Fostering Organizational Learning Process: Evidence from an R&D Organization

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Abstract

Organizational learning occurs when the insights and learning of individual members are transferred to the larger organizational system. Various organizational processes enable this transfer to take place effectively. This paper presents an empirical investigation of the impact of different organizational processes on organizational learning. The study involved 260 middle and senior level managers from seven major sub-units of a large national organization engaged in R&D and project management. Organizational processes of managerial orientation, allocation of managerial attention, conflict management and leadership styles were examined for their contribution to organizational learning. Results suggest that organizational processes do bear significant association to the various organizational learning dimensions. Managers adopting developmental or nurturant-task styles of leadership, proactive methods of conflict management, having an explicit agenda of change and innovation, supporting team learning and encouraging experimentation were found to contribute to organizational learning. Avoidance behaviour in resolution of conflicts and a style of leadership that concerns itself only with achievements of targets were conspicuous with their significant negative influence. The study also shows that learning organizations achieve superior performance.

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INTRODUCTION

It has long been recognized that organizations have to learn continuously to function effectively and efficiently [e.g. **1, 2, 3**]. However, this subject has received a great deal of attention only in recent years as evident from the spurt of articles and books on organizational learning [**4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19**, to cite a sample]. Probable reason for this enhanced interest among academics and practitioners is the increasing uncertainty and complexity in the environment, and pressures on organizations to cope with the changes by not only developing new ideas, but also modifying work methods to successfully implement them.

In dynamic environments, learning disabilities threaten organizational health and survival. An American study shows that the average life expectancy of family-owned or controlled organizations is only 24 years. Further, only three of ten such firms survived beyond first generation [**20**]. The high sickness and mortality rates are often caused by the inability of senior managers to develop appropriate strategies and effectively handle the process of learning and change. As Garratt [**21**] points out, organizational survival requires that the rate of learning should be greater than or equal to the rate of change in the environment.

HOW DO ORGANIZATIONS LEARN?

Organizations learn through their individual members [**22, 23, 24**]. However, all individual learning does not become organizational learning [**25**]. As Argyris and Schon [**26**, p.19] point out: "in order for organizational learning to occur, learning agents' discoveries, inventions, and evaluations must be embedded in organizational memory. They must be encoded in the individual images and the shared maps of organizational theory-in-use from which individual members will subsequently act. If this encoding does not occur, individual will have learnt, but organizations will not have done so." In essence, linkage of individual learning to the larger organizational system is most crucial in facilitating organizational learning. Some firms are able to ensure greater diffusion of learning of their employees to the organization, and so are able to compete more successfully in the market place [**27**]. Nonaka [**28**], Pascale [**29**], and Sullivan and Nonaka [**30**] argue that Japan's success story can be traced to superior mechanisms and processes for learning in Japanese corporations.

Importance of Organizational Processes

Many organizations usually have mechanisms in place for generation of new ideas but tend to ignore organizational processes which facilitate or block the flow of these insights to other parts of the organization where they can be interpreted, acted upon effectively and get integrated in the organizational theory-in-use [31]. Ideas and innovations can reach implementation stage and ultimately benefit the organization only if: (1) their generation is facilitated by a congenial organizational climate, (2) organizational members feel a sense of motivation to explore, evaluate, modify or improve them with an open mind; (3) the ideas and innovations reach appropriate decision makers promptly, (4) the organization recognizes, values and appreciates this learning and improvement process, and (5) facilitates action. It has been reported, for example, that product development cycles in an automobile company took longer than necessary not because the quality of engineers was poor but because their management processes took too much time [32]. Clearly, organizational processes are important and they have to be managed effectively to foster learning in the organization.

This study is an empirical investigation of the impact of different organizational processes on organizational learning. Specifically we have examined how processes of conflict management, leadership, allocation of managerial attention and managerial orientation contribute to the translation of individual learning, insights and knowledge to organizational learning. We present our study design in the next section; it is followed by description of organizational learning dimensions and an elaboration of the organizational processes studied, along with their measurement. Results come next, with discussion at the end.

STUDY DESIGN

Research Site

The study was conducted in seven major units of a leading Indian research organization, engaged in R&D in advanced areas of science and technology. The research centers were dispersed all over the country. The organization employs more than 10,000 scientific and technical personnel working at the frontiers of pure and applied sciences in very diverse areas. The research centers maintain collaborative relationships with similar organizations in other countries, mostly the developed ones. This R&D organization has several highly creditable achievements to its name. As the organizational pursuits are in the forefront of technology that is constantly

undergoing rapid change, and as its members work in very diverse areas, the need for it to learn continuously, efficiently and effectively is very high.

Sample

The sample consisted of 260 middle and senior level managers (Scientists/Engineers) from the seven units, belonging to the rank of senior professionals with independent responsibilities. The respondents were highly qualified and experienced. Many of them would be counted among the top professionals in their respective fields in the country, and recognized in professional circles internationally.

Methodology

The study was carried out through an elaborate questionnaire survey. The questionnaires were developed by the study group and were tested for validity and reliability. While this paper presents a few important aspects of the constructs and their measurements, Khandwalla [33] presents substantially greater details on the questionnaires. The questionnaires consisted of items to be rated on a Likert type scale, and the respondents rated the responses with respect to their own research groups. These items related to various dimensions of organizational learning, and the different organizational processes that were studied. Intense discussions were carried out with a select group of senior managers in the organization while developing the questionnaire. We expected that such interactions would minimize the possibility of differences in meaning and interpretation which the respondents from diverse units, functions and locations would attribute to words and constructs. At the conclusion of the study, results were fed back to the organization and discussions held with about fifty top and senior managers. We now describe the key constructs used in the study and their measurement.

