DOĞUŞ UNIVERSITY
SOCIAL SCIENCES INSTITUTE

THE APPLICATION OF OOAD TO "ORGANIZATIONAL LEARNING, ADAPTATION, AND MANAGEMENT SUPPORT SYSTEM"

MBA THESIS

by Fırat DOĞAN

Thesis Supervisor
Assist. Prof. Mehmet Değirmenci

Istanbul, June 2002

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PREFACE

Today organizations are faced with huge amounts of data and information obtained both from the external environment of the organization and from the internal processes of the organization.

Despite the widely-accepted belief that more information facilitates the decision making process, the complexity and huge volume of the data and information puts the decision makers into a harder situation. To filter, condense, classify, and decompose these data and information, and to enable the generation of more reliable decisions, decision support systems are needed.

The organizations also need to monitor and store the given decisions in order to record and evaluate possible errors of omission and possible errors of commission.

Monitoring of decisions, diagnosis of errors, analysis of error-sources and prescription and adaptation of the remedies against these errors are the basic steps of the learning process within an organization.

In this thesis a learning model that facilitates learning and can be applied to the whole organization is developed by using object oriented analysis and design technique.

I would like to express my deepest gratitude to my thesis supervisor Assist. Prof. Mehmet Değirmenci for his invaluable guidance, continuous support, encouragement and motivation throughout this study.

I would like to thank to Mathew Nazmi for his invaluable suggestions and contributions.

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İstanbul, June 2002 Fırat Doğan

ÖZET

Bu çalışmanın amacı nesne temelli analiz ve tasarım teknikleri kullanılarak organizasyonel öğrenmeyi sağlayacak bir öğrenme modelinin oluşturulmasıdır. Çalışmaya temel oluşturması amacıyla yönetim trendleri, öğrenme teorileri, öğrenme yöntem ve araçları, ve öğrenen organizasyonlar gibi temel konular üzerinde derinlemesine bir kaynak araştırması gerçekleştirilmiştir. Ayrıca Peter F. Senge, Michael J. Marquardt, Russel L. Ackoff, Chris Argyris gibi yönetim teorisyenlerinin oluşturdukları modeller detaylı olarak incelenmiştir. Çalışmada temel alınan Ackoff'un "organizasyonel öğrenme, adaptasyon ve yönetim destek sistemi" nesne temelli analiz teknikleri ile geliştirilmiş ve genelleştirilmiş modelleme dili ile modellenmiştir. Modellemede Microsoft Visio 10.05 modelleme paket programı kullanılmıştır. Çalışmanın sonunda sonuçlar özetlenmiş ve ileride yapılabilecek çalışmalar belirtilmiştir.

SUMMARY

This study aims to develop an object oriented analysis and design based model that facilitates organizational learning. To form a basis for the study a thorough literature survey is performed on the subjects of management theories, learning theories, learning methods and tools, and learning organizations. Moreover the learning models that are developed by the management theoricians, Peter F. Senge, Michael J. Marquardt, Russel L. Ackoff and Chris Argyris are analyzed in detail. Ackoff's "organizational learning, adaptation, management support system" model is improved with the use of object oriented analysis and design technique and is modelled with unified modelling language. Microsoft Visio 10.05 modelling package is used as a tool for modelling and the study is concluded with the summary of results and the statement of future studies.

LIST OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

DSS	Decision Support System
OLAMS	Organizational Learning, Adaptation and Management Support
OOAD	Object Oriented Analysis and Design
OOP	Object Oriented Programming
TQ	Total Quality
TQM	Total Quality Management
UML	Unified Modelling Language

1. INTRODUCTION

Management is a field of science that works parallel to the needs of humans. Even in the eras that are defined to be non-scientific, there had been examples of such workouts. In addition, studies that had begun with industrial revolution, has encouraged studies of theoreticians like Taylor, Fayol, Weber and etc., thus management has gained a scientific identification and provided an important increase in efficiency. These studies, also named as classical management approach, have been criticized according to new developments, and a continuously developing field of management has formed.

However soon, the classical approach of management was not adequate to satisfy the needs of business environment including employees and employers, shareholders, customers and society, in line with rapidly changing technological, scientific, social and economic changes.

Organizational learning is vital for the organizations to achieve high level of performance, improve quality, enhance customer satisfaction, obtain competitive advantage, deal with change, and especially to survive within the competitive environment by continuously improving the intellectual abilities of its employees, providing the environment that supports learning, supporting the involvement of employees in the decision making processes and creating and adapting a shared vision.

This philosophy includes all the concepts that other management approaches put forward like, quality, mission, vision, values, company culture, strategies, goals, processes, internal and external customer satisfaction and expectations in a more general manner, horizontal hierarchy, and effective communication. In addition learning organizations philosophy implies that the mentality of traditional approach should be changed radically.

Object oriented analysis and design is a methodology that models the real life objects as software objects, unified modelling language is a technique that transforms object oriented analysis and design models into a software language.

In this thesis the aim is to develop an object oriented analysis and design based model that facilitates learning within an organization. Ackoff's "Organizational learning, adaptation, management support system" model is used as a reference in the study. This model is developed by the use of the three main diagrams of unified modelling language: Use case diagram, sequence diagram and class diagram.

The structure of this thesis is organized as follows: In chapter two and three a detailed survey on management theories and learning concept that serve as a background for learning organizations is given. In chapter four the concept of learning organizations is introduced, the need for learning organizations, the evalution of learning organizations, different aspects of learning organizations, the obstacles that learning organizations may encounter and different organizational models are analyzed in detail. In the fifth chapter object oriented analysis and design methodology and unified modelling technique are explained and object oriented analysis and design based learning model is introduced. Chapter six concludes the thesis and states the future research areas.

2. MANAGEMENT

2.1. Definition of Management

Management is defined as the process of achieving organizational goals in an effective and efficient manner through the four basic functions: planning, organizing, leading and controlling.

Planning is the management function concerned with defining goals for future organizational performance and deciding on the tasks and resource use needed to attain them (Daft, 2000). Planning involves estimating future conditions and circumstances and based on these estimations, making decisions about what work is to be done by the manager and all of those for whom he is responsible. This function involves two types of planning. Strategic planning that addresses long-range goals and the approaches for achieving them and operational planning that focuses on the short-range objectives and the approaches for achieving them.

Bartol and Martin, (1998) define organizing as the management function that focuses on allocating and arranging human and non-human resources so that plans can be carried out successfully. Through this function managers determine the tasks that are to be done, how these tasks can best be combined into specific jobs and how these jobs can be grouped into various units that make up the structure of the organization.

Leading is the management function that involves the use of influence to motivate employees to achieve the organization's goals (Daft, 2000). Providing leadership in an organization is important since it helps to create a shared culture; ensures that the employees understand the organizational goals and motivates them to achieve these goals.

Controlling is the management function concerned with monitoring employees' activities keeping the organization on track toward its goals and making corrections as needed (Daft, 2000). The function is also referred to as "monitoring and evaluating" since the real time performances of the employees are monitored and evaluated. Afterwards, these results

of the evaluations are fed back into the planning process. Therefore, these four managerial functions are considered as a recurring and reciprocal process.

Effectiveness and efficiency concepts mentioned in the definition are two dimensions that constitute the performance of the management process. Bartol and Martin (1998) define effectiveness as the ability to choose appropriate goals and achieve them and efficiency as the ability to make the best use of available resources in the process of achieving these goals. It is not sufficient for the organizations to show high level of effectiveness or high level of efficiency separately, they need to exhibit both effectiveness and efficiency in order to be good performers.

2.2. History of Management Thought

Management philosophies and organizational forms have changed over time to meet the new requirements of the organizations. According to Daft, (2000) this change is affected by four important forces; social, political, economic and technological forces.

Social forces are the aspects of a culture that guide and influence the relationships among people; their values, needs and standards of behaviour (Daft, 2000). For example, as the workers in an organization become more skilled, their attitudes, values and demands change accordingly and the power shifts to the worker rather than the organization. The organizations need to excel the right policies in order to attract and attain well-educated employees.

Political forces refer to the influence of political and legal institutions on people and organizations. These include the assumptions about current political system, property rights, contract rights etc.

Economic forces are the ones that affect the availability, production and distribution of a society's resources among the competing users.

Technological forces include the scientific and technological advancements in a specific industry as well as in the society at large.

Daft, (2000), mentions that examining the history of management is essential since it gives a way of thinking, a way of searching for new patterns and understanding the trends in management. In this section, history of management policies will be analyzed briefly.

2.2.1. Preclassical Contributors

Although the practice of management thought leads to the 3000 B.C. (Daft, 2000), the development of management as a field of knowledge is much more recent. The interest of developing management theories and principles originated from the industrial revolution, in the early 1800s. The preclassical contributors in the middle and late 1800s focused on the problem of organizing the activities of factories and directing the work of the people employed in them. Their ideas are seen as a ground-work for management thought.

Robert Owen, a successful British entrepreneur focused on the working and living conditions of workers. His ideas laid the groundwork for the human relations movement. Charles Babbage, known as the father of modern computing, built the first mechanical calculator and a prototype of modern computers. He suggested the idea of specialization of mental work and suggested profit sharing. Henry R. Towne suggested that management should be considered as a science and that systematic principles that may be applicable to all types of management situations should be developed.

2.2.2. Classical Viewpoint

The classical perspective which emphasized the importance of principles for the design of a logical structure of organization management emerged during the nineteenth and early twentieth century. This viewpoint has three major sub-groupings: Scientific management, bureaucracy and administrative management.

2.2.2.1. Scientific Management

Scientific management is an approach within classical management theory that emphasizes the study of work methods in order to improve labor productivity. The basic ideas of scientific management can be summarized as the development of standard methods for performing each job, selection of workers with appropriate abilities for each job, training workers in standard methods, supporting workers by planning their work and eliminating interruptions; and providing wage incentives to workers for increased output.

The major contributions of scientific management are that; it emphasized the gathering of data concerning jobs and tasks, persuaded managers to abandon hazardous approaches to planning and organizing work, stressed the role of management in organizing work, training workers and demonstrated the importance of compensation for performers. The major representatives of the scientific viewpoint are Frederick W. Taylor, Frank and Lilian Gilbreth and Henry Gantt (Turner et.al., 1993).

Scientific management has been criticized from both the organized labor and behavioral scientists. Black and Porter, (2000) summarize the stated criticisms as follows:

- Scientific management places too much pressure on workers
- It suggests an unfair division of rewarding policy between management and labor.
- Presents an oversimplified approach to worker motivation.
- Pays insufficient attention to social factors in the workplace that affects worker behaviour.
- Demand an excessive specialization of jobs and tasks.

2.2.2.2. Bureaucratic Management

Bureaucratic management is a subfield of the classical management perspective that emphasizes management on an impersonal, rational basis through elements like clearly defined authority and responsibility, formal record keeping and separation of management and ownership (Daft, 2000). Most of the concepts of bureaucratic management were

introduced by Max Weber, a German Sociologist. Bartol and Martin, (1998) summarize the major characteristics of Weber's ideal bureaucracy as follows:

- Specialization of labor
- Formal rules and procedures that specify the behaviour desired from members which facilitate coordination and ensure uniformity
- Impersonality such that, rules, procedures are applied uniformly regardless of individual personalities.
- Well-defined hierarchy
- Career advancement based on the qualifications and performance of members.

Weber's concept of bureaucracy has been criticized by various researchers. Mullins, (1999) summarizes the criticisms as follows:

- Over emphasis on rules and procedures rather than purpose.
- Dependence upon bureaucratic status, symbols and rules.
- Risk of lack of flexibility and adaptation to changing circumstances.
- Lack of responsiveness to individual incidents or problems.

Mullins, (1999) also states that Argyris was one of the strongest critics of bureaucratic organization. Argyris claimed that bureaucracies restrict the physcological growth of the individual and cause feelings of failure, frustration and conflict.

2.2.2.3. Administrative Management (Principles)

Administrative principles is a subfield of the classical management perspective that focuses on the total organization rather than the individual worker. Bartol and Martin (1998), state that administrative management approach focuses on the principles that can be used by manager to coordinate the internal activities of organizations. The major contributors of this approach include Henry Fayol, Mary Parker Follet and Chester Barnard.

Henry Fayol is famous with his book "General and Industrial Management" in which he states that managers perform five basic functions: planning, organizing, commanding, coordinating and controlling. These functions are also accepted as the major functions of management process as mentioned in Section 1.1.

Mark P. Follet analyzed the dynamics of management-organization interactions and addressed the concepts such as ethics, power, empowerment, facilitating rather than controlling employees. Her ideas served as a contrast to scientific management as she stressed the importance of people rather than engineering techniques.

Chester Barnard argued that organizations are not machines, and informal relationships are powerful forces that help the organization if properly managed. He also stated that people have free will and can choose whether to follow management orders and that they are more willing to accept directions from a manager if they understand that the order is line with the organizations purposes and the employee's benefits.

Daft and Steers, (1986) states that classical management perspective is a very powerful approach that gave companies fundamental new skills for establishing high productivity and effective treatment of employees.

2.2.3. Behavioural Viewpoint

Behavioural viewpoint is a management perspective that emphasizes understanding human behaviour, needs and attitudes in the workplace. Black and Porter, (2000) analyze the approach in two subfields: Human relations approach and human resources approach.

Human resources approach originates from the findings of the Hawthorne studies. Hawthorne studies are a series of research studies performed at the Hawthorne plant of the Western Electric Company that focused on the importance of human factor in productivity. According to the results of the studies, human relations factor was the most significant factor that explained the increase in the output of production. It was stated that employee's output increased sharply when managers treated them in a positive manner. Dessler, (2000)

states that Hawthorne studies were a turning point in the study of management since the results showed the managers that human behaviour at work is a complex and powerful force.

Human resources perspective is an approach that involves a basic belief that people possess and want to make greater use of their talents and capabilities; and that if allowed to do so, performance and satisfaction will increase (Black and Porter, 2001). Two of the best-known contributors to human perspective are Abraham Maslow and Douglas McGregor.

Abraham Maslow, a practicing psychologist is well known with his hierarchy of needs theory that proposes that humans are motivated by multiple needs and that these needs exist in a hierarchical order (Daft, 2000).

Douglas McGregor formulated the famous theories, theory X and theory Y that proposes assumptions about human behaviour.

2.2.4. Quantitative Management Viewpoint

Quantitative management viewpoint emerged during the world war II with the aim of using the current resources in the most effective manner. The quantitative methods used during the war gained attention of business organizations. Bartol and Martin, (1998) state that quantitative management viewpoint focuses on the use of mathematics, statistics and information aids to support managerial decision making and organizational effectiveness. Three branches have evolved from quantitative management viewpoint: management science, operations management and management information systems.

Management science -also known as operations research-is an approach aimed at increasing decision effectiveness through the use of sophisticated mathematical and statistical models.

Operations management is the field of expertise responsible for managing the production and delivery of an organization's products and services. It is often applied to manufacturing settings in which various aspects of production need to be managed.

Management information systems refers to the field of management that focuses on designing and implementing computer based information systems for use by management. They are seen as an important competitive advantage since they enable the organizations to handle large amounts of information.

Black and Porter, (2000) state that quantitative management field grew rapidly in popularity for its ability to provide precise solutions to decision problems especially in complex circumstances. However such techniques do not provide comprehensive theories of management and thus have not had the same impact as the previously described management approaches.

2.2.5. Contemporary Viewpoints

While the classical, behavioural and quantitative approaches continue to make contributions to management; other viewpoints have also emerged. These are called contemporary viewpoints since they represent major innovations in ways of thinking about management (Bartol and Martin, 1998). Three major extensions of this perspective are systems theory, the contingency view and total quality management.

