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From Organizational Learning to the Learning Organization

Introduction

To remain viable in an environment characterized by uncertainty and change, organizations and individuals alike depend upon an ability to learn. Yesterday's knowledge and skills are vulnerable to obsolescence, and future success requires flexibility, responsiveness and new capabilities. Yet psychological and organizational factors conspire to make organizations and their members resist change and miss opportunities to create preferred futures. These sources of resistance, as well as strategies for overcoming them, have been explored under the broad rubric of organizational learning by a diverse group of researchers, including practicing managers (e.g. de Geuss, 1988; Stata, 1989) and scholars from fields as diverse as organizational behavior (Argyris, 1982; Levitt and March, 1988; Huber, 1991; Schein, 1992), operations management (Hayes et al., 1988), strategy (Redding and Catalenello, 1994; Collis, 1996) and system dynamics (Senge, 1990).

With this growth comes confusion. 'Organizational learning' encompasses considerable territory in the management literature; it is presented as occurring at different levels of analysis – from individuals (Argyris, 1982) to organizations (Levitt and March, 1988) – and as applying to such disparate processes as the diffusion of information within an organization (Huber, 1991), how individuals interpret and thereby create their organization (Weick, 1979; Daft and Weick, 1984), how interpersonal communication precludes detection and correction of error (Argyris and Schön, 1974), and the encoding of organizational routines (Cyert and March, 1963; Nelson and Winter, 1982; Levitt and March, 1988). In some conceptions, organizational learning is prescriptive, that is, viewed as an outcome that can be brought about through intervention (e.g. Hayes et al., 1988; Senge, 1990; Argyris, 1993); elsewhere, organizational learning is the focus of descriptive theories which document factors influencing or impeding organizational adaptation (e.g. Levitt and March, 1988; Huber, 1991). In our view, this confusion limits the accessibility and potential usefulness of this literature for practitioners. Thus, in this article we provide a framework to organize these diverse scholarly contributions into meaningful categories. Our aim is to foster

discussion among scholars and practitioners that facilitates future application of these ideas.

This article contributes to the literature in three ways. First, we review existing ideas about organizational learning and present a two-by-two framework for categorizing these diverse contributions; this review is intended to identity and illustrate distinctions we have identified in the literature rather than to be exhaustive. Second, we discuss differences between the terms *organizational learning* and *the learning organization*. The term organizational learning encompasses a broad range of phenomena, including, but not limited to, desired processes of individual development and organizational adaptation, while work discussing the learning organization forms an explicitly normative subset of the literature. Third, we identify substantive relationships between different foci in the literature and show how these relationships together suggest a model in which the leverage for creating a learning organization lies in the cognition of organization members. To illustrate and provide additional support for this model and its implied strategy for creating organizational change, we offer a brief discussion of the work of two of the most visible researchers in this field, Peter Senge and Chris Argyris. The article concludes by showing how integrating these two different approaches may help to overcome shortcomings of each one implemented in isolation, and this discussion suggests specific questions for future research.

Organizing Organizational Learning Research

Dimensions of Organizational Learning

The organizational learning literature is notably fragmented, with multiple constructs and little cross-fertilization among scholars (e.g. Shrivastava, 1983; Fiol and Lyles, 1985; Huber, 1991). Primary unit of analysis – or, the entity seen as 'learning' – provides one distinction in the organizational learning literature; research goal or objective provides another. Some researchers study how *organizations* as whole systems adapt or change (as a function of individual cognitive properties or of organization policies and structures) and label this system-level phenomenon 'learning'. Other researchers focus on how *individuals* embedded in organizations learn – that is, how individuals develop, adapt, or update their cognitive models.[1] At the same time, across both groups, some authors primarily attempt to describe relationships among variables. The intended research product is an accurate description of a phenomenon or a robust model of causality. Others undertake research primarily aimed at creating organizational change. Their research objective is to identify and test managerial actions that improve organizational effectiveness. The distinction between descriptive and intervention research thus provides a second dimension, and the two-by-two matrix shown in Figure 1 depicts the resulting categories of learning phenomena. Each of the four categories is discussed below.