DESCRIPTION AND MEASUREMENT OF KEY CONSTRUCTS

Organizational Learning

A learning organization is one that continuously strives to expand its capabilities to adapt to changes in the environment and to create its future. Many a time, learning in organizations may be blocked by factors such as functional myopia, command and control orientation, excessive formalization, pre-occupation with day to day routines, absence of felt need for change and inadequate external orientation [34]. Based on how some organizations have effectively dealt with these blocks and facilitated learning,

Ramnarayan [35] proposed a model of organizational learning. It considers organizational learning as a dynamic process, consisting of the following dimensions: (1) generating shared purposes and priorities, (2) building organizational designs, and (3) initiating managerial actions, for learning (Figure 1).

Generating Shared Purposes and Priorities

Managers are always confronted with the difficult balancing act of carrying on their daily operations and functions, while at the same time planning and building for the future. Investment in future requires conscious attention to the development of latent or invisible assets [36, 37]. When senior managers allocate time, attention and energy to build technical and managerial skills of the employees; develop R & D or market know-how; generate values of quality and team work or create sound relationships with customers, dealers, suppliers and other units; they contribute to the latent assets of the organization. Managers who ignore the task of building latent assets, either by being drowned by day to day activities or otherwise, end up with organizations that do not have the inner strength to cope with the pressures of a rapidly changing environment. It is therefore important for managers to support and expand the core skills of their members and teams, essential for learning, and strengthen the processes that contribute to developing and nurturing them.

Through its commitment to well defined organizational priorities, management creates a learning agenda for individuals and sub-units within the organization. Shared priorities and values among members energize and enable them to participate, involve and contribute meaningfully to organizational learning [38]. Envisioning process requires thinking in systemic terms. This is not an easy process. Just like an architect conceptualizes a design by keeping in mind the overall context (physical/ natural environment, values/ needs of people, social/ economic aspects, etc.), managers need to master the art of gaining a holistic picture of the system, understanding its significant interdependencies and dynamism, as well as get into the details of individual sub-systems when and where necessary without getting lost [39]. This would enable them to know as to what makes the system tick, what are the strategic levers of learning and change and how they may be leveraged.
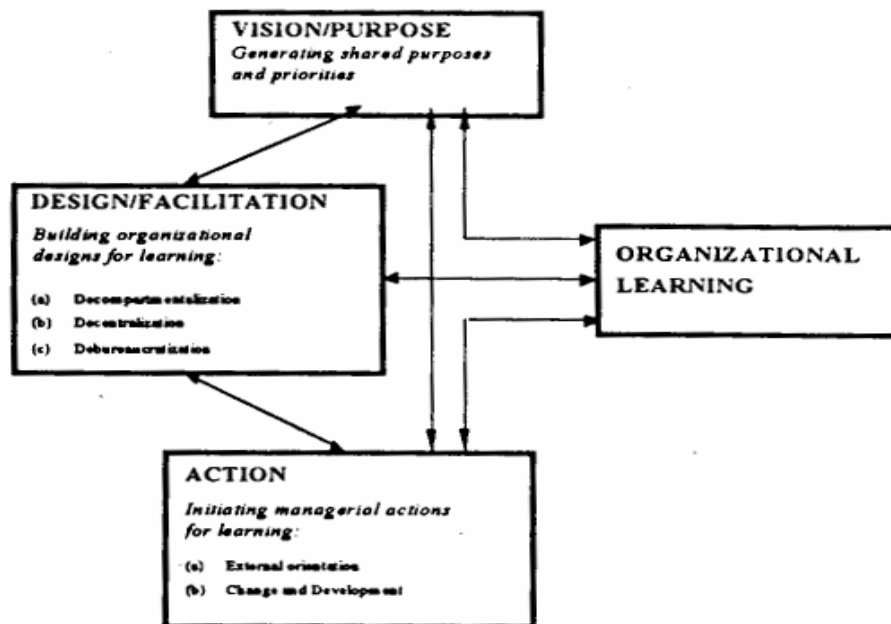
Figure 1. Organizational Learning Dimensions of a Dynamic Process

Building organizational designs for learning

Implicit in the notion of organizational learning is the metaphor of organization as an organism [40]. It is an organism that can learn to adapt to a changing environment by picking up signals, interpreting them and initiating appropriate actions to survive and thrive in the new environment. On the other hand, a machine can only function as per set programmes or parameters and is therefore incapable of learning. This highlights the need to move organizational designs from mechanistic forms to more organic forms [41]. Organizational design choices that explicitly work against the search for security and certainty need to be adopted. In other words, designs that do not rely excessively on specialization (or compartmentalization of activities), centralization and formalization become important.

Decompartmentalization. In most organizations, members consider their function as the most important one. This notion manifests itself in the attitude of functional specialists to view and evaluate organizational issues from their perspective alone, and in isolation from key inter-linkages that may exist with other units and functions in the organization or environment [42]. When such myopic groups come together for resolving organizational issues, they merely tend to restrain each other, leading to what may be called 'mutual

checkmating'. This prevents the emergence of constructive alternatives. When there is functional myopia, organizational members may even withhold relevant information from other units in the organization.

In units suffering from functional myopia, bright and competent members tend to cancel out each other. To overcome this paradox of 'dull units with bright members', managers need to consistently raise awareness of organization-wide concerns and the need for individual units to address these issues collectively [43]. A learning culture requires open communication, free exchange of ideas, a spirit of collaboration among specialists and line managers, and mutual trust. A shared set of values and common vocabulary need to be evolved so that different units and functions address issues and problems in common terms. Nonaka [44] presents illustrations of how successful Japanese firms use symbols and language effectively to create collective appreciation of organization wide issues, concerns and priorities that facilitate learning.