2.2.5.1. Systems Approach

Systems approach attempts to focus on the total work of the organization and the interrelationships of structure and behaviour and the range of variables within the organization (Mullins, 1999).

System is defined as a set of interrelated parts that function as a whole to achieve a common purpose. A system functions by acquiring inputs from the external environment, transforming them in some way and discharging outputs back to the environment.

Systems theory in the organizational context, refers to the process involved in how inputs get transformed by the organization into outputs as shown in Figure 2.1

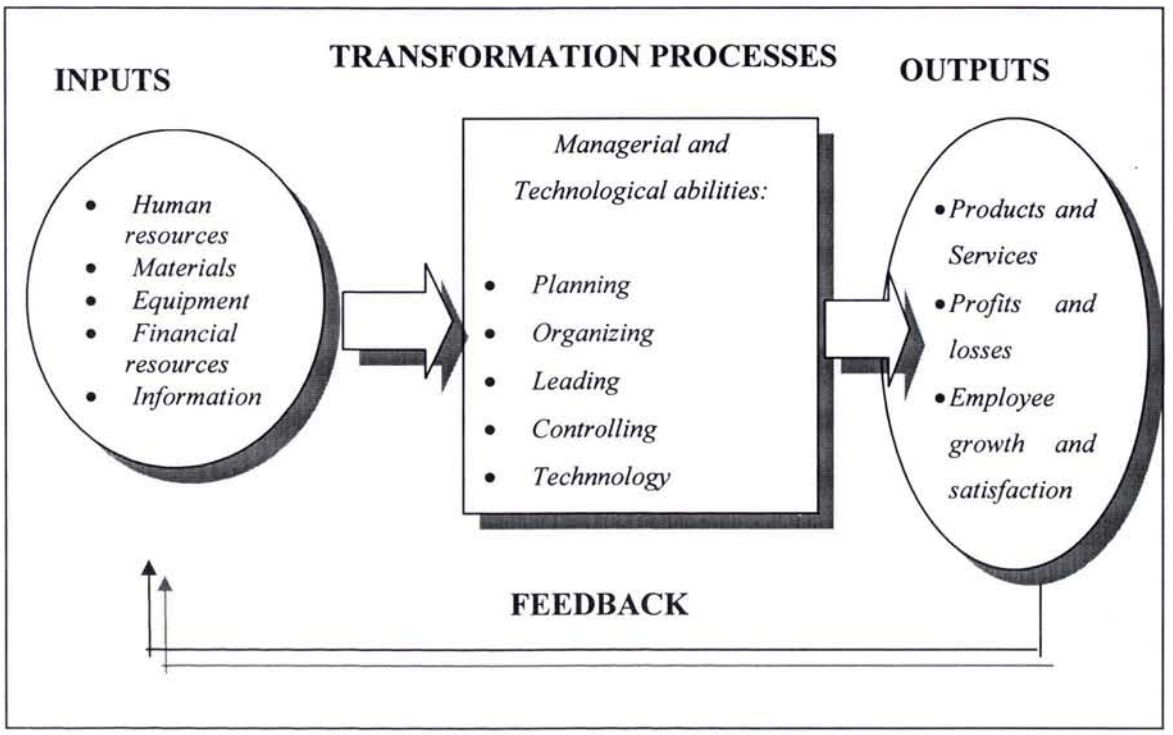

Figure 2.1. Systems view of organizations (Bartol and Martin, 1998)

As presented in Figure 2.1, according to the systems approach, an organizational system has four components. Inputs are the various human, materials, financial equipment, and informational resources required to produce goods and services. The second component, transformation processes are the organizations managerial and technical abilities that are applied to convert inputs into outputs. Outputs are the products and services and other outcomes produced by the organization and lastly the fourth component is the feedback, the information about results and organizational status relative to the environment. Feedback influences the selection of the inputs during the next cycle of the process.

In the systems viewpoint, the organizations are seen as open systems that operate in continuous interaction with its environment. Through such interaction the system takes new inputs and learns how its inputs are received by various important outside elements. Open systems have two major characteristics; negative entropy and synergy.

Daft (2000) describes entrophy as the tendency for a system to run down and die. If a system does not receive inputs and energy from its environment then it will eventually die. Therefore, organizations must continuously interact with their environment and must adapt their selves to changes.

Synergy means that the whole is greater than the sum of its parts. The meaning of synergy from the organizations view is that organizational units working together can accomplish more than same units working alone. Bartol and Martin, (1998) state the advantages of systems approach as follows:

1. It can analyze systems at different levels
2. Provides a framework for assessing how well the various parts of an organization interact to achieve a common purpose.
3. Emphasizes that a change in one component of the system may affect other parts.
4. Considers the interaction of organization with its environment.

2.2.5.2. Contingency Approach

Black and Porter, (2000) define contingency approach as a choice between more traditional forms of organizational structure and methods of management and more flexible and less specified structure and methods. In the broader view, contingency approach means that there are no general principles of management that can be applied to all situations. The best principle will depend on various variables, many of which are out of the managers control but most of which should be considered in deciding how to proceed.

2.2.5.3. Total Quality Management

Total quality management (TQM) is a concept that focuses on managing the total organization to deliver quality to customers. It is considered a management philosophy since it encompasses a commitment from all levels of employees to continually strive to make improvements and satisfy customers (Black and Porter, 2000). Bartol and Martin,

(1998), summarize the fundamental assumptions underlying the total quality management concept as follows:

1. Quality is less costly than poor workmanship.
2. Employees will naturally try to improve quality as long as they have appropriate support.
3. Serious quality improvement requires cross-functional efforts.
4. Quality improvement requires the strong commitment of top management.

Total quality management has four important elements: Employee involvement, focus on the customer, benchmarking and continuous improvement. Employee involvement is the companywide participation in quality control. Employees participate in a wide range of areas including setting goals, determining standards of performance, governing quality, and designing control systems. Customer focus is the organizing of all processes and employees in a manner to satisfy customer requirements. Benchmarking refers to a process whereby companies find out how others do something better than they do and then try to imitate or improve on it. Continuous improvement is the implementation of small incremental improvements in all areas of the organization on a continuous basis (Daft, 2000).

According to Juran and Goldfrey, (1999), among many others, the major outcomes of the implementation of total quality management philosophy in the organization are, lower costs, higher revenues, delighted customers and empowered employees which are the objectives of current organizations.

2.3. The Paradigm Change in Management

Through the middle and late 1900s the rate of change in the world of organizations and management has started to rise significantly. These rapid changes in the external and internal environment of organizations have a dramatic impact on the organizations and management thought.

Traditional organizations are vertical organizations in which the activities are grouped by common functions from the bottom to the top of the organization. The organization is coordinated and controlled by vertical hierarchy and the decisions are given by the upper-level managers. These organizations are chacterized by routine specialized jobs and standardized control procedures. Vertical organizations are considered to be very effective in the stable environment however they are insufficient to deal with the changing environment. For this reason the companies shift to a new paradigm, the "learning organization".

In the new paradigm, the primary responsibility of managers is not to make decisions but to create learning capabilities throughout the organization. Everyone in the organization participates in identifying and solving problems, enabling the organization to continuously experiment, improve and increase its capability. Employees are empowered to identify and solve problems since they understand the vision and long-term goals of the organization (Daft, 2000). Figure 2.2 presents the two paradigms of management.

	OLD PARADIGM	**NEW PARADIGM**
	Vertical Organization	**Learning Organization**
Forces On Organizations		
Markets	Local, domestic	Global
Workforce	Homogenous	Diverse
Technology	Mechanical	Electronic
Values	Stability, efficiency	Change, chaos
Management Competencies		
Focus	Profits	Customers,employees
Leadership	Autocratic	Dispersed, empowering
Doing Work	By individuals	By teams
Relationships	Conflict,competition	Collaboration

Figure 2.2.Paradigms of Management

Daft (2000) specifices learning organization concept as the last step in the history of management thought and presents the management perspectives over time as shown in Figure 2.3.

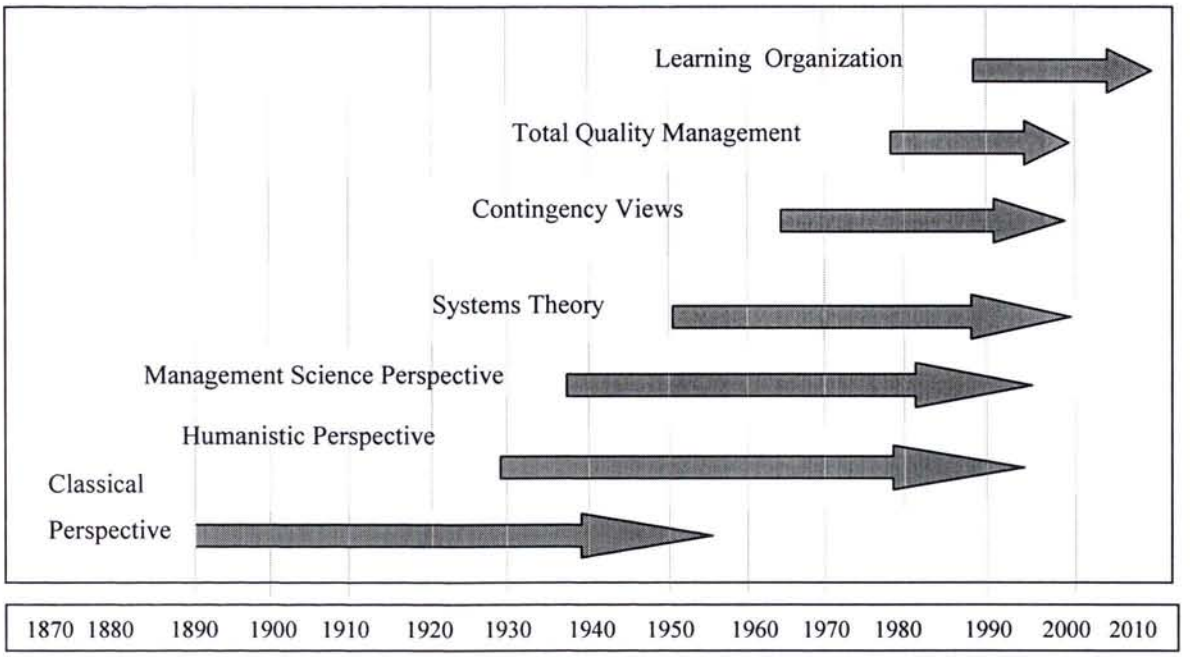

Figure 2.2. Management perspectives over time (Daft,2000).

3. LEARNING CONCEPT

3.1. The Definition of Learning

Inspite the fact that the essential information, knowledge, manners, and attitudes in order to survive the daily life are gained through learning, learning concept is as old as the existence of human beings. However, the analysis of learning concept through managerial concerns began in the 20th century. According to Macmilan dictionary, learning is defined as gaining of information and knowledge. Different disciplines have different definitions of learning. Economists, define learning as simple improvements in activities or abstract and definable positive outcomes. In administration literature, learning is equivalent to competitive efficiency. According to Peter Senge's (1990) "The Fifth Discipline", "learning" is not gaining more knowledge. It is to improve the skill of creating the desired outcome in life. Learning, in basic, is a frequent and continuous change in attitude via experience and practice. "Experience and practice" refer to the ways that attitude is gained and "frequent and continuous" refer to the continuity of the attitude after it has been gained. Changes in attitude with respect to single situations like, exhaustion or a temporary adaptation, should not be considered as normal examples of learning. Another characteristic of learning is that it cannot be observed directly. There are four important aspects to emphasize on. First, learning should definitely result in a change in attitude. This change may also be for the better or worse. Second, the change in attitude should be considered permanent in order to define it as learning. Third, learning process should be exercised through experience and practice. This description does not comprise the changes in attitude through physical growth. For example, the act of walking is a matter of physical growth and cannot be considered as learning. The last one states that the act can be considered as learning as long as it is reinforced through any form of experience and practice. If not followed by reinforcement, the change in attitude would not be permanent. Performance and learning should never be confused. Learning is an internal process, hence cannot be measured directly. However performance can be qualitatively or quantitatively measured and evaluated. For example the unit production rate per day for a worker or the quality of a decision for a manager can be measurements of performance. Learning can improve rate and quality of production, or the quality of decision. Therefore learning is a

factor that defines the limits of performance. Sometimes test subject may not expose what he has learned through his attitudes. It is important to posses the will of transforming the learnt information into action. By observation, individuals may learn things despite the fact that they do not have the intention to learn that specific subject. The exposion is contingent to motivation (Arslan and İşçioğlu, 1998).

In order to state that learning act is accomplished, the student should comprehend the idea or thought that he did not know before, should perform acts that he could not perform before, should create new concepts by synthesizing known concepts, should use and apply the information and knowledge he has learnt, and should understand and evaluate the attitude and knowledge of other individuals. Learning results in associations and connections among responses to stimulants. Stimulants can be internal sources of the organism (pain, feelings, ideas, and thoughts) as well as external sources from the environment (words, light, sound, objects). No matter how light, any stimulant that leaves a trace on brain or nervous system, results in a response act. Most of the researches on learning focus on the realization of learning via social effect, in other words how one learns from others. In addition, it has become an accepted and well-known fact that all the derivatives of learning have been created from experiences of others. Learning from others' experiences is an important aspect since it is continuous and shows the natural flow among humans. Before defining other concepts of learning, it would be better to emphasize on different concepts learned (Tınaz, 2000).

What can be learnt can be any of the following; data, information, knowledge, understanding or wisdom. Unfortunately these concepts are usually misused and confused. "Data" and "Information" are frequently confused. A distinction between "knowledge" and "understanding" is seldom made. However, the concept of "knowledge" is much more different. For example in representing "awareness" one may say, "I **know** you are there" or in order to emphasize on talent, "I **know** how to drive a car." Current learning systems and most of the computer-aided systems are associated with collection of data, revealing, processing and transmission of information. Knowledge is barely considered and understanding almost not even dealt with. And wisdom is not taken into account with learning.

Data: Originates from symbols that show objects, events and their characteristics. Data is the product of observation. Humans or relevant equipments and machines can carry out both observation processes. Data is the raw material of information. If a group of data can be processed and transformed into a beneficial form then it becomes information. As in the example of the process of iron ore transforming into useful iron.

Information: It is a definition that comprises the answers to the questions of who, what, when, and how much. Information benefits in decision process, in order to determine what to do, however it cannot be used in order to determine how to realize the act. For example a schedule that shows the movies in a cinema is information, but this information does not provide the ways to get to the cinema. However, the correctness of the decision is contingent to the specifications of the program.

Knowledge: It consists of the instructions that determine how to perform an act. Knowing how a system works, knowing how to rearrange the system in order to make it work properly, or knowing how to repair a system can be called as knowledge. Control is to measure the efficiency of an act performed to attain the aimed result, in various ways. The efficiency can be calculated by whether determining how much resource is used to get the output, how much resource is needed to succeed, or measuring the function of resources and realization possibilities. Knowledge can be gained by trial / error, or by benefiting from the knowledge of others that they have gained through their own experiences. Training is the transmission or gaining of knowledge. Training and education do not refer to the same concepts. Education is the gaining and transmission of understanding and wisdom. The skill of gaining knowledge is called Intelligence. Thus the correct measure for intelligence is contingent to the rate of gaining knowledge. Therefore it is the rapidity of gaining knowledge that determines the intelligence qualification not the level of knowledge.

