety, and City Service). Nobody played his/her own professional role.

(3) Results
The process of producing the schematic and the test runs of the prototype already started to change the interpretative frameworks of the city officials and council members. The Strategic Financial Planning Team of the City was quite confident that the Exercise would foster a heightened awareness and understanding of the need for,

and benefit of, appropriate long-term financial planning; and communication and alignment of thinking among Council and Departments.

Since the original event, the Game has been hosted for a number of other groups, including participants at Annual Meeting of Mayors in Michigan State.

4. Discussion

In these two cases, policy exercise successfully provided interactive organizational learning environments and made double-loop learning possible. Interpretative frameworks can change only through experience, however, as Senge (1990) pointed out, there exists the dilemma of learning from experience. Using my double-loop learning model, I would like to clarify how policy exercise facilitated double-loop learning.

The most powerful learning comes from direct experience, but "Learning by doing" only works so long as the feedback from actions is rapid and unambiguous (Senge, 1990). The learning cycle assumes uninterrupted links between actions and responses, between responses and interpretative frameworks, and between interpretative framework and new actions.

In the real world, however, there exist many factors that lead to what Senge (1990) called the "dilemma of learning from experience." These factors are often thought to be
- learning horizon,
- scarcity of experience, and
- irreversibility.

Policy exercise can provide interactive organizational learning environments and facilitate double-loop learning essential for the creation of a learning organization. The reasons are thought to be as follows:
- enlargement of interpretative frameworks by (1) providing a big picture, and (2) exposing us to unknown simulated world and creating turmoil in our mind,
- expansion of learning horizon by (1) simulating near-events and hypothetical histories and (2) expanding our comprehension of history,
- acceleration of learning process by compressing time and space,
- provision of risk-free environment for trial and error,
- facilitation of shared experience by providing environment to share experience.

5. Conclusion

A learning organization is an organization that makes double-loop as well as single-loop learning consistently at all levels of the organization. Policy exercise can provide an interactive learning environment for double-loop organizational learning and facilitate creation of a learning organization Based on the findings of this research, I am now designing two policy exercises. One is a policy exercise for the nuclear power plant crews of Tokyo Electric Power Company to minimize the possibility of accidents due to human error, and the other is a policy exercise about public

References

Argyris, C. & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.

Armstrong, R. H. R. (1995). Gaming-simulation in perspective. In Crookall, D. & Arai, K. (Eds.) *Simulation and gaming across disciplines and cultures* (213-224). Thousand Oaks, CA: Sage.

Bartunek, J. M. (1984). Changing interpretive schemes and organizational restructuring. *Administrative Science Quarterly*, 29, 355-372

Daft, R. L., & Weick, K. E. 1984. Toward a model of organizations as interpretation systems. *Academy of Management Review*, Vol. 9, No. 2, pp. 284-295.

Great Lakes Environmental Laboratory, (1994). *The Ecological approach to the zebra mussel infestation in the Great Lakes*, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, the University of Michigan Cooperative Institute for Limnology and Ecosystems Research

Kuhn, T. S. (1970). Reflections on my critics. In Lakatos, I. and A. Musgrave (Eds.) *Criticism and the growth of knowledge* (231-278). New York, NY: Cambridge University Press.

Levitt. B. & March, J. G. (1988). Organizational Learning. *Annual Review of Sociology*, 14, 319-340

March, J.G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2, (1) 71-87

Murakami, Y. (1992). *Hankoten no keizaigaku* (in Japanese). Tokyo: Chuo Koron Sha.

Pearce, D. (1987). *Roads to commensurability*. Holland: D. Reidel Publishing.

Polanyi, M. (1958). *Personal knowledge*. London: Routledge & Kegan Paul.

Senge, P.M. (1990). *The fifth discipline*. New York, NY: Doubleday.

Tsuchiya, S. (1998). Reengineering management. *International Transactions in Operational Research*, 5 (4), 271-281

Weick, K. E. & Daft, R. L. (1983). The effectiveness of interpretation systems. In Cameron, K. S. & Whitten, D. A. (Eds.) *Organizational effectiveness: A comparison of multiple models* (71-93). San Diego, CA: Academic Press.