Decentralization. Many organizations fail to sustain the enthusiasm and eagerness of junior and middle level employees to contribute effectively. This happens because employees feel that the organization is interested only in their 'hands' and not in their 'heads' or 'hearts'. If the organization does not show sufficient sensitivity to people potential and needs, members may feel peripheral, disillusioned, and alienated. Barth [45] notes that, even with their specialized knowledge and diverse experience, career civil servants are unable to contribute to the learning of their organizations. With periodic changes in political leadership, missions and values are thrust on them, with little opportunity to influence policy. Their responsibility remains restricted to implementation as per directives and any expression of dissent is treated as obstructionism. Such an orientation is not conducive to organizational learning.

Debureaucratization. Emphasis on strict adherence to rules and regulations robs the innovative spirit of members since every idea or proposal is put through the 'red-tape' and subjected to scrutiny all along the reporting line. Many of the scrutinizing managers may not be knowledgeable, serious and interested enough (as much as the proposing individual/unit) to pursue these ideas to their fruitful completion. Over a period of time this leads to a state of apathy and indifference among members leading to loss of motivation to propose new approaches. Experimentation, innovation, and calculated risk taking being the hallmarks of any learning agenda [46, 47, 48, 49], March [50] opines that support for experimentation and creativity requires deliberate and temporary relaxation of rules. It also needs elimination/

reduction of 'red-tapism' that strangles the innovative spirit and initiative of members, and acceptance of mistakes committed in the process of experimentation as genuine business risk.

Initiating Managerial Action for Learning

It hardly needs to be emphasized that it is leadership and managerial actions that ultimately inject life into organizational structures and processes and make learning possible. Senior managers play an important role in influencing organizational members' perceptions of situations, elevating their aspirations and expectations, changing their definitions of reality, actualizing their potential by motivating or by overcoming negativism and cynicism, and focusing their attention on goal accomplishment. Active alertness to developments in the environment and facilitating change and innovation are crucial here.

External Orientation.   The drastic changes in environment makes it inevitable that many external factors which hitherto have been irrelevant or insignificant, suddenly become very critical, even threatening the organization's very survival. For example, many organizations in developing countries enjoyed monopoly markets and government protection and did not bother about customer satisfaction, competitive forces, and newer developments in technology and management practices. Suddenly they find their national economies opening up, trade barriers being pulled down and seemingly unimportant items in their old agenda ringing death bell over their heads. This situation has arisen because of their insufficient external orientation. Even successful companies that become complacent or overconfident may fail to detect or act on significant developments in the environment.

Organizations need to closely monitor happenings in the outside world and be aware of latest developments achieved by similar organizations. Managers need to devise formal and informal mechanisms for effective scanning of environment, to pick up global trends and pass on information to concerned departments instantly. It also becomes necessary to develop 'absorptive capacity [51] that enables the organization to recognize valuable new information, assimilate and apply it conveniently. At a personal level, managers need to widen their perspective and enlarge their information base by resorting to diverse sources of information, formal and informal. This would enable them to think strategically [52].

Change and Development Orientation.   In most organizations, members are socialized from an early age to conform to authority and follow

directives. When this couples with low mobility of members across units and functions, they get dogmatically entrenched in certain viewpoints and perspectives. Members, therefore, perceive change and learning as threats to their peaceful existence [53]. To trigger change, managers have to either deliberately create events or capitalize on crucial and opportune happenings in the organization or environment to raise valid questions about the tacit mental models of members. de Gues [54] illustrates that enquiry into the collective mental models of members about the organization and its future can facilitate meaningful self-analysis leading to organizational learning and even suitable response generation when faced with new situations. Effective training of members to shoulder challenges of change, regular and frequent exposure of specialists to organization-wide issues, encouragement of constructive dissent, interactions with experts from outside, etc., may help managers develop change orientation among members in the organization.

Measurement of Organizational Learning

Organizational learning in various research groups in each of the seven units was measured on the above dimensions using a 46-item questionnaire [55]. Table I gives the Cronbach's alpha[1] score of each of the dimensions.

ORGANIZATIONAL PROCESSES

We surveyed the key organizational processes of managerial orientation, allocation of managerial attention, dominant modes of conflict management and styles of leadership for their influence on organizational learning. Table 1 summarizes them with Cronbach's alpha scores.

Managerial Orientation

Managerial orientation refers to how organization members experience themselves in the organizational space. Six composite variables were used to measure this:

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[1] Cronbach's alpha (or coefficient alpha) is the basic measure of reliability based on internal consistency of items in the instrument [56, 57, 58, 59]. It is an inter-item consistency or measure of the extent to which the items are related to each other in measuring the construct. Nunnally [60, p 210] emphasizes that coefficient alpha "should be applied to all new measurement methods. Even if other estimates of reliability should be made for particular instruments, coefficient alpha should be obtained first". A low alpha means either the test is too short or the items have very little in common. Acceptable value of alpha depends on the use to which the measure is used. While for basic research, modest reliabilities of 0.6 or 0.5 is sufficient; for applied purposes (like selection tests) value of 0.9 to 0.95 is desirable [61].

Sense of meaningful job assignment. This measures if members are satisfied with their present job and feel enthused to learn, to perform better and contribute meaningfully. Various elements included in this construct are: clarity of job, challenge in job, sense of worthwhile accomplishment, job satisfaction, opportunity to do something useful to society and opportunity for taking initiative [Cronbach's alpha: 0.78].

Sense of development. This measures if members feel stagnant or well integrated in a dynamic and developing organization. This composite variable included: satisfaction with managerial and technical training, opportunity to influence decisions of superiors, opportunity for development of skills and knowledge to handle greater responsibility, and support and encouragement from superiors [Cronbach's alpha: 0.77].