Understanding: It covers the answer to the question "Why?" If one knows how to perform an act in the right way, that doesn't increase the level of knowledge. When an act is carried out in the wrong way, determining the reason and source of the error, and correcting it results in learning. It is a common mistake not to check the correctness of the things we

know. Therefore being able to determine the error, (Observation and Control) also determining the reason and source of the error, and constructing the system that takes the necessary precautions in order to avoid error, becomes essential. These systems are named "Learning and Adaptation" systems. An error or the reason of an error determined during the flow of a process shows that one possesses comprehension and understanding abilities. For understanding to be realized, data and information have to be conforming. The event, reasons of the occurring event and how it has occurred should be set clearly.

Some computerized systems have been developed to diagnose the malfunctioning of organisms, but are in relative infancy. The types of malfunctioning that can be explained by computerized diagnostic systems do not involve choice, purposefulness. As yet, we do not have the ability to program computers to determine the intentions behind or producers of purposeful behavior. Computers have made inroads into storing and providing data, information, knowledge and understanding, but they can not provide computerized wisdom generation.

Wisdom: Doing something right does not necessarily mean doing the right thing. This is like the distinction between efficiency and effectiveness. Information, knowledge and understanding are great aids to efficiency however do not guarantee effectiveness. Wisdom is the evaluation of the results of the attitudes in the long term and understanding of this evaluation and also it is the will to sacrifice in the short term and in return to get benefit in the long term. The action of the person is the representation of his information, knowledge and understanding. Information, knowledge and understanding are valuable and facilitating factors in order to get the desired results. An effective act may not reveal its outcomes for the long term and in addition an effective act is not always evidence to effectiveness or that the act is done in the right way (Ackoff, 1999).

There is also no ideal unity for learning in managerial science. For example managerial theoreticians like Argyris and Schön, Fiol and Lyles, claim that learning and a rise in performance are equivalent whereas, most of others like Huber, Levitt, and March disagree to this idea and state that efficient learning organizations, especially in the long term, would provide better results then their competitors (Arslan and İşçioğlu, 1998). In fact

organizations learning the incorrect things, or the existence of incorrectness in the learning organization system, does not provide efficiency in performance. Thus, reliable and valuable learning, in other words effective learning becomes important. The efficiency of learning can be measured by the ability of learning to satisfy our needs. Learning has to generate actions in order to increase our efficiency. In order to provide this, knowledge is as much needed as information. Learning can also be defined as gaining the necessary physical ability – know-how, and gaining of the ability to understand and evaluate the conceptual explanation of an experience – know-why. In other words, what people learn and understanding and application of this doctrine forms the two steps of learning. Therefore it is possible to define learning as the increase in capacity of an individual in order to perform more efficient activity.

Similarly, Marquardt and Reynolds (1999), have defined learning as a process of gaining new information and intuitional understanding, which aims to reset actions and attitudes in order to get desirable outcomes.

Pedler and Aspinwall (1996), stated that learning in a learning organization has four important aspects; learning things – gathering information, performing actions – improvement of skills, individual being himself and improvement in self-potential – personal improvement, and learning to attain a goal in a teamwork – participating interrogation. The first two are methods that successful companies have been implementing for years. Third one has been applied at schools and very recently been used in business organizations. The fourth one has been put into agenda with the organizational learning concept and is still being developed and is also taking a role as a bridge between personal learning and organizational learning.

3.2. The Basic Aspects of Learning Process

Considering any kind of learning process; we come across four basic concepts:

Instinction:

It is a motivation aimed at learning. There are two forms of instiction. Primary instincts are

not learnt. For example, hunger. In order to quench hunger there occurs a motivation in order to learn the sources for food. Secondary instincts are learnt. A desire for social statue is a secondary instinct.

Stimulant:

It is anything that causes a response. For example a rumbling stomach is a stimulant that urges one to thing on food. If one asks another "What do you think on this subject?" then this is stimulant that makes the other start talking.

Response:

Response is a behavior act against a specific stimulant. In other words it is the behavior result of the stimulant. A ringing alarm clock is a stimulant. Turning of the alarm and waking up is the behavior response to stimulant.

Consolidant:

A consolidant is an object or an event that increases or sustains the effect of the stimulant. Consolidants can be primary or secondary just as instincts. Food, beverage and similar are primary consolidants that strengthens the response they follow and motivates one to show the response. Some neutral stimulants that match these consolidants soon gain the characteristics to be consolidants. These are called secondary consolidants. For example one tells a joke and the audience laughs with sincerity. Then one learns that laugh is evidence of social acceptance. Thus a response that causes laughing will be strengthened and sustained. Sincere responses to one's act are important for the continuity of the act. An artificial response will not have a consolidating effect.

There exists another process that avoids unpleasant, boring or punishing situations. This process is called negative consolidation. Avoiding specific food in order to avoid indigestion is an example of negative consolidation. By the aid of negative consolidation one learns two kinds of attitudes: getting away and abstaining.

3.3. Receptive Processes

Learning is a very simply developing process in line with a proper system and tools. Human beings already posses by birth, some of the systems that aid learning process. A child learning the word "cat" should be capable of connecting the sound of the word with an object or picture he/she sees. In the same manner, the word "hot" is learnt by connecting the sound of the word by touching something hot. Receptive processes are senses that inform us about the things that we have to learn. There are seven receptive processes; seeing, smelling, touching, tasting, hearing, balancing, kinestesy .It would be wiser to explain the subject by means of examples in order to provide a better comprehension.

Reading, taking a glance at a picture, and analyzing an explanation are several ways one uses the sense of "seeing" in learning process. While learning how to cook or how to operate on machines (in case of danger) one may use the sense of "smelling". In learning equipment, clothes, hot, and cold one uses the sense of "touching", in learning soar and sweet one uses the sense of "tasting", and in learning how to ride a bike or carrying a full tray one uses the sense of "balancing".

The most recent process that has partaken among receptive processes is kinestecy. Muscle sense that we name kinestecy, is mostly important in learning physical skills. (Tinaz, 2000).

3.4. Classification of Learning According to Levels Approach

Levels Approach divides learning in organizations into three steps. Learning organizations maximizes these three steps and provides continuous capacity enhance. Figure 3.1 demonstrates the relationship among these steps.

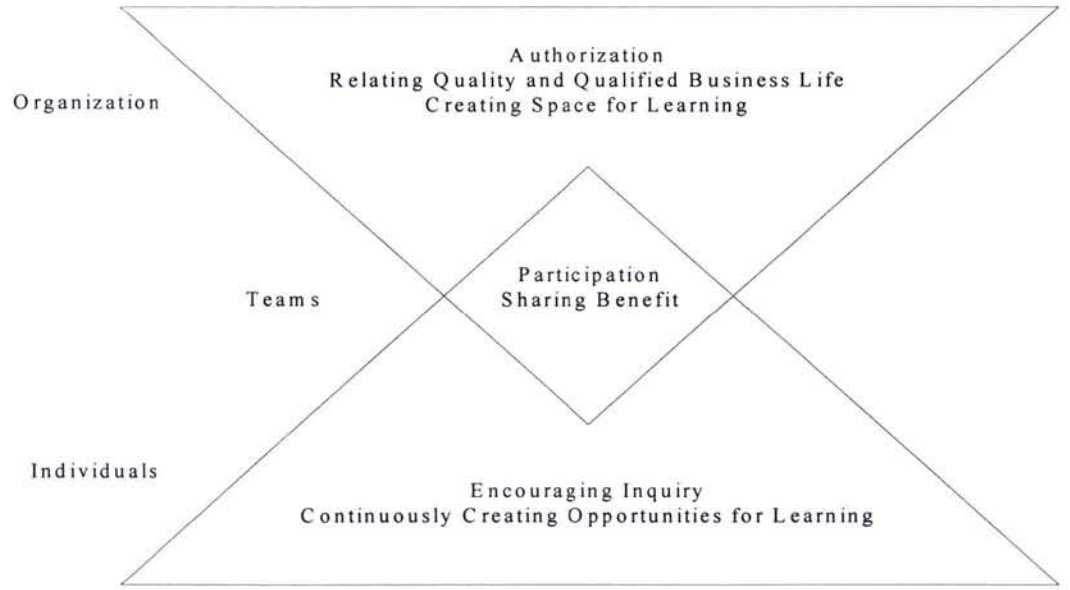

Figure 3.1. Learning Steps Model of Watkins (et.al). (Marquardt, 1996)

3.4.1. Individual Learning

Individuals represent the key steps in learning in organizations and teams. In addition to benefiting the internal information, they also outsource information to the company. Thus they are named "boundary spanners" and "technological gate-keepers" in literature.

Individual learning comprises of the changes in skills, approaches, knowledge, understanding and values with respect to individual studies, technological tools, comprehension and observation.

According to Corsini (1987) individual learning is a combination of five different learning skills. These are oral information, intellectual skills, cognitive strategies, and attitudes. (Erol, 1999).

Oral information, comprises of all kinds of information from singular reality to organized information. Intellectual skills, enable one to elucidate concepts and rules. Cognitive strategies, comprise of a series of processes like comprehension, coding, renewing, and thinking. Attitudes are learnt conditions that determine the choice of behavior of the individual against other individuals and objects. Individuals create or demolish

organizational forms that enable the kind of learning that would lead to organizational transformation. This seems consistent with "action perspective", which is an individual approach to Argyris and Schön's learning process. Learning activities of individuals can be facilitated or slowed down by an ecologic system of the factors that can be named as an organizational learning system.

3.4.1.1. Individual Learning Process

As a result of the experiments and researches made on the brain system, it has been found that human brain could not learn in a regular form but instead it collects messages in smaller divisions, and synthesizes these with existing information by creating new relations. This implies that learning is definitely a process.

According to Kurt Levin learning process originates from four basic steps. Even if the simplicity of the subject or accumulation of knowledge accelerates the process and these steps are not noticed when crossing our mind, a process always exists. If it is cut during in any stage, information sticks in the level of knowing that corresponds to this stage (Kim, 1993)

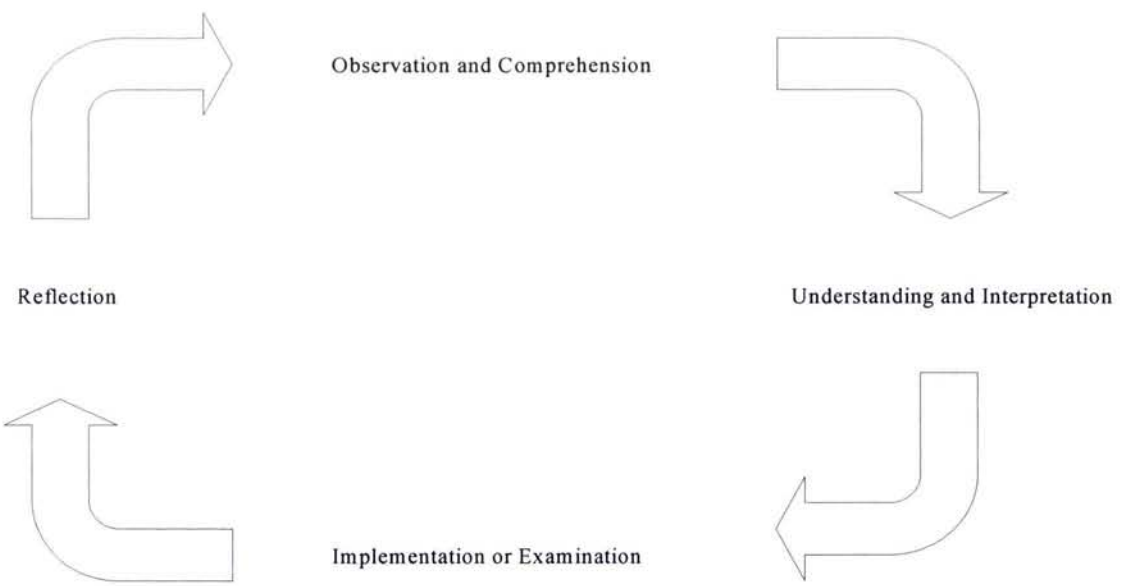

Figure 3.2 Levin's Learning Process

It should be noted that learning process shows similarities to the "Plan-Do-Check-Act" thesis of Deming in Total Quality Management literature. In a similar manner Argyris and Schön have mentioned about understanding-interfere-produce-generalize; Schön has mentioned about observation-emotional reaction-judging stages of learning process.

Kim (1993) has generated a common cycle of observe-evaluate-design-perform, by analyzing and combining Levin's, Argyris and Schön's and Kofman's learning processes. With this cycle he claimed that existing models are helpful in understanding learning processes but cycles are incomplete since none of them consider memory or mental models. He also declared that memory has a critical role in transition from individual learning to organizational learning and exposed a learning process that also included a mental model. On the other hand, in every cycle even though not mentioned namely, mental models do exist. For example, in the cycle that Kim has stated, in transition from observation to design stage, actually mental models of the individuals also take active part. Thus, different individuals may derive different conclusions of observations for the same event.

3.4.1.2. Learning Theory and Approaches

The theories that have been derived from the results of laboratory researches have formed the basis for especially education and rehabilitation applications for years. Recently learning theories have been used as a tool to influence the behavior of employees.

The first experiments of learning have started with behaviorism movement. Afterwards, informational learning approach has exposed which can be accepted as the complementary of the former one. Social learning approach, which synthesizes behaviorism approach and informational approach in order to define social behavior, recently has been attracting for the ones that study the field of learning.

Approaches of Behavioristic Learning

Approaches of behavioristic learning follow the general behaviorism approaches of psychology and by the aid of observable behavior, have studied behavior – environment

relations (relation of stimulant - response). The experimental history of approaches of behavioristic learning begins with Russian philosopher Ivan Parlov who has developed classical conditioning principles.

Classical Conditioning

Classical conditioning has been named so, since it is the first condition that has been analyzed experimentally in the field of stimulant – response relation. The basis in the stimulant – response relation experiments of Parlov is the exposition of contingency among the effect of external stimulants and reactional behavior. A simple reflex is a response to a specific stimulant that derives from an unintentional reaction. The movement of the leg when someone hits under your knee, the fear emerging from the loud shouting of someone are examples of such reflexive behavior.

Pavlov has experimented in order to find out whether there is an ineffective stimulant for saliva reflex, for example ring sound or bulb light, would generate a saliva act. Soon ring sound and bull light have been related to food and the saliva produced by dog as a reaction has been measured.

Food (unconditioned stimulant) → Saliva Production (unconditioned response)
Ring sound (conditioned stimulant) → Saliva Production (conditioned response)

As mentioned above when an unconditioned stimulant is offered, it causes an unconditioned response because the test subject does not need to learn how to response to this stimulant. However in the second situation, conditional response occurs, because the test subject has been subjected to a relation between ring sound and food and learning has been realized.

Generating a known response by classical conditioning depends on offering the unconditional stimulant and conditional stimulant continuously in the same time interval. If no food is offered to the dog that has been conditioned by ring sound and food relation, soon the conditional response will diminish. This is called deflation.

Actual or Implementational Conditioning

This approach depends on the belief that a stimulant does not create a response but spontaneous acts that depend on trail and error would repeat itself if an award were offered. Since there is an effect on environment this kind of conditioning is called actual or implementational conditioning since it is a tool for awarding or avoiding a punishment. In this kind of conditioning, observational behavior – result relation forms the basis. Instinctual facts are not considered.

The first actual conditioning experiments were conducted by Thorndike in the early 20th century. The classic example of Thorndike's stimuli and response theory was a cat learning to escape from a "puzzle box" by pressing a lever inside the box. After many trial and error behaviors, the cat learns to associate pressing the lever with opening the door. Here result or award is escaping from the box or reaching food.

The concept of Actual Learning is accepted to have a major role in predicting, controlling, and changing the behavior. This concept depends experimentally on the operational relationship between a stimulant and its previous results. Since behavior forms according to its result, then it is possible to affect on behavior by affecting results.