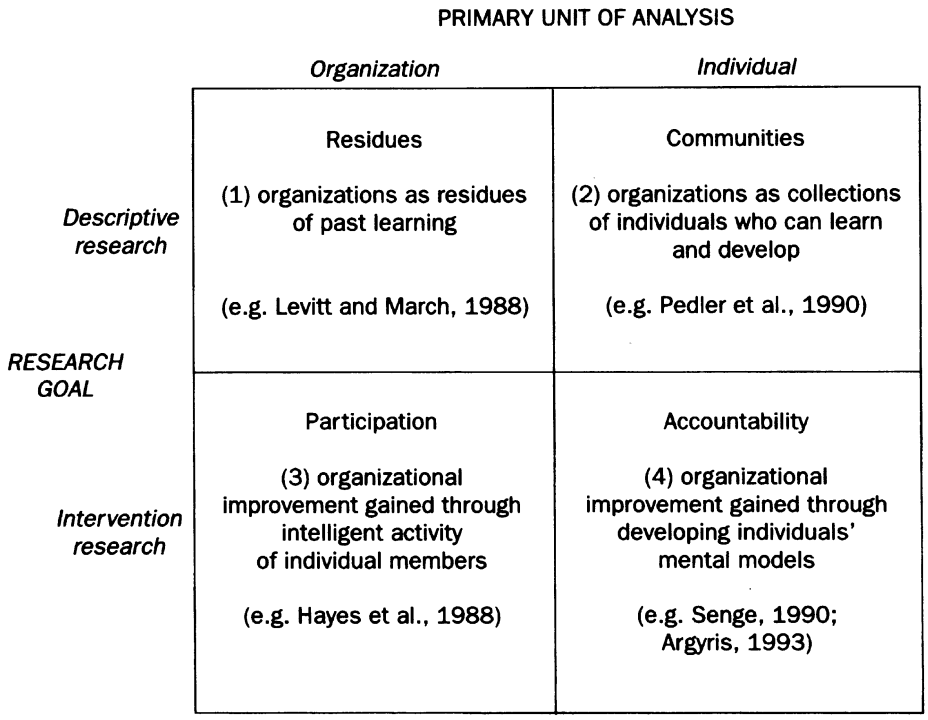

Figure 1 *A typology of organizational learning research*

Residues: Organizations as Residues of Past Learning

Descriptive research at the organization level of analysis includes approaches stemming from behavioral theories of the firm and from theories of social construction. Organizational learning in this category encompasses phenomena such as how routines shape organizational behavior, how knowledge is acquired, and the role of interpretive processes in precluding rational adaptation.

Several scholars focus on the role and stability of routines in organizations. Levitt and March (1988) distinguish theories of organizational learning from theories of rational choice, resource dependency and population ecology. Rather than treating learning as a way to combat inertial tendencies in organizations, these authors view organizational learning as an alternative mechanism to account for existing organizational behavior – that is, a mechanism that explains how organizations evolve over time and thereby accounts for the status quo. Organizational learning, in their model, describes processes such as imitation and trial-and-error experimentation that explain how organizations behave and evolve over time. In contrast to the normative approaches discussed below, learning is seen as a faulty mechanism. Because behavior in organizations is routine driven (Cyert and March, 1963; Nelson and Winter, 1982), the lessons of the *past* – embodied in current routines – dominate organizational life. Organizational routines, in

which 'action stems from a logic of appropriateness or legitimacy, more than from a logic of consequentiality or intention' (Levitt and March, 1988: 320), are thus over-learned, such that actors are more habit driven and imitative than rational. Learning, in this model, is essentially the accumulated residues of past inferences.

Levitt and March (1988) embrace the organization as their primary unit of analysis, and focus on the ecological nature of how organizations select and encode routines. They observe that organizations as entities stop actively seeking alternatives once they have built up experience in known routines; this creates built-in barriers to adaptation at the organizational level, such as 'superstitious learning' (viewing desired outcomes as a result of well-reasoned organizational actions) and 'competency traps (beliefs that current practices are better than potential alternatives, leading to the continuity of inferior work processes). Because of these organizational barriers, only exceptionally inappropriate routines are likely to lead to a perceived need for change (Levitt and March, 1988).

Other scholars define organizational learning as a process through which an organization expands its repertoire of actions, and they focus on how knowledge is acquired and distributed. For example, citing behavioral learning theory, Huber (1991) defines *learning* as a process that enables an entity to increase its range of potential behavior through its processing of information. *Organizational learning* is then defined as occurring when any of an organization's units acquires knowledge that the unit recognizes as potentially useful to the organization (Huber, 1991).