Sense of harmony among organizational members. The overall climate of the organization has a decisive bearing on the impetus to learning. A fertile ground for learning is created when members genuinely and collectively value cooperation to achieve organizational excellence. Items of this composite variable are: attitude of workers and unions towards work and company, team spirit among subordinates, harmony within the organization, and the spirit of cooperation among colleagues [Cronbach's alpha: 0.73].

Sense of reward in one's Job. This measures the level of explicit or implicit rewards that motivate members to contribute effectively to the organization. This composite variable included: opportunity for promotion, praise and respect from superiors for good work done, and prestige in society from one's job [Cronbach's alpha: 0.68].

Sense of security. A secure job can foster or inhibit learning, depending on factors like organizational culture. When members are not constrained by uncertainty in tenure and fear of dismissal, they can concentrate on their tasks. They may also experience a strong sense of loyalty and commitment to the organization. But excessive security is also known to inhibit learning as members take their survival and that of the organization for granted, thus experiencing no need for learning. Items in this construct are: job security, helpful nature of immediate boss, and assurance of support and information needed for making decisions [Cronbach's alpha: 0.64].

Table 1.   Key Organizational Processes and Constructs

Organizational Processes and Constructs	Cronbach's Alpha
Organizational Learning	
Shared purposes and priorities	0.69
Organizational designs for learning:	
Decompartmentalization	0.91
Decentralization	0.82
Debureaucratization	0.64
Managerial actions for learning	
External orientation	0.73
Change and development orientation	0.76
Organizational Processes	
Managerial Orientation	
Sense of meaningful job assignment	0.78
Sense of development	0.77
Sense of harmony among organizational members	0.73
Sense of reward in one's job	0.68
Sense of security	0.64
Allocation of Managerial Attention	
Managerial Attention to Change and Innovation	0.84
Managerial Attention to Continuity	0.93
Dominant modes of Conflict Management	
Proactive methods	0.60
Committee referral (Single variable item)	---
Hierarchical referral (Single variable item)	---
Avoidance orientation (Single variable item)	---
One-to-one resolution (Single variable item)	---
Styles of Leadership	
Nurturant-Task (NT) leadership (Single variable item)	---
Developmental leadership	0.83
Professional leadership (Single variable item)	---
'Get results by any means' style (Single variable item)	---
Organizational Performance	0.93

Allocation of Managerial Attention

March [62] notes that managerial attention is a highly scarce organizational resource, and allocation of attention, therefore, is a key organizational process variable. Managers have to do the delicate balancing act between routine activities and activities that ensure a healthy future. The former may be referred to as *continuity* related activities and the latter seeks to accomplish *change and innovation* to sustain and upgrade the organization's competencies to meet future demands. Innovation and change may be neglected if managers spend too much of their time and attention on activities relating to continuity.

Managerial attention to change and innovation. This refers to the futuristic actions of managers whereby they anticipate, equip and prepare the organization for facing newer challenges. This composite variable consisted of: developing managerial and technical abilities of subordinates, ensuring professional satisfaction by providing challenging work, developing and implementing new work methods, tapping creative ideas, introducing technological innovations and improvements, ensuring satisfaction by providing caring environment and effective personnel practices, developing the ability of the group to work together, and establishing challenging goals/overall priorities [Cronbach's alpha: 0.84].

Managerial attention to continuity. It must be noted that even sustaining performance at a high level, on a day to day basis, requires considerable effort. This composite variable consisted of: meeting time deadlines in one's work relating to external agencies as well as internal departments, working effectively with other departments, maintaining high quality standards in work, bringing decision making as close to action as possible, and maintaining a good work culture in the group [Cronbach's alpha: 0.93].

Dominant Modes of Conflict Management

With horizontal and vertical differentiation, conflicts are inevitable in any organization. As Thomas [63] notes, conflicts can be harmful as well as beneficial depending on how they are managed. He describes several positive effects of conflict: (1) members consider conflict as a process of testing and assessing so that may bring out the best in them resulting in higher utilization of their capabilities; (2) it generates divergent views, the confrontation of which can result in ideas of superior quality; (3) differences among conflicting parties need not always result in a win-lose situation, but can also lead to a win-win situation where circumstances drive the concerned parties to search for creative solution; and (4) there can also be useful side effects like conflicts inviting the attention of managers to systemic problems

requiring change. Hall **[64]** considers effective management of conflict as a necessary pre-condition for creativity. The crux of the matter lies in management of conflict rather than its elimination.

In our study, respondents were asked regarding the extent to which the following styles of conflict management were used in their sub-units: (1) planning to anticipate potential sources of conflict to minimize points of friction, and (2) by emphasis on corporate objectives, core values, communication and job rotation. Both these are *proactive methods of conflict management* which form a composite variable with Cronbach's alpha of 0.60. The other conflict resolution methods investigated are: disputes are referred to committees *(committee referral)*, or to higher level bosses for mediation or resolution *(hierarchical referral)*; conflicts are pushed under the rug *(avoidance orientation)*; and people in a conflict situation come to an agreement on an one-to-one basis *(one-to-one resolution)*.

Styles of Leadership

Bennis and Nanus **[65]** note that many organizations are well managed but poorly led, as they excel in performing routine tasks while not bothering to question the basic assumptions underlying them. They identify four essential competencies of an effective leader: a) attracting others by conveying a clearly focused vision, b) communicating it in a manner understood by the followers, c) nurturing others' trust by being reliable, and d) being aware of one's own potential, capabilities and shortcomings and utilizing them effectively. Selznick **[66]** lists four key leadership tasks: defining purposes, embodying purposes in programmes, defending institutional integrity, and ordering internal conflict. This study reflects some of these ideas and looks at the following leadership styles.