Cognitive Learning Theories

With the experiment he carried out on rats and mazes in the early 1930's, Tolman emphasized the organized aspect of learning: "The stimuli which are allowed in are not connected by just simple one-to-one switches to the outgoing responses. Rather the incoming impulses are usually worked over and elaborated in the central control room into a tentative cognitive-like map of the environment. And it is this tentative map, indicating routes and paths and environmental relationships, which finally determines what responses, if any, the animal will finally make." In this case, learning occurs not by trial and error but systematically and persistently. The connections between stimulant and response are realized through cognitive processes. A stimuli-organism-response model can represent these ideas. Stimuli comprise all objects and facts that exist in the field of perception. Organism comprises several cognitions like memory, targeting and expectations.

When the test subject confronts a stimulant, or aims to attain a goal, remembers the past experience that is hidden in its memory, decides what to do and responds.

Social Learning Theories

Social learning theories represent behaviorism approach as an extension of above mentioned classical actual (implemetational) conditioning theories. However both classical and actual conditioning explains learning with respect to environmental effects and direct experience and do not comprise intentional factors. Cognitional learning theories exposed the effect and importance of intentional factors, in other words cognitional processes in learning.

According to social learning theory learning model, stimuli are all of the objects and facts that surround the test subject, and cognitional processes like memory, an organism represents thinking and decision-making. When the test subject confronts a stimulant, or aims to attain a goal, remembers the past experience of stimulant-response-result relationship and chooses the attitude that would lead the correct result.

A new concept that social learning approach has brought is the ability of individuals to improve themselves. In social learning theory every individual can award himself in return of specific behavior. This improving result may cause an internal pleasure or as an award the individual may buy himself a gift (Baysal, 1996).

Learning Methods and Tools

Most of the information and knowledge that is being used in our daily life are not gained in order to learn but instead they are gained unconsciously as a result of activities performed for other purposes. Conditioning, taking others as model, experience, etc. there are many ways to learn. It is possible to classify learning methods and tools. In the most general manner, learning can be classified into two branches as conscious efforts and indirect methods (or learning through living). In the former one, learning is the aim of action however in the latter one, learning occurs as the side effect of another purpose. Since this goal affects the control over different learning it requires different approaches. Conscious learning has the advantage of being aware of what is learnt, why and how, because the

success of the action is determined by its aim and method. The method and tools chosen should comfort to the subject to be learnt, intelligence of the student, and the nature of the learning process.

Learning through living comprises the information from first hand thus is more effective then other sources. Besides since this kind of direct learning exposes more informative results then things learned through other's experiences, it is more advantageous. In addition, living through learning can be considered disadvantageous with respect to time concerns.

Another indirect method of learning is to relate concepts. The strength and clarity of the relational web inside brain represents a power of the memory. The variety and originality of relationships among concepts is the measure of creativity, clarity and consistency is the measure of its logic.

While relating concepts, integrity, reasonability, and connectionism approaches are used. Integrity approach is directly related to system approach and aims to have information about the whole by the aid of smaller portions of the whole, when the whole can not be interpreted directly. However in this situation it is important to remember that smaller portions of the whole cannot represent all properties of the whole system.

Reasonability approach aims to get benefit of reason-result relationship in leaning. There are several points to consider while implementing this method. The first point is that a single result may have more than one reason. This is called parallel reasons. Different reasons may affect result in different levels. Another point is that if the reason is withdrawn the result may change. However sometimes a reason might be the result of another reason and if that another reason is not withdrawn, the result does not change. This is called consecutive reasons principle. The third point is that every reason may not conduct a single result, and as reason-result relationship branches out, a single reason may derive many results. This is called avalanche effect. Finally one should take into account that reason-result relationship does not necessarily follow a linear pattern. Sometimes result generates a feedback that reaffects reason and thus forms a vicious circle.

The last approach that we use in relating concepts is connectionism. The skill of connecting objects or events is one of the most important aspects of learning. In order to create connections, there has to exist an infrastructure. Depending on the subject, conditions, intellectual structure, and goals, one may not see all the connections another one can see. This again proves that learning is a process.

One other method of indirect learning is learning through problems. When evaluated effectively every problem is a powerful tool for learning. Taking models is another effective indirect method of learning. If taken models are not implemented according to learning processes and characteristics of the individual it cannot get further than imitation. Learning through experiences can be both personal and by analyzing other peoples experiences. Learning form others is a common method just like taking models and is also an obligation since it is impossible to reexperience millions of years of humanity. There is also a need for an infrastructure for the inference of experiences. For example it is possible to conclude that after Newton discovered gravity by the aid of an apple falling from a tree he lied beneath, most people would avoid resting under apple trees.

One of the most important ways of learning through living is conditioning. The classical example of conditioning is Pavlov's dog. Similar results are derived from individual's experiences. For instance, by the aid of environmental factors one can be very successful or unsuccessful however the reason may be mistakenly accepted as the result of individual's information, knowledge or attitude. Conditioning is not always deficient. However, continuous behavior that is not contingent on a reality, conflicting with logic, can not be explained, or that results in unsuccessful outcome depends on conditioning subconscious. This condition, which can also be described as superstitional learning, should be avoided in order to prevent it to affect other learning trials. The most difficult part of learning is to replace incorrect information with the correct one.

It would be unwise to limit the trials of learning through living only with past and today. Determining the goals and targets about future, preparing the conditions, and acting in a planned manner are prerequisites not just for learning but also to be successful. In this era where future is imperceptible than ever and rapid changes are confronted, there exists no

theory or law that can predict future in the most accurate way. Thus creating multiple variations of assumptions is essential in order to cover this gap. Learning by assumptions would be more effective than learning by coincidences. It is important that assumptions are reflected to an unknown subject by combining known ones and that the assumption can be tested and its result can be evaluated (Yıldırım, 1999)

Learning Curves

In learning curves the vertical axis is the measure of performance whereas the horizontal axis represents the number of repetition, or experiences. This number can be classified as number of trials or time interval. In each repetition of the trial, the power of response increases. The curves represented in Figure 3.3 can both be interpreted for individuals, teams or organizations (Baysal and Tekarslan, 1996).

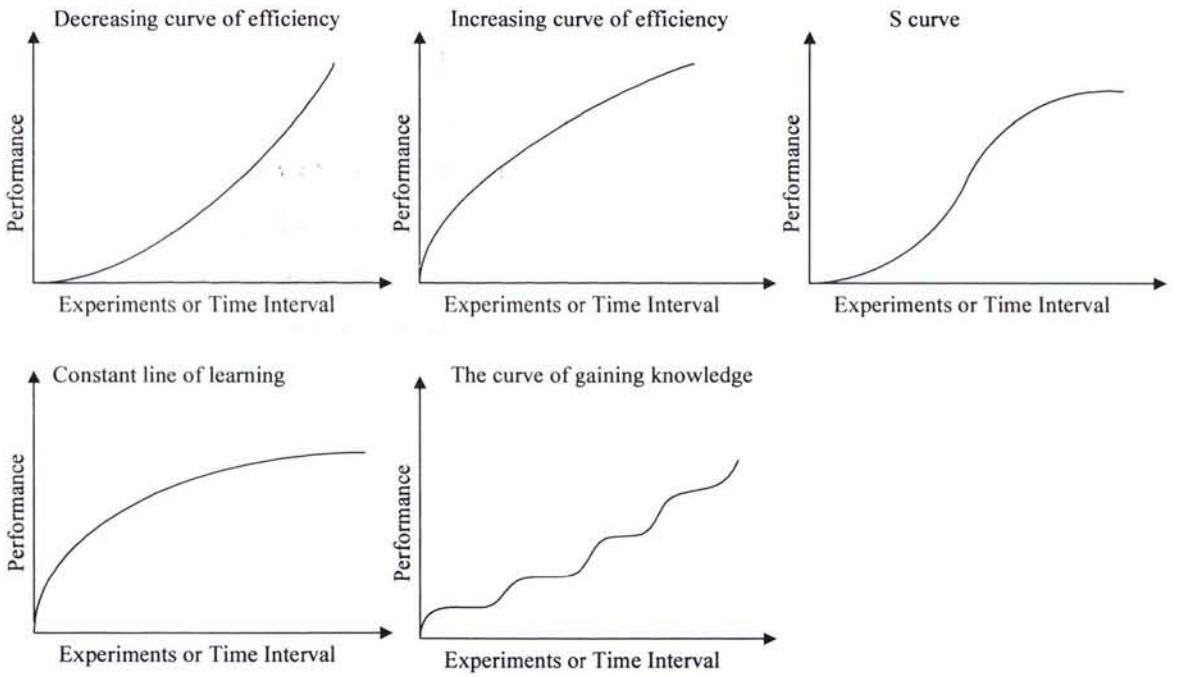

Figure 3.3 Learning Curves

Decreasing Curve of Efficiency: This curve shows acceleration in negative direction. Learning generally occurs in this pattern. In the first trials, performance accelerates rapidly, then the deceleration occurs and it stops. Learning of most mental and motional acts, for example routine acts, follow this pattern.

Increasing Curve of Efficiency: It is the opposite of decreasing curve of efficiency. It shows acceleration in positive direction. This kind of learning is not experienced as frequent as the former one. It is confronted especially when the individual has to learn something he is not related to in any means. Learning is slow at the beginning but it accelerates suddenly. Engineering, market researches, staff works, and works that require above level talent are learnt in this manner.

S Curve: This curve is a combination of increasing and decreasing curves of efficiency. Theoretically all learnings follow this kind of curves. This kind of learning is met where the individual brings no learnt information to the learning environment, in learning of subjects that are unknown, hard to learn and require comprehension, for example technical information that requires high levels of skills.

Constant Line of Learning: In most cases of learning the process goes a steady speed. Then such a point is reached where nothing new can be learnt and there a constant line occurs. This case happens in low level, and dull works.

The Curve of Gaining Knowledge: This curve represents the most complicated way of learning. It includes all ideas of other curves. After constant line, effectiveness increases. Individual suddenly goes a step further in learning and improves his performance. By repetition, individual becomes better. Continuous reputation would probably result in learning something deeply. When this is achieved individual tends to keep this knowledge in mind forever. Riding bicycle is an example for this case.

Several assumptions can be derived form learning curves. (Eren, 1993).

- The level of knowledge on the subject to be learnt is directly proportional to the progress of the process in the beginning. Slowly it speeds up in time. If individual is familiar to the subject to be learnt then, progress is faster and slows down in time.
- During learning of complicated knowledge, long or short-term progress becomes steady for sometime but later it accelerates. This kind of pause can occur more than once during the process.

- When the top level of learning is reached, it slows down and many trials might be needed in order to show a little progress.

3.4.2. Learning in Teams

The word "team" in Indian-European linguistics refers to the word "deuk", which means to carry together. In modern linguistics team means a group of people acting together. Learning in teams means that the members of teams create assumptions, think together and design future by seeing structures. In order to do this, deep thinking in complicated subjects, creative actions, dialogue and argument skills must be developed and members should possess organized planning and solidarity skills. The basics of team working emerged in 1924 when Elton Mayo started studying on relationships between workers, industrial sociology and management of employees. In 1960's, Japanese started to use quality cycles that have been formed by gathering experts, that acted independently in order to increase efficiency. This approach came into effect in western countries after 1980's.

Nowadays organizations get use of teams in order to attain their goals and solve problems. If organizations and societies are compared, it can be seen that teams are the families that form society of organizations. For this reason it is important that teams are created in a form of learning system. Since teams are formed of individuals, the assumptions derived for individuals are also naturally valid for teams. However it does not necessarily mean that teams learn as individuals learn. In other words individual learning is needed for the team to learn but is not enough.

The lack of common goal, stiffness in untested models, traditional ideas, density of priorities, inadequate communication and thinking, self-benefits over team benefits, are the factors that avoid team learning. In order to transfer from individual learning to team learning dialogue technique should be used in learning as a team principle. The aim of this technique is to expose individual thinking, conducting real sympathy, and satisfy the improvement of common thinking habit and as a result emerge an idea better than one alone can produce. By the aid of dialogue, the individual assumptions of the team are

suspended and a transition to a real common thinking act can be satisfied. Thus a free flow in the group is conducted and reaching instincts that cannot be reached individually is made possible.

Dialogue also comprises the methods that show how to identify communication forms that hinder learning. In arguments individuals try to force others to accept their ideas. Defensive situations mostly determine how the team works. In order to provide real learning there has to be a balance between arguments that form the platform to offer different ideas, and dialogue that makes it possible for the members to be open-minded with the conscious of mental models.

When learning as a team can not be realized adequately, the collective IQ level of a devoted managing team of individuals with intelligence quality above 120, can drop to 63. This subject is especially important in organizations of today where units are transformed from individuals into teams, since it is impossible for organizations to learn unless teams do so.

Senge (1990), sees learning teams as a process of ordering and increasing the capacity of generating the outcome that team members desire to achieve. Group Planning Coordinator of Shell, Arie De Geus, defines teams as "individuals in need of each other for action". The decisions taken by the organizations are implemented by individuals or teams. In some cases individual learning is not enough for organizational learning. However learning by teams creates little universes where in return the organization develops.

The organizations of team members attain performance goals and learn through multi systems communication that comprises the team itself and its members individually. Members of a successful team show simultaneous corresponding interaction in order to satisfy the needs of dynamic team and individuals and as well find the ways to satisfy the demands of a dynamic organizational system. During the process, they learn to share information, cooperate and create information. Learning as a team results in useful new information or organization, implementation of information in order to attain goals of the team or individuals.

Team members can follow all outcomes and processes and reflect these observations as increases in the performance of future actions of the team. Moreover team members may get use of shared mental models. Shared mental models give the team members the advantage of being punctual in realizing their roles and coordination. In addition they aid in team-work as a single unit.

"Alignment" is a group of people operating as a whole in a learning team manner. In most of the teams, energies of individual team members go in opposite directions. If one has drawn the picture of a team forming of individuals that go different paths in their life and posses personal mastery of different levels, it would resemble something like the figure below:

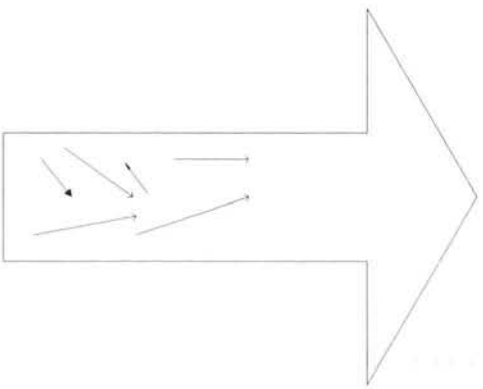

Figure 3.4 Group of people not operating as a whole in a learning team manner

The basic characteristic of a relative ordered team is wasted energy. Individuals may work hard but their efforts may not generate efficient teamwork. On the contrary, if a team is ordered, a directed corporation emerges and energies of individuals conform to each other. Less energy is wasted. A shared goal and vision, and being complementary to each other are the common characteristics of this understanding. Individuals does not sacrifice their self-benefits in order to provide more benefit for the team as a whole but instead, the common vision happens to be in the form of extension to self-benefit of individuals. Acually ordering claims that gives the individual power is the prerequisite in order to be able to make the team powerful.