Finally, others examine interpretive processes as a form of organizational learning. Weick (1979) notes that adaptation can preclude adaptability; that is, shared interpretations of reality can inhibit perceiving a need for change. The following quote from Weick (1979: 135) highlights the phenomenon also captured by Levitt and March's competency trap; organizations that acquire an exquisite fit with their current surroundings may be unable to adapt when those surroundings change'. This notion is also similar to that discussed in 'groupthink' research, in which social psychological mechanisms in high-level decision-making groups are thought to foster cohesiveness and inhibit disagreement (Janis, 1982). Social construction processes are at the root of these organizational dilemmas, as shared perceptions of the appropriateness of current practices are seen as precluding effective adaptation by the system. Weick (1979) takes social construction a step further in his descriptions of 'enactment' as a process in which organizations make sense of the chaotic stimuli of experience – sorting chaos into separate events and parts that can be connected and sequenced. In his model, the organizational context is in fact created through a sense-making process.

Communities: Organizations as Collections of Individuals Who Can Learn and Develop

Descriptive research at the individual level of analysis includes descriptions of individual learning in organizations, models that specify conditions that

enable employee learning, and models that describe beneficial outcomes of individuals engaging in learning. Brown and Duguid (1991: 48) describe learning as becoming 'an insider' by acquiring tacit or 'noncanonical' knowledge. Ray Stata, CEO of Analog Devices, takes a more normative approach, describing widespread individual learning as a source of competitive advantage for his organization (Stata, 1989). Others show how organizations affect the learning and development of individuals. For example, flatter organizational structures create a tension that elicits personal development by employees, and this individual learning contributes to a process of continual transformation of the organization (Pedler et al., 1990). New interpersonal challenges encountered in less hierarchical, team-based organizations encourage individuals to engage in developing communication and other interpersonal skills, which creates a kind of institutionalized learning or 'organizational capability' (Pettigrew and Whipp, 1991).

Others have shown how individual learning can lead to organizational change. For example, in a study of how a large software firm responded to the implementation of new information technology, Orlikowski (1996) describes the subsequent unplanned, ongoing adjustment and improvisation activities of organizational actors, and proposes that this individual learning transformed the organization.

In sum, when its members learn an organization's capability may be enhanced. This approach can be distinguished from intervention research (discussed in the following two sections) in that it is primarily descriptive and does not prescribe strategies for implementing organization change. In contrast, researchers in the remaining two categories have embraced this objective.

Participation: Organizational Improvement Gained Through Intelligent Activity of Individuals

Intervention research at the organization level of analysis explores questions of what policies can be employed to create flexible and responsive ('learning') organizations. Researchers in this group often advocate human resources or manufacturing policies to improve organizational responsiveness. For example, operations management researchers Hayes et al. (1988) focus on initiating changes in organizations' operating systems to create what they call learning organizations. Making critical information accessible and transparent, such as by increasing the on-line inter-dependencies among workers, is one element of increasing both the probability and importance of problem-solving by individuals. Individual members thereby can contribute to creating more flexible, efficient organizations. This pragmatic research focuses on technical solutions to the problem of sustaining organizational learning, and on the role of people in making these changes. In their model, fostering the participation of all employees and putting their innate ability to think to work for the organization is described as essential for organizational effectiveness. This participation can extend beyond the boundaries of the organization to

include learning by customers, whose input can contribute to innovation in the organization (von Hippel, 1988).

In this category, the *organization* learns when its members participate fully, such as by solving problems and communicating about substantive issues with each other. In contrast, in the accountability group discussed below, when *individuals* learn, through explicit interventions designed to foster self-reflection, their organizations become more effective.

Accountability: Organizational Improvement Gained Through Developing Individuals' Mental Models

Intervention research at the individual level of analysis explores strategies for examining and developing the way individuals think about the organization. Organizational learning is portrayed as a phenomenon in which individuals in organizations take action to develop and refine their cognitive maps – for example, their 'theories-in-use' (Argyris and Schön, 1974) or 'mental models' (Senge, 1990) – and thereby become more effective decision makers. The goal of researchers is to develop intervention strategies to facilitate this process. For example, John Seely Brown at Xerox describes the use of laboratories in which employees experiment with computerized simulations designed to help them develop new mental models of how the business operates (Brown, 1991). Research traditions as different as system dynamics (e.g. Sterman, 1989; Senge, 1990) and action science (e.g. Argyris, 1982) exemplify work in this category. The term 'accountability' captures a common theme characterizing much of this work; that individuals' decisions and cognitions shape their organizations and, equally important, that they can learn to change these cognitions in preferred ways. These researchers invite individuals to be accountable for changing their organizations, as seen in the work of Senge in system dynamics and in the work of Argyris in action science.