Nurturant-Task (NT) Leadership. A nurturant-task leader emphasizes task accomplishment, goal orientation and purposiveness in the organization, and at the same time cares for subordinates, shows affection, and takes personal interest in their well being **[67]**. Concern for task and nurturant orientation are the two pillars of this style. Though both NT and democratic or participative styles are similar in their ways of enabling full participation of members in organizational activities, there is an important difference between them. While participative school considers the member to be fully equipped, motivated and prepared to contribute as 'equals', NT school believes that some sort of a guided initiation is required to enable members to come up to their full potential before they can contribute meaningfully. It may be noted that NT style has evolved in the cultural backdrop of developing countries **[68]**.

Developmental Leadership Style. This style is similar to the NT style but devoid of any emotional backing. This composite variable included the following items: leadership strongly stresses the competency development of subordinates, inspirational leadership that highlights a vision of excellence, strong emphasis on delegation of authority and initiative taking by subordinates, and placing issues before subordinates for frank group discussion before decisions are made [Cronbach's alpha: 0.83].

Professional Leadership Style. This style emphasizes formal, rational and scientific approach to problem solving and decision making. Relegating the 'individual' in the 'organization member' to the background, it focuses on results, perfection, and excellence as assessed on purely professional yardsticks.

Get Results by Any Means' Style of Leadership. Managers with this style are only bothered about results/outcomes and not about the means employed to achieve them.

Organizational Performance

Organizational performance can be examined on two aspects: *internal outcomes* as reflected in improvement in employee satisfaction, productivity, work innovation, etc., and *external outcomes* as reflected in improvement in customer satisfaction, fulfillment of commitments, reputation for quality and excellence, market leadership, etc. In this study, we asked respondents the extent to which there was deterioration or improvement in the following areas in their sub-units: morale of work-force, morale and team spirit of managers, quality of project management, support of top management for improvement, co-ordination among departments, quality of managers, quality of technical staff, workforce productivity, result orientation, level of task innovation and level of openness in the organization. This composite variable of organizational performance had Cronbach's alpha of 0.93.

RESULTS

Managerial Orientation and Organizational Learning

All factors of managerial orientation show significant correlation with the different dimensions of organizational learning (Table 2). Sense of meaningful job assignment and sense of harmony among organizational members have the lead scores in most cases. Both these orientations consist of items that could be termed as motivctors (e.g. challenge in job, sense of

accomplishment, team spirit and harmony, etc.) which trigger an intrinsic need to learn and provide a force for linkage and integration, so essential for organizational learning. We also see from Table-II that, sense of meaningful job assignment and sense of harmony among organizational members have the highest correlation with shared purposes and priorities, decentralized operations that help employees act as learning agents, and building bridges among different functions overcoming compartmentalized approaches.

Table 2. Correlation Between Organizational Learning and Managerial Orientation

Managerial Orientation	Organizational Learning						
	Shared Purposes & Priorities	Organizational Designs			Managerial Actions		Total orgnl. learning
		Decompartmentalization	Decentralization	Debureaucratization	External Orientation	Change and Development Orientation	
Sense of meaningful Job assignment	0.45	0.44	0.43	0.40	0.31	0.33	0.42
Sense of development	0.30	0.31	0.28	0.35	0.26	0.29	0.30
Sense of harmony among Organizational members	0.43	0.42	0.40	0.31	0.28	0.43	0.38
Sense of reward in job	0.39	0.33	0.34	0.25	0.25	0.35	0.32
Sense of security	0.26	0.30	0.32	0.32	0.32	0.28	0.29

All correlations are significant at $p < 0.01$

Sense of security does not merely represent security of job tenure. The construct also includes items such as assurance that necessary information and other resources would be available as and when needed, and helpful and supportive nature of the immediate superior. This factor has relatively lower correlation with different dimensions of organizational learning, but all the same has a facilitating influence on them. Finally, we note that sense of harmony among members creates a climate of openness and trust so that there is encouragement for constructive dissent, the organization benefits from interactions with outside experts, is able to carry out meaningful reviews and thus develop capability for learning and change.

Managerial Attention and Organizational Learning

Allocation of managerial attention to change and innovation emerges as a crucial and important process in a learning organization, showing the highest correlation to learning among all the composite variables in the study (Table 3) Results indicate that managers of learning sub-units make consistent efforts to develop managerial and technical abilities of subordinates, generate professionally challenging tasks, initiate continuous innovations in work methods, introduce technological improvements, minimize costs through improvements in performance standards, and most importantly develop the ability of groups to work together.

It is significant to note that the element of developing teams emerges as very important. Teams are groups with a meaningful purpose, specific performance goals, common approach, complementary skills and mutual accountability [69]. Teams are particularly important in a research organization that works in advanced areas of science and technology and has to bring its experts together, pool their talent, and address complex issues of technology development and project management collectively. The organization has to perform as a team of teams to accomplish its missions. When senior managers emphasize teamwork, they create a favourable context for individuals to collectively concern themselves with long-term issues, take entrepreneurial risks and act as learning agents for the organization. It appears that the creation of a learning organization is rooted in transforming the organization into a team of teams.

Though in comparative terms, managerial attention to continuity has weak association with organizational learning, an examination of its individual items shows that one group of items has practically no relation to organizational learning, while another set has a low to moderate association. Specifically, attention to meeting time deadlines or routine interface issues has no relationship with learning. It is likely that attention to these issues reflects concern with productivity and not learning. As Friedlander [70] notes, when a system concentrates on being highly productive, it tends to ignore learning and concern itself more with applying what it knows already rather than search for new methods and approaches. But another set of issues relating to continuity - attention to maintaining high quality standards, creating informal group culture, and getting decision made as close to action as possible - has a facilitating influence on organizational learning. It is possible that these continuity-related concerns foster incremental learning through collective efforts toward improvement. This learning may be largely 'single loop', in the nature of initiating corrective

actions within the existing framework and work methods rather than 'double loop' of questioning and modifying the guiding framework itself [71].