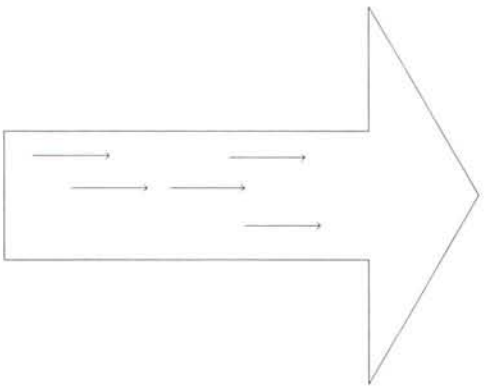

Figure 3.5 Group of people operating as a whole in a learning team manner

However in the existence of a relative low level of order, providing power to the individual would result in a chaos and make it harder to manage the team.

There are three important aspects of learning as teams. The first one is that, there is a need of inner thinking on complicated problems. Here teams should learn how to get use of the potential generated by more than one brain thinking together which is obviously advantageous than one mentality only. Even if it is easy to say so, there are forces that tend to lower intelligence of the team than intelligence of team members individually. Most of these forces are in direct control of team members.

The second is the need of innovative, coordinated action. Champion sports teams provide the metaphors for natural but coordinated activity. Leading teams in organizations develop a relationship in a similar manner. There is an operational confidence that causes each member to be conscious of other members of the team and they trust that each individual would behave in a manner that would be complementary in each other's actions.

The third is the role of team members on other teams. For example, the actions of teams that are formed by senior level managers are conducted by means of other teams. Thus, a learning team continuously improves other learning teams by suggesting its learning team practice and knowledge widely.

The discipline of learning teams requires the teams to apply two different communication ways among teams, dialogue and argument practices, as worthy as they should be. In

dialogue, complicated and sensitive problems are analyzed in free form and in a creative point of view, individual ideas are suspended and members listen to others' ideas seriously. Opposing to this, different ideas are presented and defended. The teams seek for the most appropriate point of view that supports the decision to be taken. Dialogue and argument are potentially complementary of each other, but many teams cannot distinguish the two concepts and there is a lack of skill of conscious transition among the two.

Finally, like any kind of discipline, the discipline of learning teams requires practice. However in modern organizations this is what teams lack of. Consider a sports team that does not practice. Actually the learning process of this kind of teams depends on the transitions among practice and performance. Team practices then plays, then again practices and again plays. We are in the very beginning of learning how to create such opportunities for managerial teams.

Despite its importance, learning teams are not understood enough. The concept will retain its mystery as long as it is not described in a better and detailed way. Unless a theory is stated about the process of learning teams, we will not be able to distinguish group intelligence from group ideas where individuals yield to group pressure for harmony. In order to create teams that can create teams, which can learn together, reliable methods should be revealed unless this will remain as coincidence. Thus being an expert on learning teams will be a critical step in building learning organizations.

Before beginning analysis of organizational learning concept another important concept; "implementation and control" should be understood in details in order to increase the comprehension of the former one.

3.5. Classification of Learning According to Type

Management and organization literature is rich in terms of revealing the concept of learning. Some of these can be listed as follows;

- Single loop, Double loop (Argyris and Schön, 1978)
- High and Low Level Learning (Fayol and Lyles 1985)
- Continuous and Innovative Learning (Bennis ve Nanus, 1985)
- Learning How to Learn (Morgan, 1986)
- Condition Sustaining, Adaptive, Creative Learning (Meyers, 1990)
- Productive and Adaptive Learning (Senge, 1990)
- Operational and Conceptual Learning (Kim, 1990)
- Strategic and Tactical Learning (Dodgson, 1991)
- Adaptive and Creative Learning (McGill, Slocum and Lei, 1992)
- Simple and Complex Learning (Stacey, 1993)

We will now analyze the frequently used ones in literature of the above listed concepts.

3.51. Adaptive and Productive Learning

Adaptive learning occurs when individuals and organizations learn through their reflections and experiences. Generally the algorithm of adaptive learning is as follows;

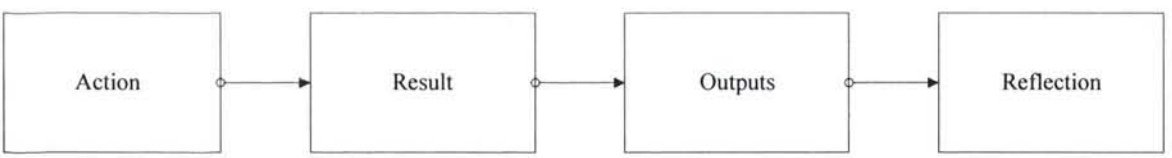

Figure 3.6 Adaptive Learning Algorithm (Marquardt, 1996)

As can easily be seen, individual or organization, first takes the action in order to attain the determined goal, as a result of the action, some internal and external effects emerge. The change exposing from the result is analyzed in conform with the goal and the new action or modification of the old one is carried out according to this analysis.

If adaptive learning is accepted as a response mechanism for errors, this would correspond to Argyris and Schön's single loop learning. In addition, the same authors mention about productive learning concept and this corresponds to double loop learning. Marquardt, on the other hand, claims that adaptive learning can both be single and double loop.

Senge (1990) corresponds adaptive learning with single loop learning and productive learning with double loop learning. Adaptive learning represents the current perspective of organizations, whereas productive learning emphisizes on defining the problem, feedback and continuous experience in continual analysis' of multidimension organizations that deal with solutions of problems. Productive learning deals with creation, and requires system thinking, shared vision, personal mastery, and team learning. Differing form adaptive learning, productive learning requires a new point of view to world. However adaptive learning focuses on providing solutions regardless of testing the conformity of current learning behavior.

Adaptive organizations focus frequently on past success records and increasing improvements. They do not question underlying traditional acquiescences in existing workflows. The basic distinction is being conformist and having the skill of conform. In order to sustain continuity of the ability of conformity, organization should operate as self-experimenting or self-designing organizations. In other words organizations should posses continuous change in their domains and targets.

3.5.2. Single and Double Loop Learning

Learning can be both single looped or double looped as Argyris and Schön (1996) has mentioned. (Figure 3.7) Single looped learning focuses gaining information for preserving the current system and sustaining its continuity. It detects errors and by correcting them responds to the changes in environment. However it aims to sustain present organization norm. This level of learning does not encourage or require any kind of thinking or questioning. It only focuses on the solution of the current problems and the behaviors or ideas that create problems are not revealed.

The most appropriate example for single loop learning from the daily life would be a thermostat. As well-known, a thermostat is a tool that considers the side effect diversions and focuses on a steady temperature level. Since it does not question the determined temperature level, even if it's adjusted to an unreachable temperature due to environmental factors, it still tries to reach that level.

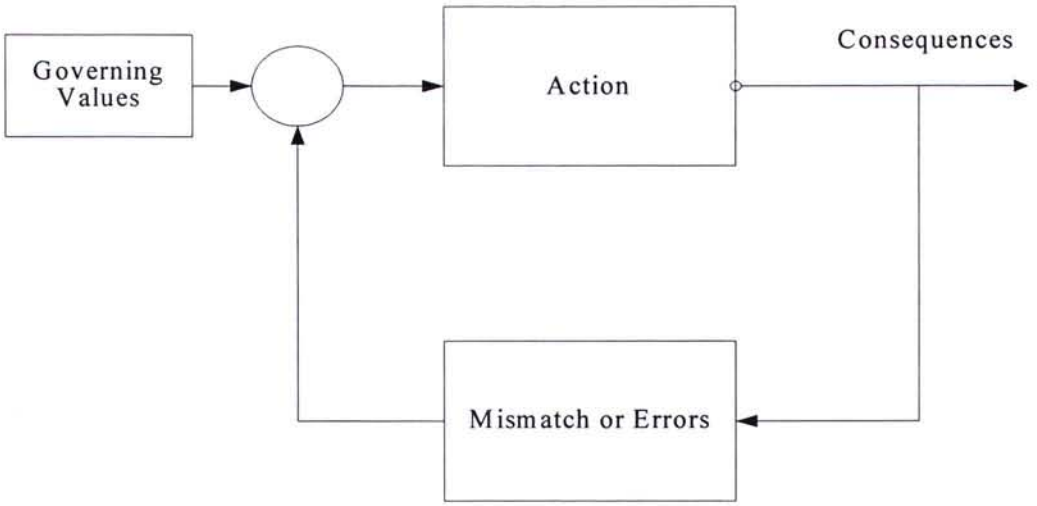

Figure 3.7 Argyris and Schön's Single Loop Learning Process

The processes of detecting and correcting errors for continuous improvement in total quality concept, which is implied by many organizations today, gives organizations the ability to sustain and also attain their current policy and goals. Thus this is also an example to single loop learning.

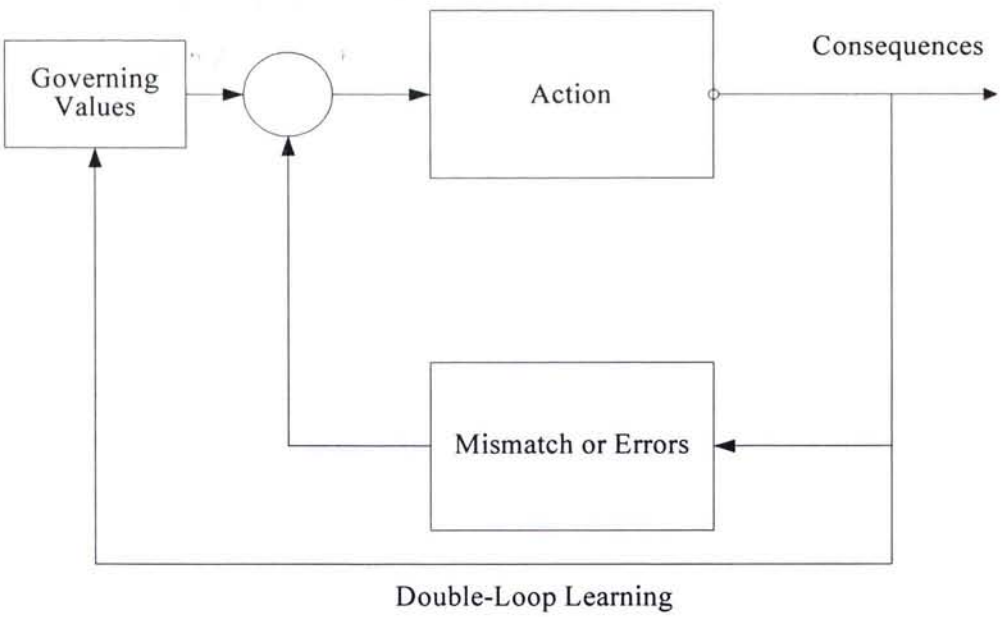

Figure 3.8 Argyris and Schön's Double Loop Learning Process (1996)

Double loop learning comprises the questioning of the system itself, the reasons of errors and successes and it is detailed (Figure 3.8). It not only analyzes the current processes but

also it comprises the correction of the culture, policies, goals, strategies and structure of the organization. Thus problem solvers do not only solve the problem but at the same time investigate reasonable factors in a wide aspect. In short, via double loop learning, error is found, it is corrected, and norms, policies and goals causing the error are also modified. Sterman (1994), schematizes Argyris and Schön's single and double loop learning processes as in Figure 3.9 (Polat, and Bozdag,1998).

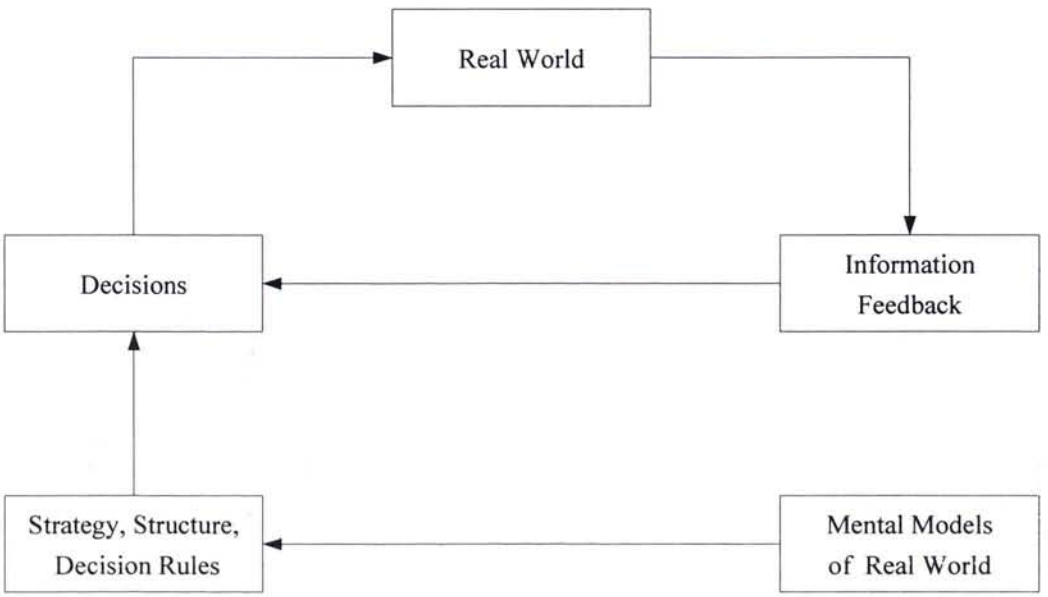

Figure 3.9 Single Loop Learning Process (Sterman, 1994)

Polat and Bozdag (1998) have stated that decision-makers in single loop learning compare quantitative and qualitative data about the real world with goals, observe the differences about realized consequences and goals, and in order for the real world to reach to the targeted condition a classical negative feedback exists. However the only factor that affects the decision is not feedback. In addition to feedback, the information about world reveals according to decision rules, or implementation of policies that have been constructed due to or corporate structures, organizational strategies, cultural norms, and directed by mental models in our minds. Single loop learning does not affect our point of world.

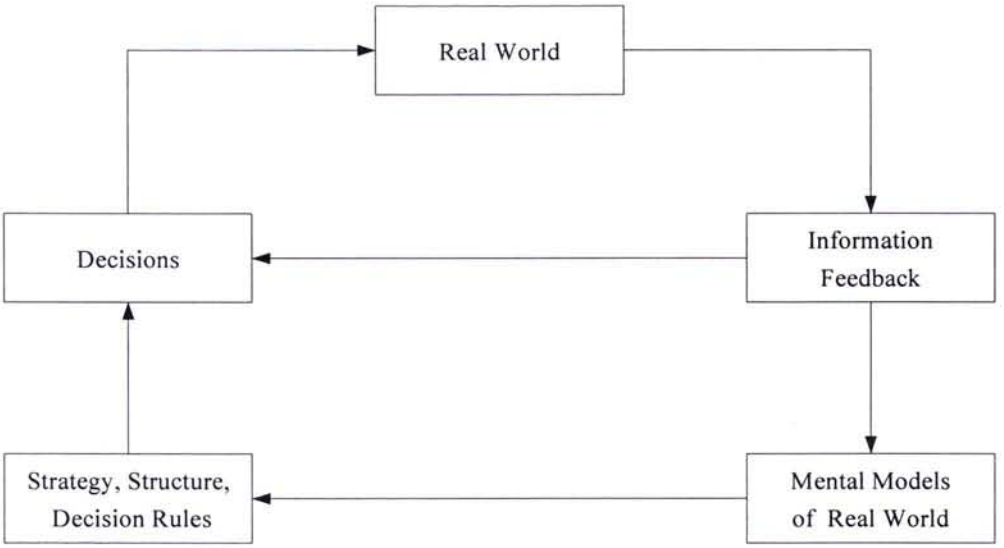

Figure 3.10 Sterman's Double Loop Learning Process (Polat and Bozdag, 1998)

Double loop learning occurs when information feedback of real world changes our decisions in the frame of current decision rules and in addition affects and changes our mental models. Since mental models can change with numerous other facts, it would be possible to take decisions that would result in various outputs to the same fact in different conditions and time periods. Thus for different decision rules, different organization structures and strategies would exist. In other words the same information processed by different decision rules may result in different outcomes. Such kind of learning not only comprises modification of understanding or redefining the situation but also results in new decisions and new goal and decision rules. Double loop learning can be defined as adaptation of the organization with respect to its environment.