System dynamics examines ways in which features of human cognition, such as blindness to interconnections among elements of a complex system, produce managerial policies that neglect the long term and ignore the effects of feedback (Forrester, 1961; Sterman, 1989). According to this perspective, in order to reduce the organizational ineffectiveness caused by counter-productive managerial policies individuals must learn how to diagnose organizations as complex dynamic systems. Yet, the behavior of complex systems like corporations is difficult to decipher, in part because human cognition is insensitive to non-linear relationships and to the effects of feedback delays (Sterman, 1989). Learning about the effects of decisions in organizational settings is thus difficult; feedback is either missed altogether or misunderstood, an observation that is similar to Levitt and March's concept of superstitious learning. As a result, managers tend to address symptoms rather than underlying causes of problems, thereby focusing only on the proximal results of robust patterns of behavior, themselves shaped by organization policies and structures. Senge (1990) proposes that organizational actors can learn to think systemically so that they can understand how

their own organizational systems work and make changes which offer leverage in influencing results; this is how to create learning organizations. We revisit this approach in the second part of this article.

Although it focuses on the nature of interpersonal competence rather than on the systemic complexity of organizations, action science also maintains that the way individuals think is a critical cause of organizational ineffectiveness (e.g. Argyris et al., 1985). Argyris (1993) shows that individual actors engaged in difficult or face-threatening conversations fail to communicate relevant information clearly and fail to learn from each other. In these conversations, individuals' implicit theories, or 'theories-in-use', lead them to behave in ways that produce outcomes exactly contrary to what they hope to produce in interpersonal interactions (Argyris, 1982). Moreover, these theories-in-use systematically preclude learning about ways to escape their counterproductive effects, and thereby contribute to organizational systems that reinforce anti-learning interpersonal dynamics (Argyris and Schön, 1978). Analogous to the competency trap, theories-in-use constitute built-in impediments to learning at the micro-level of individual reasoning processes. Based on this understanding of how organizational effectiveness is limited, Argyris conducts intervention research designed to help individuals develop new theories-in-use to enhance their ability to learn in interactions with others. This approach is also discussed in the second part of this paper.

Summary

A brief review of the organizational learning literature reveals considerable diversity. Some authors describe how organizations learn whatever it is they learn, while others view learning as something that needs to be created through intervention. Given the variety of phenomena labeled organizational learning, the *learning organization* rubric can be used to separate research aimed at developing strategies to improve organizational adaptiveness from the larger body of work. Within this normative subset, two levels of analysis represent two different – potentially complementary – theoretical views. Those in the *participation* category view organizational effectiveness as an outgrowth of policies that engage individuals in contributing to the organization, while those in the *accountability* category view effectiveness as dependent upon properties of individual cognition.[2]

In the second half of this article, we offer our own definition of organizational learning and argue that engaging individuals in reflecting upon and developing their own thinking processes is an essential component of creating learning organizations. Relationships among the different areas of research described above form the basis of our argument, which is supported further by the work of two well- known intervention researchers, Peter Senge and Chris Argyris. Although the theories of Senge and Argyris at first appear as different as the academic traditions that influenced them, we show that they are similar in a fundamental way.

An Integrative Approach to Addressing Cognitive Barriers to Learning

Although this article notes that the organizational learning literature is fragmented, we also wish to draw attention to benefits of this diversity. First, with its many different foci, this literature represents an encompassing effort to understand a complex phenomenon. Studies of organizational routines, of interpretive processes, or of individual learning and development each offer a part of a complete picture of organizational adaptation. Describing the 'elephant' of an organization's behavior requires more than one observer and more than one lens (Waldo, 1961; Adams, 1994). Second, substantive relationships among these parts point to leverage for intervention, as we will show below. In this section, we first present our own definition of organizational learning, and then examine relationships among parts of the literature and draw some new conclusions.