Table 3. Correlation between Organizational Learning and Allocation of Managerial Attention

Allocation of Managerial Attention	Organizational Learning						
	Shared Purposes and Priorities	Organizational Designs			Managerial Actions		Total orgnl. learning
		Decompartmentalization	Decentralization	Debureaucratization	External Orientation	Change & Development Orientation	
Managerial attention to Change and Innovation.	0.53	0.45	0.51	0.55	0.44	0.47	0.45
a. Developing managerial abilities of subordinates	0.45	0.39	0.45	0.50	0.38	0.40	0.40
b. Developing technical abilities of subordinates	0.45	0.38	0.41	0.52	0.33	0.40	0.39
c. Ensuring professional satisfaction of employees with challenging work	0.48	0.43	0.45	0.45	0.39	0.37	0.44
d. Developing & implementing new methods of work	0.41	0.43	0.43	0.39	0.39	0.37	0.44
e. Introducing technological improvements and innovations	0.46	0.44	0.43	0.40	0.35	0.34	0.42
f. Developing ability of group to work together	0.59	0.48	0.53	0.53	0.49	0.48	0.47
g. Carrying out work at minimal costs	0.37	0.38	0.36	0.32	0.37	0.28	0.38
Managerial Attention to continuity.	0.28	0.19	0.26	0.32	0.22	0.22	0.18
a. Meeting internal time deadlines in work.	0.10	0.04	0.09	0.15	0.07	0.04	0.04
b. Meeting time deadlines in work with respect to outside agencies	0.07	0.01	0.06	0.12	0.05	0.07	0.04
c. Working effectively with other functions/departments.	0.13	0.05	0.09	0.22	0.12	0.10	0.06
d. Maintaining informal culture within the group.	0.21	0.12	0.26	0.32	0.24	0.21	0.18
e. Maintaining high quality standards in work	0.40	0.29	0.32	0.45	0.31	0.29	0.26
f. Getting decisions made as close to action.	0.32	0.26	0.28	0.22	0.21	0.26	0.18

All correlations are significant at $p < 0.01$.

Conflict Management and Organizational Learning

Table 4 shows that only the two proactive methods of conflict management have significant correlation with organizational learning. Planning process helps the organization confront its present problems in the context of its future aspirations and thus generates a concrete learning agenda for its members to pursue [72]. Planning process can also highlight the systemic factors that need attention. Significance of conflict management through emphasis on common objectives and values, communication, and job rotation also needs emphasis here. Neilsen [73] proposes two strategies for reducing conflict between groups - one by change in behaviour of concerned actors and the other by change in their attitude. Behaviour change makes the conflict less visible through hierarchical intervention, short-term compromises, or separation of the groups. This may eliminate or reduce open conflict, but the members of one unit may still dislike members of other units. A change in attitude is deeper and happens over a longer time period. It includes a change in behaviour as well. Emphasis on superordinate goals, inter-group training or job rotation foster learning through an attitude change brought about by an awareness and appreciation of priorities and issues across units or departments.

Table 4. Correlation between Organizational Learning and Modes of Conflict Management

Dominant Modes of Conflict Management	Organizational Learning						
	Shared Purposes & Priorities	Organizational Designs			Managerial Actions		Total orgnl. learning
		Decompartmentalization	Decentralization	Debureaucratization	External Orientation	Change & Development Orientation	
1. Proactive Methods: A. Planning to anticipate potential source of conflict to minimize friction.	0.35	0.44	0.32	0.19	0.33	0.37	0.41
B. Emphasis on corporate objectives, core values, communication & job rotation.	0.28	0.33	0.25	0.14	0.19	0.35	0.33
2. Disputes are referred to committees (committee referral)	0.18	0.19	0.25	0.25	0.07	0.16	0.12
3. Disputes are forwarded to top bosses for resolution (hierarchical referral)	0.15	0.12	0.11	0.26	0.08	0.10	0.18
4. Conflicts are pushed under the rug (avoidance orientation)	-0.35	-0.45	-0.30	-0.15	-0.26	-0.20	-0.32
5. People in conflict situations come to an agreement on one to one basis (one-to-one resolution)	0.21	0.20	0.29	0.12	0.13	0.21	0.14

All correlations are significant at $p < 0.01$.

Results show that committee and hierarchical referral modes of conflict resolution do not contribute much to organizational learning. In both cases, the resolution comes as a 'settlement' arrived at after some cross-questioning or enquiry. These are more of procedural approaches where norms/rules take precedence, with no real attempts at integration [74]. 'One-to-one resolution' whereby conflicting parties settle on compromise also shows insignificant relation to learning, as trade-offs and/or appeasements are likely with such resolutions which have little or no scope for learning. Interestingly, there is high negative correlation between learning and conflict management through 'avoidance orientation' whereby conflict resolution is delayed or avoided. Thus managers who pursue delay tactics or close their eyes to conflicts in the belief that 'time' is the best healer may be blocking learning in their organizations.

Table 4 also reveals a seemingly contradictory result. Proactive methods that show fairly high correlation with organizational learning dimensions however show a relatively low correlation with debureaucratization that fosters experimentation and innovation. At the same time, management of conflict through committee and hierarchical referrals which generally exhibit weak correlation with organizational learning dimensions display notable correlation with debureaucratization. This might be implying that conflicts arising in organizations call for attention of managers to systemic problems that require change. It is possible that hierarchical and committee referral modes have greater likelihood of taking calculated risks. In a large bureaucratic organization with attendant rules and regulations, the tacit support of top/senior managers and/or the backing of a task force or committee may be necessary to experiment with new approaches. These modes may also provide a convenient means of drawing the attention of superiors to some persistent problems.