3.53. Deutero Learning

The third, and highest, organizational learning level of the organizational learning model from Argyris & Schön is deutero-learning which can be regarded as learning to learn. Deutero-learning has to be understood as a process, wherein the single-loop learning and double-loop learning processes are considered and reflected by at least one observer of the organization (see Figure 3.11).

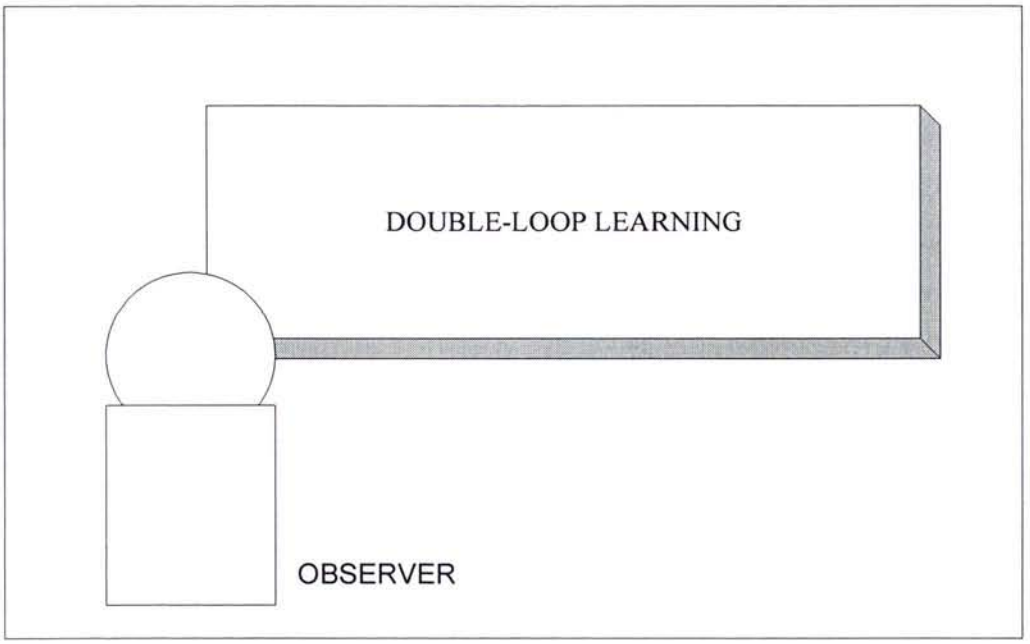

Figure 3.11 Deutero Learning (Argyris & Schön, 1996)

Deutero-learning enables the learning and improving of organizational learning processes on the level of single-loop and/or double-loop learning. The thorough reflection of the learning context, the removal of learning impediments and the promotion of learning supporting mechanisms are essential for successful organizational learning.

Argyris & Schön (1996) admit, however, that organizational learning is normally limited to single-loop learning, and does not engage in double-loop learning. They also suggest that deutero-learning is predominantly used for reflection about single-loop learning, and not double-loop learning.

A practical application of the three different learning levels would be the case of a typical European organization, which finds too many defects in its products. Single-loop learning would apply for the increase of inspection, which would be learning within the normal governing values. Double-loop learning would be a change towards organizational learning systems for employees or teams, and delegating the quality control to the shopfloor, thus copying the successful Japanese way of production. Deutero-learning would try to learn from the analysis of the performance of learning on both levels and would try to improve them, as well as implementing the lessons learnt in the other areas of the organization.

Single-loop learning, double-loop learning and deutero-learning, are divided by Argyris & Schön (1996) into four phases of an organizational learning cycle, which are the discovery of problems, invention of a solution, production and evaluation, and generalization of outcome.

Among the kinds of learning, the most accepted definitions are the ones related to Argyris and Schön's single, double loop and deutero learning. The common factor of these is the feedback factor. Feedback concept shows that learning systems are not linear but dynamic in structure. A system purified from uncertainity can not create new behaviors.

3.5.4. Conceptual and Operational Learning

Kim (1993) suggests that the observe-evaluate-design-take action cycle he used to explain learning strategy comprises of two kinds of learning: conceptual and operational learning. Evaluation and designation are the elements of conceptual learning while observation and taking action are theelements of conceptual learning. In conceptual learning the answer for "why?" question is sought and mental models, ruling conditions procedures take part in concepts.

3.5.5. Strategic and Tactical Learning

Argyris (2000), considers single loop learning similar to activities combined to databases, expertises, or routines that do not change the basic structure of organizations. Double loop learning on the other hand, comprises of correction of culture, goals, strategies and structure of the organization besides monitoring current processes. Double loop learning deals with modifying the database, expertises, and routines of the organization. Thus problem solvers do not only deal with the solution of the problem but also analyze the reasonable factors of it in detail.

Shell's "planning while learning" approach, which is also known as the future concerned learning approach is accepted as a valuable strategy and a reflection of vision to learning activities. Shell sees this approach as an aid to handle the decrease in petrolium prices.

3.5.6. Low Level and High Level Learning

Fiol and Lyles (1985), define two different kinds of learnings: low and high level learning. Low level learning relies on repetition of previous behaviour examples and is generally short-termed, superficial, and temporary in structure. This kind of learning is very routine. High level learning on the other hand deals with developing high level rules and arrangements for new actions. In other words, this kind of learning comprises of changes in basic norms, reference frames and assumptions thus affecting the whole of organization.

3.6. Organizational Learning

Contrary to the statement in learning teams, it would be a mistake to assume that organizations also learn as the participants of the organization learn. Because between individual learning and collective learning there is a basic distinction in transition to a team of individuals determined to generate the desired results from a group of skilled individuals possessing a high level of learning. Organizational learning requires a series of processes and a robust structure for generating new information, sharing of understanding in a collective manner, and aiding to continuous improvement for both individuals and organization even when participants may leave.

When Malhotra (1996) exposed the differences between individual and organizational learning, he emphasized on the reactions to stimuli, where in individual learning each individual responds to a specific stimulant in a different manner whereas groups of individuals would respond to different stimuli in the same manner if called organizational learning.

According to Argyris (2000) shared norms and values refer to organizational learning rather than individual learning. Despite the fact that organizational learning is an act of individuals, it would be a mistake to conclude that organizational learning is an accumulation of individual learnings in an organization. Organizations do not have a brain, but they have cognitive systems and memory. Individuals may come and go, leaders

change, however the memories of organizations preserve specific attitudes, cognitive maps, norms and values against time.

Organizations posses an organizational memory, culture and mythology independent of the individuals they include. In organizational learning, action guides remain as a trace as individuals leave the organization and this determines the basic distinction criteria between the two kinds of learning.

Organizational learning is not the accumulated learning of the individuals the organization includes however the process of organizational learning includes learning via individuals thus there exists a relationship. This relation is demonstrated in Figure 3.12. The actions of the individuals affect the action of organizations, and the actions of organizations evoke the response of the environment. Environmental responses and actions evoke back organizations and their members thus result in changes in cognitive structure, preferences, decisions, and actions of individuals Hence Ludwings (1995), define organizational learning as a dynamic action-reaction cycle among environment, individuals and organizations. It is possible to analyze individual and organizational learning via learning processes (Arslan, 2001).

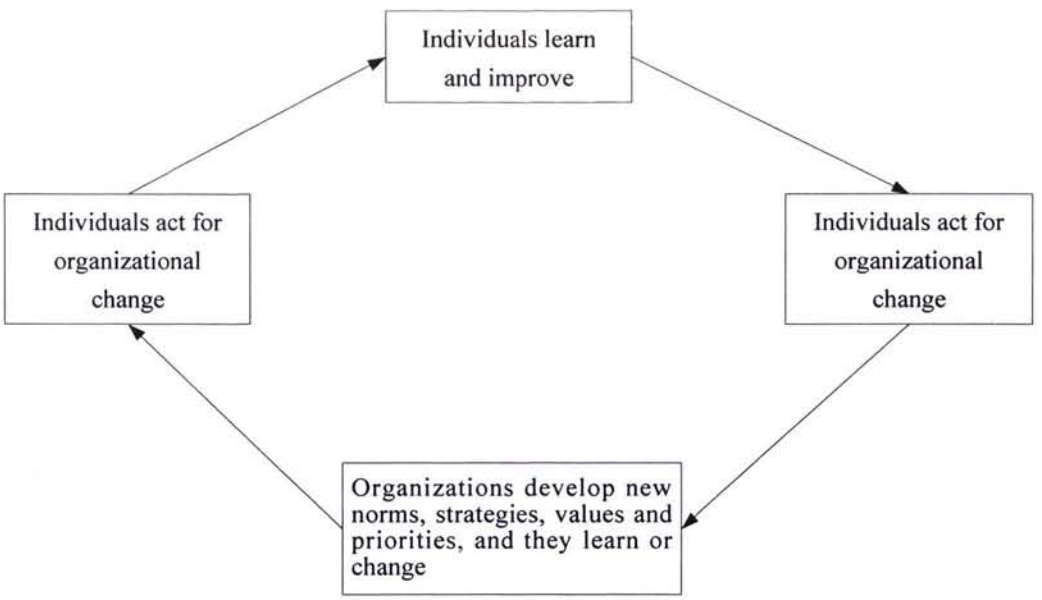

Figure 3.12 Relationship between individual learning and organizational learning.

There are many definitions for organizational learning in literature. Table 3.1 shows some of these definitions.

Even though there exist numerous definitions of organizational learning according to (Arslan, 2001) there are several aspects, which are commonly accepted.

- The expectation that excess information would provide improvement in actions.
- The acception that there exists a relationship between organization and environment.
- The idea of solidarity as in collective or shared thoughts.
- A proactive attitude via organization that diverts itself.

Table 3.1 Definitions of organizational learning

Author	Definition
Argyris, 1977	Organizational learning is a process of determination of error and correction.
Nevis, 1995	Organizational learning is the capacity and process for sustaining performance and improvement in an organization contingent to experience.
Duncan&Weiss, 1979	Organizational learning is the change and improvement of organizational information. It is a process where the members of the organization improve themselves about action-reaction effects and the effect of environment on these relations.
Malhotra, 1996	Individual learning occurs when people respond to the same stimuli in different manners. However in organizational learning a group responds in the same manner to different stimuli.
Huber, 1991	Organizational learning is the change in the level of potential behavior via processing information.
Drucker, 1994	Organizational learning occurs as a company tests assumption of its basic knowledge by the environment that creates its business theory and its mission and takes necessary actions for change.
Watkins & Golembiewski,1995	Organizational level of learning comprises of sustaining information in the long-term, supporting of creation of information, generation of systems which has the capacity that would provide realization of continuous change.
Fiol&Lyles, 1985	Organizational learning is a process of improving actions via better information and cognition.
Levitt&March, 1988	Organizations learn by converting interpretations of past to routines that guide their behavior.
Stata, 1989	Organizational learning generates by the aid of common understanding, information and mental models and depends on past information in memory and experience.
Schein,1997	Organizational learning is learning via members and groups of the organization.
Nelson&Winter, 1982	Organizational learning is the creation of routines that activates the memory and database of organizations.

Peters (1996) states that a learning organization should learn the following six subjects (Sandelands, 1999).

1. How to do better or as Senge states, personal mastery
2. How to construct strategic and cultural ordering, which would obliterate the control inside organization.
3. Learning of future via scenarios.
4. Understanding environment and supply chains
5. Learning how to compete via existing examples.
6. Improving organizational memory.

Arslan (2001) emphasize on seven learning intentions and ten facilitating factors for organizational learning. The seven learning intentions can be listed as follows:

1. Source of Information: internal-external. Attaining information from external sources rather than developing information via internal sources.
2. Focus on product and process: Focusing on what and how questions, the method of developing organizational products with respect to collection of data about services and products.
3. Documentation Mode: It deals with personal and common possessions of information.
4. Spread Mode: Preferences of formal and informal.
5. Learning Focus: Being radical open for change instead of being steady and in control.
6. Value-Chain Focus: Learning investments on production; in other words, on engineering or sales or services.
7. Focus on improving skills: Preferences of team improvement and personal improvement.

The ten facilitating factors are:

1. Scanning Obligation: The necessity of collection of data about external conditions and applications.
2. Performance Gap: Detecting the difference between expected performance values and realized ones.
3. Measuring: Defining of new key factors while entering new areas and importance given for measurement.
4. Experimental Mind: Supporting innovations, punishing errors, changes in workflow.
5. Open Environment: Attainability of data, open communication among organization, sharing of problems and errors.
6. Continuous Training: Support to continuous training in every unit and rank in organization.
7. Operational Variety: Variety in method, system and procedure.
8. Multiple Leadership: Being open to everyone's ideas instead of one champion.
9. Participating Leadership: Leaders create vision, communicate with every member of the team and is interested in training programs.
10. System Perspective: Independence of organizational units and relations between processes during solving problems.

The concepts and applications that have emerged under the scope of learning organizations as a whole mostly aim to develop skills in generation and usage of information in order to increase compatibility of companies. It is reasonable since in this information era, companies that cannot increase their competence power would diminish and leave their places to other companies in the market.

Globalization, increasing demands of consumers, competitive environment, shortening periods of change, leads to a change in methods. Companies that have existing for almost 30 years can diminish in only two years unless they adopt to change.

Establishments that cannot adopt themselves to change are a lot in number. One third of the most successful 500 companies that Fortune magazine has determined in 1970, could not enter to the same list in 1983. Peter and Walterman in 1982, have determined 43 "perfect companies" that have been in top for twenty years, with respect to six important criteria. After five years of time only fourteen could enter the same list with respect to the same six criteria. Some of the other companies were closed, the rest were in depression.
Besides all these facilitating factors of learning, there are also factors that we face as obstacles in the path of learning. Argyris and Schön (1996) has listed the inability to learn diseases in organizations as follows;

- Rejecting the problem, no problem syndrome.
- Determining the problem but taking no action, problem solved syndrome.
- Keeping information unshared, keeping every data in mind personally syndrome.
- Avoiding production of information, pedantic syndrome
- Inability to relate, what seen is adequate syndrome.
- Not taking lesson from past, not taking lessons syndrome.
- Not understanding the structure nor the system, indecisiveness in solutions syndrome
- Relying on past success stories, Past success syndrome
- Inability to conjoin training and learning, In training syndrome.

Diseases of inability to learn will be discussed in details in learning diseases section.

3.6.1. Learning among Organizations

It is impossible to disregard learning among organizations when considering organizational learning. Learning among organizations is a strategy that reduces the cost and accelerates the rate of learning with respect to organizations learning on their own, as in individuals and teams. Learning among organizations can be defined as collective information gain between organization sets.

Scott (www.bus.utexas.edu/~jarvenpaa/scott.html) defines learning among organizations as generation and distribution of information with participation of customers and suppliers. Reliability depends on three bases; completed contracts, observations, coordination, and usage of information systems for communication. As the productivity of information technologies increase, the cost of coordination and communication between companies decreases. In addition, they state that since quality and improvement is continuous, learning among organizations is a process.

Larson (1998) states five different strategies for learning among organizations depending on understanding or receptiveness and openness or transparency with respect to relationship among partners. As Figure 3.13 demonstrates, in "cooperation", receptiveness and transparency is high, in "competition" receptiveness is low but transparency is high, in "negotiation" receptiveness and transparency are equivalent, in "help" receptiveness is low and transparency is high, and in "abstention" both receptiveness and transparency is low (Arslan, 2001).