Organizational Learning (Re)defined

Although we view the diversity of issues covered in the literature as valuable, we propose that the multiplicity of definitions of what 'organizational learning' *is* contributes to confusion for practitioners and limits the usefulness of scholars' contributions. Thus, we propose a new definition, synthesized from the literature, followed by a brief discussion of its merits. We define organizational learning as a process in which an organization's members actively use data to guide behavior in such a way as to promote the ongoing adaptation of the organization. To use data is to seek and attend to task-relevant information, in particular for assessing collective performance and progress against goals. Guiding behavior involves choosing actions based on data-driven observations, including actions designed to test inferences. Adaptation is change by an organization in response to external changes – both problems and opportunities. Ongoing adaptation suggests sustained attention to relevant data, especially regarding results of new actions. Such an iterative cycle of action and reflection has been described by Schön (1983) as integral to the practice of highly effective individual professionals. This definition views organizational learning as a process – one that requires individual cognition and supports organizational adaptiveness. It is a process of acting, assessing, and acting again – an ongoing cycle of reflection and action that cannot be taken for granted in organizations, noted for their adherence to routine. However, as thus defined, organizational learning is a process that can be initiated, developed, and practiced.

Where does this definition fit in to the literature? We note that intervention may be needed for individuals to engage in this learning process in support of their organization's ongoing effectiveness. This framing places us in the accountability category. However, we have drawn upon other approaches in developing our model of change, as shown below. By examining relationships among three of the different foci discussed above – routines, interpretive processes and intervention to develop individual mental models

– we will show that work from other categories can be used to strengthen the argument put forth by accountability researchers.

The Relationship between Organizational Routines and Collective Interpretive Processes

As discussed above, behavioral theories of the firm have depicted organizations as entities made up of routines. Human beings play little or no role in these descriptions; the innumerable routines that transform organizational inputs into outputs are seen as having a life of their own. However, even theories that focus on people recognize the importance of routine, and few scholars of organizational behavior would deny its importance. Standard operating procedures create routines; manufacturing processes are routines, and even work groups fall into habitual routines (Gersick and Hackman, 1990). A high level of agreement exists in the literature that organizational routines endure (e.g. Hannan and Freeman, 1984; Levitt and March, 1988), and that the nature of an organization's routines determines the organization's performance and results (Nelson and Winter, 1982). We maintain that an organization's routines constitute one part of a more complete description of that organization, but a part which offers little leverage for producing organization change.

Routines are created and sustained by the decisions and actions of individual actors. Human beings design their behavior based on their interpretations of their environment (Miller et al., 1960), and behavior in organizations is an emergent product of such interpretations. If interpretive processes in organizations shape routines, they may offer a way to change them. However, first, as these subtle cognitive processes occur without actors' conscious awareness (Daft and Weick, 1984; Goleman, 1985) they cannot be altered easily. Second, as organization members share the same tacit assumptions (Schein, 1992), they are unaware of the extent to which their interpretations are subjective. Third, organizational routines themselves reinforce the validity of shared interpretations, creating a self-reinforcing dynamic, as illustrated in Figure 2. Neither routines nor interpretive processes can be altered by management decision; instead, individual organization members' attention must be called to the nature and effects of the way they see their environment. A critical question is how to help people to reduce the counterproductive consequences of tacit assumptions they are unaware of holding. This question, the focus of those in the accountability category, is explored further below.

Developing Individuals' Mental Models to Alter Collective Interpretive Processes

Interventions designed to explore and change individuals' mental models offer a way to alter organizational interpretive processes, and a way out of the self-reinforcing cycle in the integrative model shown in Figure 2. In this model, leverage for influencing routines lies in engaging organization members in a process of developing their mental models. For this reason, our