Leadership Styles and Organizational Learning

The need for adopting a balanced mix of 'rational-emotional' approaches in the leadership influence process in a learning organization comes out strongly in this study as evident from correlations of developmental and nurturant-task (NT) styles in Table 5. The term 'rational' here denotes task oriented, objective approach, incorporating management principles like participation, delegation of authority and emphasis on development of subordinates, and the term `emotional' denotes the caring, nurturant and supportive approach.

Table 5. Correlation between Organizational Learning and Leadership Styles

Leadership Styles	Organizational Learning						
	Shared Purposes & Priorities	Organizational Designs			Managerial Actions		Total orgnl. learning
		Decomp artmenta lization	Decent ralizati on	Debure aucrati zation	External Orientation	Change & Developmen t Orientation	
Nurturant Task Leadership style	0.40	0.31	0.39	0.28	0.38	0.38	0.43
Developmental Leadership style	0.37	0.29	0.39	0.29	0.42	0.30	0.45
Professional Leadership style	0.26	0.25	0.20	0.06	0.23	0.17	0.25
Get Results by any means style	-0.01	-0.05	-0.02	-0.02	-0.14	-0.08	-0.17

All correlations are significant at $p < 0.01$

Both developmental and NT styles are nearly equally correlated with all learning dimensions except with 'change and development orientation' where NT style shows a higher value. This may be traced to the basic difference in approaches of individuals practicing the two styles. While NT style explicitly exhibits a paternalistic concern and involvement in the development of subordinates, developmental style though emphasizing capability development as much, lacks in emotional backing and support. As Sinha [75] points out, organization members in developing countries perceive a higher influence and contribution of NT style in not only shaping their personal and professional capabilities but also making them feel more central in organizations. This strengthens their role as learning agents for the organization.

Professional leadership style also shows significant correlation with learning but comparatively lower than NT and developmental styles. A

professional leader emphasizes rational, scientific problem solving, and analysis. It is possible that this style has greater appeal to the 'professional-self' in the subordinates, when they are socialized to think and act objectively and rationally. The 'get results by any means' style has negative correlation with learning, as this approach could imply just 'staying on plan and making your numbers [76] - the magical numbers which represent the target or plan, by even adopting unethical short-cuts.

Organizational Learning and Organizational Performance

Results in Table 6 suggest that a learning organization is also a high performance organization. We find that organizational performance as a composite variable as well as its constituent items show moderate to high association with all the learning dimensions.

Table 6. Correlation between Organizational Learning and Organizational Performance

Organizational Performance	Organizational Learning						
	Shared Purposes & priorities	Organizational Designs			Managerial Actions		Total orgnl. learning
		Decomp artmenta lization	Decent ralizati on	Debureau cratization	External Orientation	Change & Development Orientation	
Organizational Performance Total	0.48	0.46	0.47	0.32	0.41	0.40	0.40
Morale of workforce	0.31	0.37	0.30	0.12	0.20	0.28	0.25
Morale and team spirit of managers	0.46	0.46	0.40	0.23	0.34	0.35	0.37
Quality of project management.	0.45	0.48	0.50	0.41	0.45	0.39	0.44
Support of top management for improvement.	0.40	0.33	0.31	0.24	0.33	0.26	0.30
Co-ordination among different departments	0.40	0.33	0.41	0.26	0.40	0.42	0.31
Quality of superiors and managers.	0.48	0.47	0.50	0.37	0.45	0.44	0.44
Productivity of workforce	0.35	0.36	0.30	0.12	0.25	0.29	0.32
Result orientation	0.32	0.38	0.40	0.24	0.33	0.32	0.39
Level of work innovation	0.35	0.41	0.36	0.27	0.32	0.32	0.40
Level of openness in the organization.	0.38	0.33	0.37	0.32	0.35	0.35	0.34

All the correlations are significant at $p < 0.01$.

Higher the morale and team spirit of managers, morale of work-force, quality of project management, top management support for improvement, coordination among different departments, quality of superiors and managers, productivity of workforce, result orientation, level of work innovation, and level of openness in the organization, higher is the impetus to learning. We may also think of a feedback loop where organizational performance boosts the morale and efforts of members to pursue purposive learning, which in turn enables the organization to improve its performance further. This effect could continue if the organization is careful to avoid the 'learning blocks'. As Duane Hartley, general manager of Hewlett-Packard's microwave division puts it, "organizations become successful, then they lose their sense of urgency and end up having to go through some kind of transition to get it back" [77].

DISCUSSION

In this study, we attempted to empirically explore the role of certain key organizational processes in fostering organizational learning. Results show that the following factors are particularly important in fostering learning: creating an effective environment for learning, orienting individual members to act as effective learning agents by empowering them, allocating managerial attention to change and innovation, following proactive methods of conflict resolution, adopting nurturant-task and developmental styles of leadership, encouraging experimentation, and supporting team learning. Avoidance behaviour in resolving conflicts and leadership style concerned with results alone were conspicuous with their negative influence. These findings have significance for managers attempting to foster learning in their organizations and aspiring to build learning organizations.

Empowering Individual Learning Agents - Processes that Generate Feelings of Centrality and Harmony

The study suggests that an important challenge for managers aspiring to be the architects of learning organizations is one of creating a learning environment. They need to consciously and deliberately create and sustain a setting in which members experience centrality and feel a sense of importance, a sense of meaning in what they do, a sense of development of their full potential, a sense of harmony with other members that provides support, and a sense of reward in pursuing learning tasks.