Competition and Cooperation are the most common strategies of learning. As the conjoint dimension that deals with total common output moves from minimum abstention to maximum cooperation, the distributing dimension that deals with common output share of one side, moves from donor of help strategy to receptive of competition strategy. Maximizing learning among organizations refers to unifying trials that aim to increase understanding, in other words receptiveness, and openness, in other words transparency, together.

3.6.2. Organizational Learning Models

According to Kim (1993), organizations tend to change attitude in the frame of well-defined rules, with respect to short-term feedbacks provided by environment and in relation with more general rules, adopt these to long-term feedbacks. Under this hierarchial structure lies the "Learning Rules".

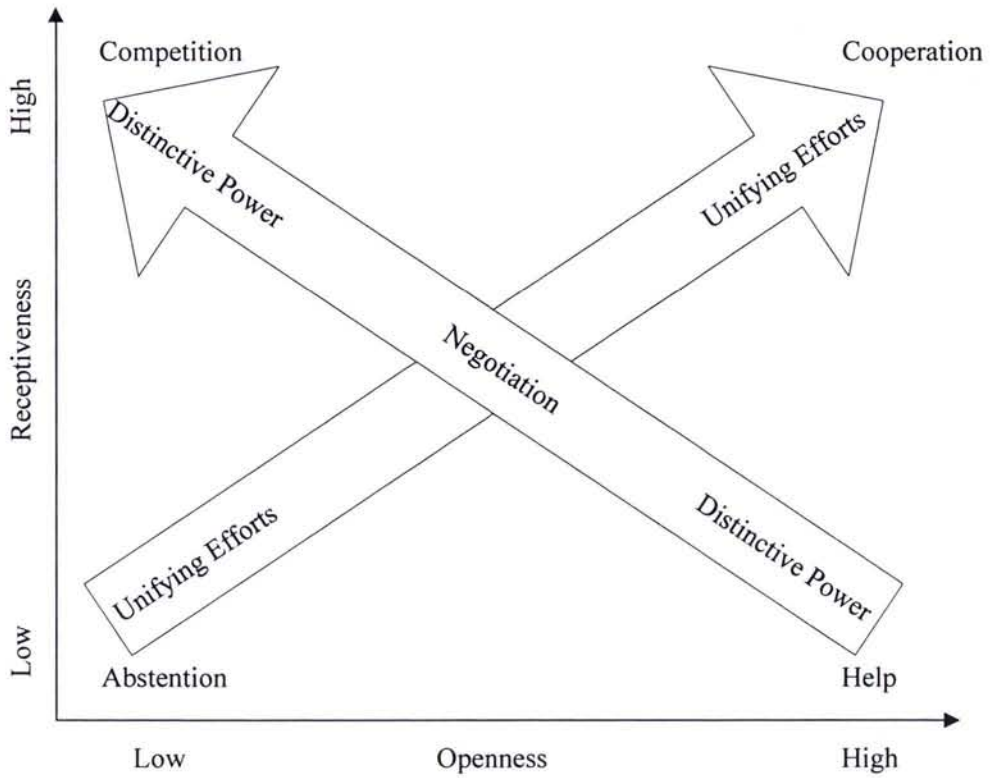

Figure 3.13 Strategies of Learning among Organizations (Arslan, 2001)

The model represented by March and Olsen (Figure 3.14.) points to incomplete learning types because of one or more weak connections or broken connections. These types are role-obligatory, individual, learning under observer, and uncertainty. For example learning under uncertainity occurs when the effect between environmental response and individual beliefs breaks. This means that the environmental effect generated by organizational act no longer affects individual beliefs thus reveals the fact that operational learning occurs but conceptual learning does not. An effective organizational learning depends on the stability among conceptual and operational learning.

Daft and Weick have defined organizations as interpretation systems and represented a model, which comprises of all learning processes in an organization. The steps of the model as presented in Figure 3.15 are Scan, Interpretation, and Learning. Scan refers to the collection of data, interpretation refers to the translation of collected data and generation to concepts, and learning refers to the information about the relationship among environment and organization. (Kim, 1993)

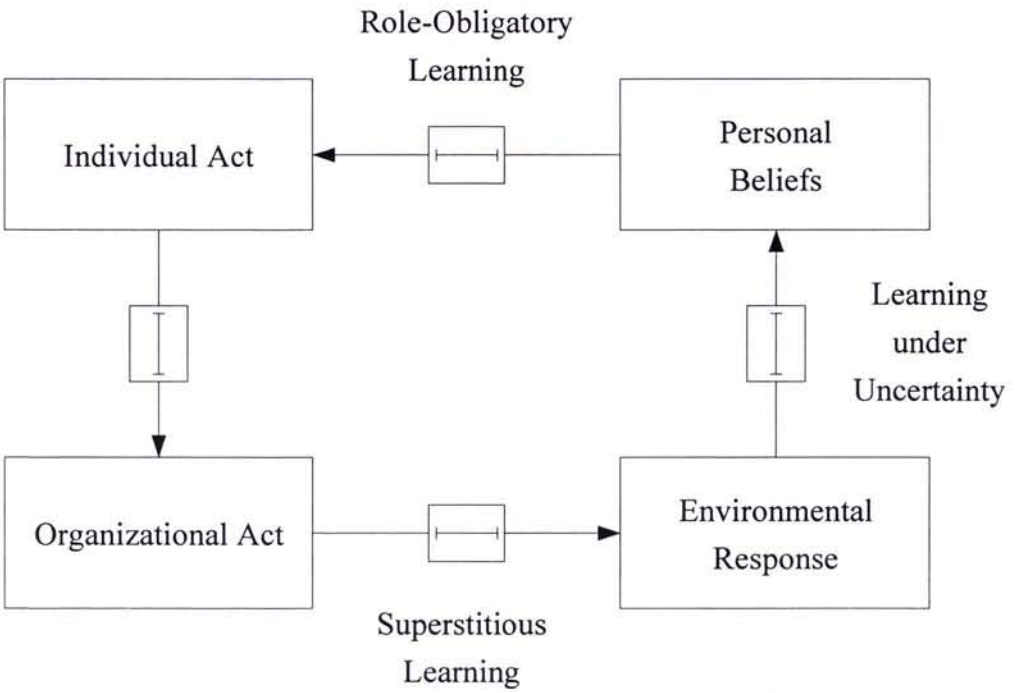

Figure 3.14 March and Olsen's Organizaitonal Learning Model (Kim, 1993)

Daft and Weick have analyzed interpretation in four parts; indirect observation, conditional observation, investigation, and action. Indeed neither March and Olsen's model nor Daft and Weick's model do not reveal the relationship between organizational learning and individual learning clearly. For this reason, Kim has constructed an organizational model that is comprised of a whole cycle of observation, valuation, designation, and implementation. As the valuation and designation steps of the model refer to conceptual learning, observation and implementation refer to operational learning. Shared mental models activate inter-organizational norms and acceptances (Kim, 1993).

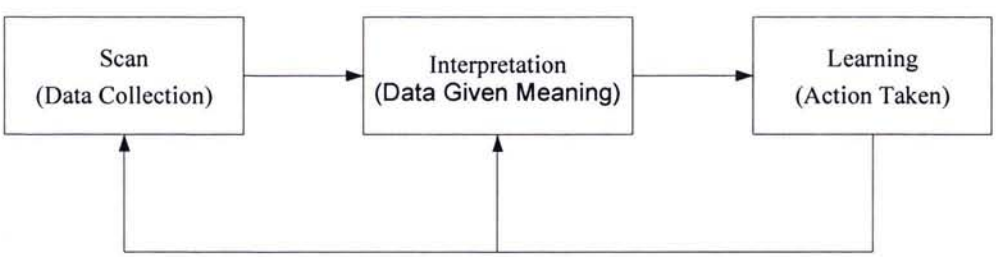

Figure 3.15 Draft and Weick's Organizational Learning Model (Kim, 1993)

3.6.3. Organizational Learning Process

Dixon (1994) suggests a four-step organizational learning process. These steps are as follows :

1. Wide-spread information generation
2. Integration of new and local information to organizational environment.
3. Colletive interpretation of information.
4. Possessing the authority in order to take responsibility of actions contingent to interpretation.

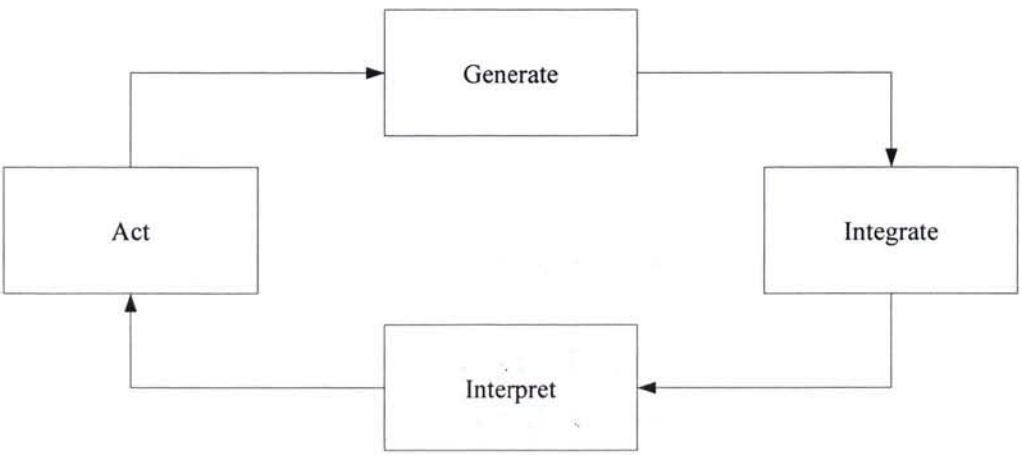

Figure 3.16 Dixon's Organizational Learning Process (Arslan, 2001)

These steps are not new for organizations. All organizations typically apply these steps. When these steps are not related to each other then organizational learning does not occur. Organizations should perform radical changes in order to realize collective organizational learning.

Thomas et.al., (2001), three-step learning model looks the process from information perspective. The steps of the model are;

1. Collection of information: Creation and improvement of knowledge, understanding and relationships.
2. Sharing of information: Widening what has been learnt.

3. Usage of information: Integration of information in order to widen information totally and generalizing it for new conditions.

Similarly Huber (1991) has stated a four-step model where steps can be listed as; gaining information, distributing information, interpreting information, and organizational memory. He claimed that learning should be conscious, and on purpose. He also concluded that learning does not necessarily increase the efficiency of the learner, even potentially, and also that learning may not result in changes in behaviour. Potential changes in behaviour are adequate for the learner.

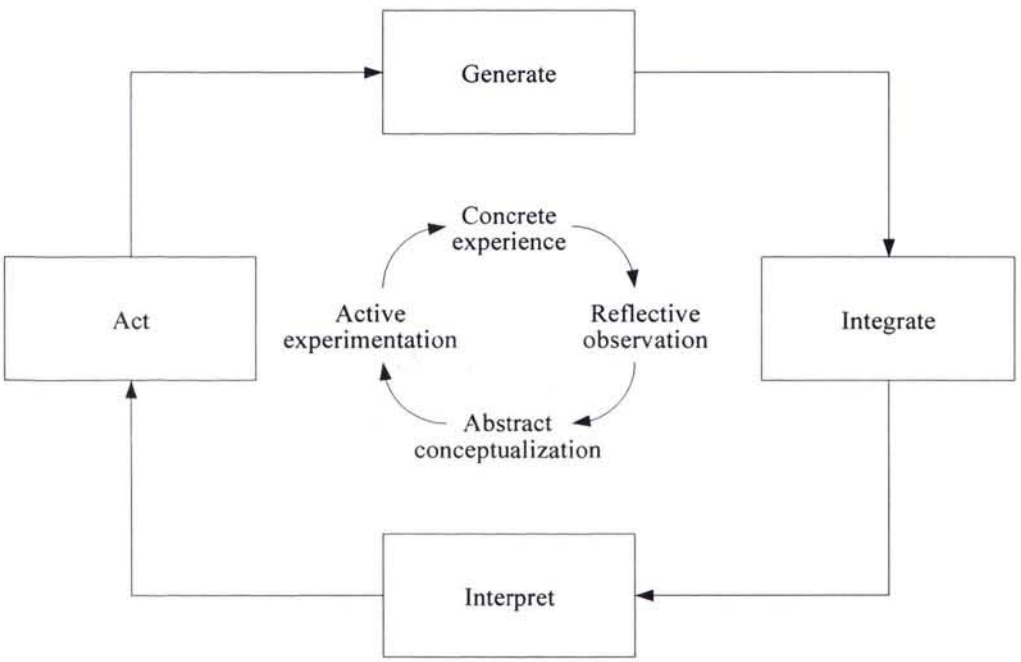

Figure 3.17 Dixon's Individual and Organizational Learning Relationship

Dixon (1994), has revelaed the relationship between individual learning and organizational learning by gathering the steps of organizational learning and Kolb's individual learning process on the same axis. In order to realize organizational learning, each member of the organizaiton should be in relation with all kinds of individual learning. However, collective learning should be generated instead of individual learning only. Concrete experience in individual level, converts to collection and production of information from environment in colletive level via conference, customer and supplier relationships. Reflective observation that refers to experience in individual bases, gets complicated in collective level and refers

to a need to information that inside or outside no individual knows. Combining the new results gained from experiences in individual bases is a task, however organizational learning requires this task to be done in collective level. In an organization comprised of individuals possessing different point of views is an important factor. The same factor is also valid in experience process (Arslan, 2001).

4. LEARNING ORGANIZATIONS

4.1. Evalution of Learning Organizations

Continuous changes in economy, social life, and technology that took start in the beginning of 1980's and became denser since 1990s, urged organizations to renew themselves in order to survive. The emerging changes are much beyond than unbalances in demand and supply or new technological developments. Ex-manager of Hannover Insurance and administrative community member of Massachusetts Institude of Technology, Organizational Learning Center, William O'Brien, claims a level of change that has never been confronted before, comprising global labor evolution.

According to O' Brien (1994), there are triggering factors underlying Ford, General Motors, Du Pont and many more giant companies that have grown and made profit during the period of 1920-1990 which can be named as moden industry era. The most important one of these factors is efficiency of production, in other words, series production, expertize, reducing costs. Second factor is that these companies have learnt to be effective by means of series marketing. A third factor may be adaptation to changing technology as quick as necessary. The forth factor is improvements in financial aspects, observing in details, accelerating the return of investments, and control of monetary transactions. The fifth and the final factor is the change in current understanding of basic human knowledge. (Senge et.al., 1999)

O'Brien claims that a new era would begin where no one can know what the next step would be. In this uncertainity, managers should ask themselves about prerequisites in order to handle this continuous change. According to O' Brien four kinds of knowledge would be necessary. (Table 4.1.)

First of all, systematic distribution of authorization should be learnt. Delegation of authorization is as dangerous as important since it may lead to chaos. Instead of imposing discipline, learning how to distribute authorization by assuring individuals to be in self-

discipline is the right thing to do. This leads usto a cultural area where, bureaucracy exchanges with desires, values and vision concepts.

Table 4.1 Changes in factors of success, according to O'Brien (Senge et.al., 1999)

1920-1990	1990-Future
▪ Efficient Production ▪ Effective Series Marketing ▪ Fast Adaptation to Technology ▪ Financial Understanding ▪ Y Theory	▪ Distribution of authorization by increasing self-discipline ▪ Systematized thinking skills improved by even lowest levels. ▪ Improved communication ▪ Voluntary monitoring

The second action to be taken is to improve qualitative system thinking knowledge. By this way, instead of directly losing your way in the depths of the forest, it is possible to view the forest above and from different perspectives and determine the correct path.