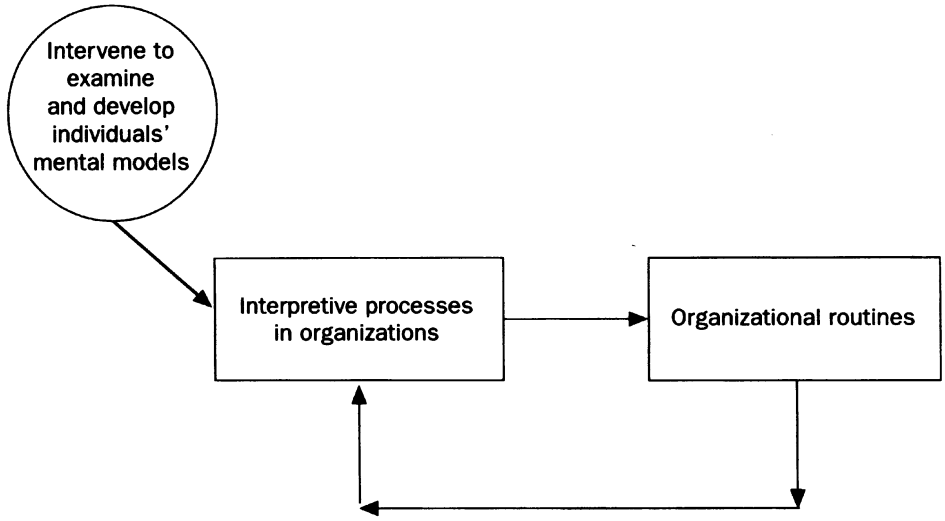

Figure 2 *An integrative model*

definition of organizational learning involves individuals actively using data to test their interpretations and conclusions. This cyclic learning process facilitates exposing erroneous or obsolete inferences. Along similar lines, Peter Senge and Chris Argyris have each advocated working with the cognitive maps of individuals to create learning organizations. In the next sections, we review their intervention strategies and conclude by suggesting that an integration of these two approaches offers a more powerful intervention strategy than either approach alone.

Integrating Intervention Strategies

System Dynamics and Mental Models

Senge's unique contribution to system dynamics, discussed above, lies in his proposal that organization members must engage in a process of learning to understand their own system, rather than relying upon expert consultants (Senge, 1990). To do this, he designs 'learning laboratories' – facilitated computer simulations that enable people to improve their mental models of how parts of their organization interact (Isaacs and Senge, 1992). Senge calls these simulations 'management practice fields', as, with them, managers can develop their thinking through trial and error without being hampered by the real-life consequences of actual decisions. A central objective of such an intervention is to allow organizational members to discover how their own thinking creates some of the problems they face. Thus, Senge combines technical models with the 'softer' concepts of vision and personal growth, as he maintains that technical issues are not easily remedied by technical solutions. This is because of the tendency for people to attribute causality to factors outside themselves – that is, to blame other managers, recessions,

customers, or suppliers – and thus to fail to see their own causal role in creating or exacerbating problems. Senge's core message is that without individuals learning to shift their own ways of thinking about systems, organizations will be ineffective. Thus, fostering an experience of accountability for results is a central component of the intervention.

Senge's approach includes involving people throughout an organization, despite the fact that the system dilemmas uncovered relate to policy issues addressed primarily by top management. His belief that participation in diagnosis should occur organization-wide is driven by his commitment to team learning and shared vision. The support of a team is needed to deal with the 'central threatening message' of systems thinking; that 'our actions have created our reality' (Senge, 1990: 237). He believes that individuals must feel a sense of accountability for current results. This approach is limited in two ways. First, those who participate in learning labs may lack the formal power to change the policy issues that the system dynamics models depict, and, second, they will almost certainly lack the interpersonal skills to communicate their new insights productively, particularly in situations characterized by face threat (Argyris, 1993). A theoretical concern is thus how participants' new insights into causal dynamics can be translated productively into action.

Action Science and Interpersonal Skill

Argyris (1982) argues that all human action is a consequence of design; not deliberate design but rather implicit if–then statements analogous to a computer program. Ineffective action in organizations is as much a result of design as is effective action. None the less, it is not possible simply to ask people to change their cognitive 'programs to improve their own effectiveness and the effectiveness of their organizations because these programs are largely tacit. There are two kinds of action programs, the espoused kind (if–then propositions that we think lie behind our actions) and the 'theory-in-use' ('if–then propositions an individual actually uses when he or she acts' (Argyris, l982: 4)). Moreover, people are unaware of the discrepancy between their espoused and their theories-in-use. This unawareness is partly due to learning these theories-in-use early in life. More insidiously, however, such theories-in-use are designed to keep people unaware of the discrepancy; a phenomenon Argyris calls 'designed ignorance'.