A stimulating environment alone is not sufficient for continuous and effective organizational learning. It needs to be simultaneously backed up

with active efforts aimed at empowerment of members who act as the actual learning agents. As Conger and Kanungo [78] point out, the notion of empowerment is much deeper than authorizing, delegating, or sharing power with subordinates. It refers to the process of enabling them through enhancing their personal efficacy and a sense of self worth. Empowerment gives organizational members a sense of task and professional competence, feeling of confidence, and in turn generate commitment to make significant contributions. NT and developmental styles of leadership and conscious and consistent managerial attention to change and innovation help in creating a feeling of empowerment among members to pursue learning.

Creating Readiness to Unlearn - Processes that Generate Supportive Context

Learning new approaches often involves giving up old ways of working, or unlearning [79], a painful process that causes anxiety and stress in individual members, subunits and the whole organization. Unlearning involves questioning and scrutinizing existing and established practices, set of beliefs, and behavior patterns, which if found to be inadequate and incapable of meeting new demands on the organization, are rejected. This initially creates some chaos and uncertainty. In this transition phase, patterns of beliefs, organizing structures, and roles and activities of members remain hazy; responses to new ideas are diffused; there is heightened political activity in an effort to define the situation; and numerous questions remain unanswered about the overall framework. Unlearning leads to conflicts within individuals, causing pain and anguish. Conflicts are also likely among different members, units or functions on matters of ideas, priorities, resource allocation, etc. There may also be conflict between 'the old guard' who may feel emotionally committed to existing practices of the organization and not convinced of the need to learn and change, and those who champion change and innovation. Individuals may also feel threatened about their own survival when new practices alien to them are introduced, and may express it through skepticism, cynicism and risk averse behavior.

This process of unlearning is inevitable as the organization takes the journey on any unchartered path. It has to be ensured that the situation does not have a paralyzing effect on the organization. As the study points out, managers following nurturant-task and developmental approaches can infuse a spirit of experimentation and entrepreneurship among subordinates, and a sense of efficacy to cope with the chaos and confusion. The nurturant attitude also lessens the anguish and uncertainty associated with unlearning. Conflict resolution through committee referral provides a wider platform for discussion and resolution of competing ideas and issues that arise in the

process of unlearning. When ideas and concerns are shared across different levels and functions in the organization, mutual confidence and trust get built. Further, organizational learning involves not only innovation and implementation but also stabilization [80]. Stabilization entails the internalization of the new norms and ways of working and adapting them to emerging challenges. During this phase, the organization gradually builds up a new set of beliefs, behavior patterns and organizing structures; new roles of members become clear, uncertainty associated with change is reduced; and the organization as a whole understands and comes to grips with the rationale behind the new pattern.

Change Agenda for Learning - Processes that Create
a Shared Sense of Purpose

     In this study, the construct of 'managerial attention to change and innovation' shows the highest association to organizational learning, highlighting the importance of generating, shaping and championing a well thought out change agenda for facilitating learning. Kotter [81] notes that certain managers see themselves essentially as change agents, spending considerable amount of their attention and energy on initiating and implementing change and innovations in their organizations. Through deep involvement and commitment they bring in an intensity of purpose to their actions. They become the 'souls of fire' [82], envisioning, championing and anchoring the change and innovation processes. With a clearly focused change agenda, such managers empower their subordinates to overcome resource barriers to change, mobilize their energies and align them with their vision. Results suggest that managers adopt a 'pull' rather than 'push' style of influence [83] to energize and attract people to be part of a larger vision of the future; identical to Senge's [84] concept of a learning organization being vision driven.

CONCLUSION

     In today's environment where changes are rapid, learning is no longer a desirable luxury, but an ardent necessity. Our study shows that meaningful learning can be kindled and nurtured in organizations when managers build them in such a manner that they are capable of acting like organisms which can pick up signals, interpret them in the light of available evidence and experience with least prejudice, and act on them effectively [85, 86]. This study indicates that, building learning organizations need to be rooted in organizational processes that empower individual members to act as effective learning agents; processes which generate and sustain a supportive context in which unlearning and re-learning can occur as a matter

of routine; and processes which anchor and inspire the learning process with a shared sense of purpose. The study also clearly suggests that learning is the key to high performance, particularly when organizations operate in dynamic environments.

What can organizations, in general, and R & D institutions in particular learn from this study? As Herbert Simon [87] points out, problem-solving processes in organizations should rest on certain sound principles. First, attention to future must be institutionalised. Senior managers should deliberately and systematically allocate organizational resources, including their attention, to deal with long-range problems. Planning resources should be protected from absorption in current problems, however urgent they may be. Second, senior managers should create processes to ensure that solving the problem on hand takes priority over looking backward to its causes. Initially, backward looks should be limited to diagnosing the causes; fixing responsibility for mistakes should be postponed until a solution is being implemented. When it is time to look backward, the primary focus of attention should be on what can be learned to prevent similar problems from arising in the future. Third, a climate needs to be created wherein managers accept personal responsibility for finding and proposing solutions, although the search for solutions may, of course, be a collaborative effort involving many people. In implementing action solutions, managers should assume personal responsibility, including securing the necessary authority from above if required.

As Prof. Simon [88] points out, these are fairly simple habits of response which are taught and learned both in the manager's one-on-one conversations with subordinates and in staff meetings. To foster learning, organizational processes should ensure, for instance, that attention is brought back repeatedly to defining problems until every one is agreed on just what the problem is. Attention should flow in the direction of generating possible solutions and evaluating their consequences. In short, organizational learning has to be consciously and carefully nurtured and managed as a process.

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