Argyris (1982) defines learning as detection and correction of error, and he documents how hard it is for individuals to detect their own errors in difficult interpersonal interactions. This is partly because of their reliance on abstractions and evaluations – inferences made by actors on both sides of a difficult interaction that are not tied to 'directly observable data' but are treated by actors as facts. Most people utilize a dysfunctional theory-in-use called by Argyris and Schön (1974) 'Model I'. Model I is a kind of causal reasoning that reduces sensitivity to feedback and thus inhibits the detection of error, and precludes learning about the real causes of problems. Model I is characterized by a need to control, maximize winning, suppress emotions,

and be rational; its strategies involve making untested attributions about others, unshared evaluations, and advocating positions without illustration or openness. Its consequences include miscommunication and escalating error (Argyris, 1982).

Individuals using Model I will create Organizational I (O-I) systems, characterized by 'defensiveness, self-fulfilling prophecies, self-fueling processes, and escalating error' (Argyris, 1982: 8). O-I systems are difficult to change, due to imbedded reinforcing dynamics created by defensive reasoning strategies that individuals are unaware of using. This sets up a 'Catch 22'; individuals' theories-in-use 'cause' social systems to malfunction and at the same time, O-I social systems 'cause' individuals to reason and act as they do (Argyris et al., 1985).

To change these self-reinforcing dynamics, Argyris argues that individuals must learn an alternative cognitive program to Model I – Model II. A Model II theory-in-use, in Argyris's words, is based on directly observable data, and requires that advocacy be supported by illustration, testing and inquiry into others' views (Argyris, 1982). Although it is not difficult to agree with these premises, employing Model II in interpersonal interactions requires profound attentiveness and skill for human beings socialized in a Model I world. A skilled interventionist can demonstrate and use these skills while engaging organization members in a diagnostic process aimed at helping them to understand ways in which their own actions inhibit learning. With considerable commitment and practice, it may be possible for members of an organization to improve their skill and their ability to learn in difficult interpersonal exchanges. For example, Argyris (1993) describes a five-year change project in a single organization, in which significant behavioral changes are observed.

The levels of skill and commitment required to successfully implement such an intervention make this approach extremely vulnerable to neglect in the face of financial or management changes in an organization. Similarly, organizations have shown reluctance to commit to behavioral change programs in the first place (e.g. Beer et al., 1990). Finally, the link between learning Model II theories-in-use and changing organizational strategy is under-specified, and Argyris pays insufficient attention to the complexity of interacting organization systems (Blake and Mouton, 1988). Thus, this approach is limited by its apparent lack of connection to strategic business issues, a gap that can be addressed by integration with a system dynamics approach.

Overcoming Cognitive Barriers to Creating a Learning Organization

Despite their contrasting backgrounds and different theories, both Senge and Argyris view properties of individual cognition as the critical source of leverage for creating more effective organizations. Both document self-sealing dynamics in organizations that require the development of individual cognitive maps to escape their counterproductive effects. Both researchers show that taken-for-granted cognition of organizational actors leads to unintended,

counterproductive effects. Furthermore, the taken-for-granted elements – whether erroneous causal models or theories-in-use – contain features that block actors' own awareness of their counterproductive nature. Senge explains that once causality is misattributed (inevitable in complex dynamic systems) decision makers stop seeking a cause for an outcome. Thus, mental models – once formulated – endure, and actors remain unaware that these observed relationships are simply hypotheses rather than facts. Similarly, Argyris describes Model I theories-in-use as learned so early that individuals are unaware of them. Thus, for example, we are able to perceive others as defensive and remain unaware of our own contributing role in producing this outcome. In short, Argyris and Senge agree on the need for a cognitive level for intervention if real change and learning are to occur.

Their intervention strategies, considered in the context of a broad range of organizational development techniques, are also similar in important ways. Both propose that tacit sources of ineffectiveness must be made explicit in order to be changed, and maintain that this blindness is unlikely to correct itself without an outside interventionist. Senge advocates the use of a researcher to facilitate diagnosis about non-obvious causal relationships in the system, and Argyris believes that organization members can learn Model II skills by working with an interventionist.

Discussion

A common focus on cognition In light of these common premises, we propose that *an integrative approach* can begin to address the core challenges or gaps identified for each of the two researchers. We concur with both Senge and Argyris that programmatic and policy-oriented changes, such as those described in the participation category, will have limited effectiveness if underlying sources of resistance embedded in the mental models of organization members are not addressed. In our integrative approach, the adaptation and enactment perspectives discussed above come together. The work of both Senge and Argyris reflects an understanding that human cognition both interprets and influences the organization – much like Weick's notion of enactment; at the same time, this work includes a prescription for engaging cognitive maps to promote effective organizational adaptation.

We view the contributions of Senge and Argyris as complementary parts of a theory of intervention that focuses on examining and developing mental models. Our analysis of relationships among different foci in the organizational learning literature suggests that this intervention strategy offers critical leverage for reinterpreting organizational situations and changing persistent routines. While Senge's model provides valuable insights to decision makers about the effects of current policies, his approach does not address participants' lack of decision-making authority to act on these diagnoses, and thus risks fostering frustration; it also fails to teach the skills to communicate new insights to others without engendering defensiveness. Argyris, on the other hand, provides a process for learning to change counterproductive interpersonal dynamics, without including a substantive focus for participants to

engage while learning these Model II skills. We believe that becoming a learning organization requires engaging in both practices at once. Fostering significant organizational change requires productive interpersonal conversation to collectively diagnose substantive cause–effect relationships.

Integration: filling gaps Both Senge (1990) and Argyris (e.g. Argyris and Kaplan, 1994) have advocated integration in broad terms. Argyris's recent work advocates the need to work simultaneously with *behavioral* and *technical* issues for successful organizational intervention, as technical changes will fail if they threaten those who are to implement them (Argyris, 1996). Similarly, Senge (1990) advocates integrating systems thinking with behavioral disciplines. Thus, we are in agreement with these recent writings; however, we offer two additional contributions. First, we have included a rationale for focusing on the cognitive representations of organization members in the context of the range of issues addressed in the organizational learning literature. Second, we identify specific ways in which system dynamics and action science – as intervention strategies – each present concerns that can be addressed in part by integrating the other. Senge's approach engages participants in substantive strategic issues, while Argyris helps them to develop critical reasoning and communication skills for learning. If an intervention includes an important substantive focus, we believe that organizational commitment to developing interpersonal theories-in-use is less vulnerable. Similarly, if participants are to take action based on new diagnoses of system interrelationships, an action science component provides training in the interpersonal competence and ability to learn in difficult interactions that are needed to communicate these insights and plans to others. Both approaches emphasize a sense of personal accountability for results, thereby mutually reinforcing a message of ownership and self-reflection. Similarly, both strive to turn participants into on-the-job researchers, in the sense of being able to examine data critically and learn from them. Our proposed definition of organizational learning emphasizes this ability, as we view it as a core competence of learning organizations.

Conclusion

The organizational learning literature encompasses a range of phenomena, some of which involve learning as a source of effectiveness. In this article, we propose that the learning organization rubric be used to distinguish these normative approaches from the larger body of work. We address the question of what it means to become a learning organization, and discuss the intervention theories of two prominent researchers in the field, Peter Senge and Chris Argyris. Although trained by very different academic disciplines, Senge and Argyris both advocate a cognitive approach to intervening in organizations to improve their adaptability and effectiveness. In the context of the broader literature on organizational learning, the work of these two researchers shares important similarities; yet each offers only part of the puzzle, and each carries important limitations when implemented separately.

In this article, we propose an equal, critical role for developing interpersonal theories-in-use and the ability to diagnose systemic implications of organizational actions. Our analysis suggests that engaging both kinds of cognitive models at the same time – cause-effect assumptions and interpersonal strategies – has the potential to prove far more effective than either approach to intervention implemented alone. Although our focus is on improving intervention, this article also draws from the descriptive organizational learning literature to find support for its conclusions. Specifically, we note that descriptive research has found that organizations fail to adapt effectively to change, and show that the stabilizing interaction between interpretive processes and routines requires addressing individual mental models to escape this self-reinforcing dynamic. Finally, we propose that empirical research must be undertaken to assess the effects of these complementary processes in producing organizational change.

Notes

1. Although both groups are interested in organizational effectiveness, the entity discussed as *learning* (or not learning) differs. In some treatments, individuals learn and organizational conditions can enhance or inhibit that potential. In other treatments, human learning is used as a metaphor to describe adaptation at the level of the organizational system.

2. These two perspectives can be seen as complementary, rather than mutually exclusive, in that implementation of well-intentioned policies in organizations as advocated by researchers in the participation category often fails due to the psychological and cognitive barriers explored in the accountability category. At the same time, those who focus directly on cognition may be able to incorporate attention to organizational policies and strategies into their approach to intervention (Edmondson, 1996).

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