The third point is that organizations require a highly developed communication web. Here communication refers to speeches. Speech alone is a perfect learning tool. The speeches that we perform in society are narrow scoped and short. Talking continuously on problems activates many defense mechanisms that weaken communication. In order to avoid this speech talent is essential.

Fourth qualification is voluntary monitoring. In order to do this, instead of such a management concept, which has become identical with control, leadership concept is taken into consideration.

In this new-world, in order to gain competitive advantage and power, companies tend to evolve in terms of learning skills. They have to learn quicker and better from their successes, failures, and both from internal and external sources. In order to sustain or improve their position, they have to change into a group where individuals continuously increase their skills in adaptation and production.

The only way to avoid an end similar to dinasours, they have to enhance the capacity of learning and adaptation to the changes in the environment. The milestones of learning organizations arranged by Art Kleiner are presented in Table 4.2. (Weber, 1996)

Table 4.2. Chronology for learning organization (Webber, 1999)

1938	John Dewey's book named "Experience and Training Guide" has been published.
1940s	In leadership of Margaret Mead, Gregory Bateson and Lawrence Kubie, Maey Conferences were performed and System Thinking approach exposed.
1940s	Scotch psychologist Kenneth Craik used mental model concept.
1946	The founder of National Training Laboratories, Kurt Levin exposed creative tension derived from personal vision.
1956	The research of Edgar Schein's on "Brain Washing in Kore", emerged the approach of process consultation.
1960	Douglas MCGregor 's "The Human Side of Enterprise" workout was published.
1961	Jay Forrester 's book named "Industral Dynamiks" was published. For the first time, System Dynamics was implied in companies.
1970	Chris Argyris and Donald Schön started to behavior science. Consequently value conflict concept was put in agenda.
1972	Dennis and Donella Meadows published the workout named "The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind".
1971-1979	Training seminars of Erhard presented the kinds of powerfull attitude developments.
1979	Robert Fritz from Innovation Associates organized a seminar named "Leadership and Mastery".
1984-1985	Scenario Planner of Royal Dutch/ Shell Pierre Wack published two articles on scenario planning as learning activity.
1982	Senge, Arie de Geus, Bill O'Brien from Honover Insurance, CEO of Analog Device Ray Stata gathered periodically an established a research group for learning organization in MIT.
1987	Peter Schwartz, Stewart Brand, Napier Collyns and Lawrence Wilkinson established "Global Business Network" by scenario plannin gin order to support organizational learning.
1989	Oxford Universty management specialist Bill Isaaes introduced dialogue concept to a friend of Quantum Physist David Bohm, Sengein order to create team knowledge.
1989	In presidency of Senge, and leadership of Schein, Argyris and O'Brien, "The Center of Organizational Learning" was established in MIT. As personnels of learning center, Bill Isaaes, Daniel Kim and George Roth were in charge.
1990	"The Fifth Discipline" was published. Fritz's "Personal Mastery" concept contingent to creative tensions, "Mental Models" studies depending on researches of Wack and Argyris, "Shared Vision" concept, depending on researches of Innovation Associates, "Learning Teams" concept contingent to David Bohm's workouts, and "System Dynamics and Thinking" approach depending on Forreseter's wourkouts aroused high interest.
1993	Harward University Professör David Garvin's article on organizational learning was published on Harward Business Review. Measurable learning concept emerged.
1994	"The Fifth Discipline Fieldbook" was published.
1994	First projects of Organizational Learning Center were completed.
1995	Organizational Learning Center, in association with Doe Hock gave start to the establishment of "Society for Organization Learning" and Senge was the president of the organization for 2 years.
1996	Art Kleiner's "The Age of Heretics" and Joseph Jaworski's "The Inner Path of Leadership" workouts were published.
1997	Arie de Geus's "The Living Company" workout was published.
1999	"The Dance of Change" was published.

In the beginning of 1990s, some organizations started to climb the ladder of being a learning organization. General Electric, Corning, Federal Express, Ford, Motorola and Pacific Bell in US; Sheerness Steel, Rover and ABB in Europe; Singapore Airlines and Samsung in Far East, were the first leaders in implementation of this concept. Everyday the number of companies adapting this philosophy increases. According to Senge (1990), the infrastructural workouts for the philosophy of learning organizations are completed. These periods are implementation periods. Companies should be careful in the implementation processes. There are numbers of companies that have tried to implement transition process in the lack of a robust change management and have resulted in failure. Some organizations that have metamorphosed while trying to implement learning organization philosophy, have contented with quality cycles and change engineering which are modest components of learning organizations (Marquardt, 1996).

Marquardt (1996), has gathered the reasons of exposing new philosophies of organization and management consisting in learning organizations, in four main titles:

- Developments in economic and social environment, and science world,
- Changes in business environment,
- Changes in customer demands,
- Changes in employees' demands.

4.2. Learning Organizations – Definitions and Characteristics

The definitions of scientists for learning organizations mostly depend on utopies full of mystic terminologies. In his book "The Fifth Discipline" Peter Senge (1990) defines learning organizations in the following manner: "Learning organizations are organizations in which individuals enhance their capacity to attain the desired output, new and expensive ideas are supported, desires are set free and individual learn together how to learn continuously."

Another definition that Senge (1990) states is: "Learning organization is what learning inside is impossible since learning becomes a life style."

Senge has claimed that there are five components that are required in order to become a learning organization. These are Personal Mastery, Mental Models, Shared Vision, Team Learning and Systematic Thinking. These components will be defined in following chapters of this study.

Some other definitions on learning organizations can be listed as follows (Arslan, 2001):

"Learning is a process of gaining new information and instinctual understanding which leads to a change in attitude and actions in order to attain the desired goal." (Marquardt, 1996)

"A learning organization, is an organization that is capable of transferring, gathering, and creating information, using its instinctual understanding in order to change its behaviour to reflect this new information." (Garvin, 1993)

"Learning organizations can be seen as authorized individual groups that create new information, products and services, forming relationships with innovative communities inside or outside the organization, and that work for illuminating a wider world and serve a higher goal." (Marquardt, 1996)

"Learning in organizational level in long term refers to retaining information, support creation of information, and generating a system that would prove a continuous cycle capacity." (Watkins and Golembiewski, 1995)

"Learning is a feedback process where our decisions change the real world. We get a feedback information from world, we use this information and we change our decisions and the mental models that drive us to take these decisions." (Sterman, 1994)

"A learning organization provides the necessary environment for individuals to learn. It benefits from this and improves its own information, understanding and environment by time." (Thurbin, 1994)

"A learning company provides opportunities for its members and continuously converts itself." (Pedler, Burgoyne and Boydell, 1991)

"What we understand from learning organizations is; efficiently utilizing the decisive goal and work strategy of sustaining profitability, improving relations with customers and vendors, quality, learning with improvement goals, and continuous inner innovations in an organization." (Mills and Friesen, 1993)

"A learning organization is an organization whose double loop learning capacity is highly increased. It is a place where basic concepts of organizational operations that support learning how to learn is taken carefully into consideration." (Field and Ford, 1995)

Learning organizations are organizations that continuously innovate themselves thus manage information in a better manner in order to provide better adaptation to changing environment and be successful, get full benefit of technology and knowledge of individuals and broadcast learning.

If the misunderstanding that suggests solving problems by separating them into pieces can be left, then learning organizations can be established. In these organizations individuals can enhance their capacity of attaining the desired outcome continuously and here new and enthusiastic thinking is encouraged, collective desires are not avoided and individuals together learn how to learn continuously.

Faster learning organizations can react thus adapt to changing environment faster also. This also brings strategic advantage in the global business world. There are important characteristics and scopes of a learning organization:

- Learning is achieved through an organizational system as a whole. Thus organization becomes one brain.
- Individuals of the organization have to accept the importance of the past learning experiences for the future and present learning succecces of the organization.

- Learning is a continuous and strategic process that goes parallel to working and integration.
- Creative and productive learning requires focusing.
- System thinking is the basis.
- Human beings are all the time in relation with information and data resources important for learning.
- There exists a working environment that encourages, awards and accelerates individual and group learning.
- Among workers, inside and outside the organization there exists an innovative and sincere grift structure.
- Change is adapted and unexpected surprises or even failures are accepted as opportunities to learn more.
- It is active and flexible.
- The desire to qualified and continuous improvement triggers everyone.
- Activities are characterized with respect to goals, reflection and conceptualism.
- It has the ability to continuously renew itself and adapt according to changing environment.

4.3. The Culture of Living Together

It is essential to generate the appropriate "Living Together Culture"in order to realize the sub-step of organizational learning, learning together.

- Culture of living together comprises of attitudes like listening to the accompany unconditioned and without prejudice, respect, take what is asked or said seriously, and respond seriously. In addition, it also comproses behavior like greetings, and asking after, the routines of daily life.
- Culture of living together comprises of asking and listening in order to learn and understand people that the individual is related to, and their thoughts, fast and without prejudice. It also comprises the ability of opening new folders when needed, claiming to have met something new.

- Sharing culture of living together is accepting that people may think different than we do and this does not necessary mean that they are wrong.
- Sharing culture of living together is being aware that on the same ship (organization) fighting and digging pits for eachother would sink the ship.
- Sharing culture of living together is to perceive that the trials of making the environment more comfortable for eachother, and cooperation would aid in developing tools that will help us to attain our goals in a more efficient manner and accelerate the process.
- Sharing culture of living together is learning to be happy with others' successes and be unhappy with others' failures. This is also valid for common successes and failures.
- Sharing culture of living together is to come together and investigate the reasons of the problem instead of blaiming eachother in exposion of a problem even we do all the rest above. It is to ask "what is my participation in the problem and how can I aid in the solution of the problem?"
- Culture of living together comprises of shared stories about the organization, facts, mistakes and judgements on typical problems.
- Sharing culture of living together is to be open to critics, and is to see and use these critics as opportunities to improvement and change.

In the perspective of learning, the hidden compressed and subsequently revealed behaviors of individuals who have experienced problems in childhood harms "Culture of Living Together" inevitably. If the problem of the individual has not turned into a psychological illness, by the aid of people who have gained the culture of living together he can be diverted and the problem may be overcomed (Senge, 1990).

4.4. Different Aspects of Learning Organizations

4.4.1. Differences from Individual Learning

If we consider learning as process two problems may merge:

The first problem is that if all members of the organization is learning then it is considered as organizational learning. Even in the widest scope, a training organization does not necessarly become a learning organization. Learning is different than training.

The second problem is; between individual learning and collective learning there is a basic distiction among a group of determined, skilled and well-learnt individuals turning into a team. Organizational learning requires a series of structural arrangements and processes that will result in collectively sharing the understanding of creating new information, and when individuals depart, operation of the system would not be negatively affected. (Ackoff, 1999).

4.4.2. Differences from Other Organizations

In learning Organizations;

- Learning is included in everything that individuals do.
- Learning is a process not a point time event.
- While individuals improve themselves they also change their organization.
- Organization learns from itself and employees train the organization in terms of new developments.
- In learning organizations individuals are creative and restructure the organization.
- Being a part of learning organization is exciting and pleasure for individuals.

The terms listed above are the main titles that differ learning organizations from other kinds of organizations. Another difference in learning organizations is that employees have knowledge of financial aspects of the organization. Individuals know the targeted sales figures, marketing plans, and financial reports. In learning organizations these information are not relevant only for managers but also all other employees. The biggest need of learning organizations is self-managing individuals.

4.5. Why Learning Organizations are Desired

In learning organizations, ideas of anybody is valuable. Regardless of the level of the employee, it is considered as a participant to improvement. It is the nature of humans to learn, improve and being active rather than being passive. The answers to "why learning organizations?" can be summarized as follows;

- It is a pleasure for employees to work in a learning organization.
- Learning organizations gives the hope that everything can be done better.
- Learning organizations provide the necessary environment for inventor souled individuals.
- Learning organizations provide a safe environment for taking risk in line with new ideas and attitudes and also for challenging current understanding.

Senge et. al., (1994), have stated the reasons for the construction of learning organizations, which is a never ending process, as follows:

- For high performance
- For improving quality
- For customer satisfaction
- For competitive advantage
- For energized workpower
- For management of change
- For reality
- For its is the necessity of the era
- For the awareness of the loyalty of individuals for eachother
- Since we want

4.6. Responsibility in Learning Organizations

4.6.1. Responsibilities of the Organization

Learning is the responsibility of the individual. However organizations can do a lot in order to create an environment that can support and improve individual learning. It has been observed that children that grow in an environment full of stimuli (colors, tastes, shapes, textures) learn more than of children who do not grow in such an environment. It is the same for organizations and members of the organizations. There are several actions that organizations can make in order to be learner-friendly companies:

1. Learning should be a part of company culture and values.
2. There has to be a place for learning.
3. Future aimed learning should be supported not past.
4. Employees should be awarded with respect to learning.

4.6.2. Responsibilities of Employees in the Organization

In learning process, other than the resposibilities of the organization, there are also responsibilities of the employees. These can be explained as follows:

- One should surrender. This is the simplist way of accepting that you don't know.
- One should be curious.
- One should posses an aim of goal.
- One should ask questions.
- One should be modest.
- One should seek for the truth.
- One should be ready and patient.
- One should be a risk-taker.

4.7. The Fifth Discipline of Senge

According to Senge, (1990) the seed of the philosophy of organizational learning comprises of five learning disciplines to be implemented continuously. Systems Thinking, Personal Mastery, Mental Models, Team Learning, and Shared Vision.

4.7.1. Systems Thinking

Systems thinking is an attempt to see the whole. It focuses on process, analyzes corresponding relations rather than facts, and that is aimed to see the basic structure in complex conditions (Senge, 1990). It has been introduced as General System Theory in 1940's by Ludwing von Berttalanffy and implemented in the field of engineering and entered in to science of organization and management after 1960's especially by the aid of studies of Jay Forresster and his friends, on system dynamics with respect to organizational change. The feedback theory especially presented by cybernatic studies, improvements rapidly ongoing on the field of engineering since 19th century, and improvement level attained reminding people the huge mass of unknowns and chaos theory, have put system thinking approach to the importance level it deserves to be.

Systems thinking theory is defined as an organized, indivisible whole, which consists of two or more parts or substructures that are connected to each other, has boundaries with respect to its fuction and specifications and that can be distinguished from others (Eren, 1993).

Senge et. al, (1994), defines system as whole of components that operate for a common goal and that are continuously interrelated. The word is based on philologically to a Greek verb, "sunistana", which means, "to be the reason to become together". Human body, atmosphere, factories, society, families, teams, and organizations are all examples of system concept.

Since past, systems thinking has been accepted as a very powerful tool for problem solving, however, Senge et. al. (1999), define system thinking as a language that changes

and improves the ordinary methods we use in order to understand the complex subjects we talk on or think about. The required mental change for constructing a learning organization is hidden in system thinking.

Today, estimating the results of decisions, and learning from experiences become harder everyday. Systems thinking provides companies a tool for the management of continuous change. Recent studies on organizational change process conclude that change should not be from top to down or visa versa but as an ordered whole system, by the participation of individuals in all levels. This can be attained by presenting system thinking tools; reasonal cycle diagrams, system examples, computer aided modelling, and system dynamic concept to teams' service and by hanging these tools on the walls of meeting rooms in order to provide energy for organizational learning. (Senge et.al.; 1994)

Senge et.al., (1994) sees scenario planning as a system tool and claims that system thinking is a concept to be shared with all the individuals of an organization and requires the learning of how to learned, also named as productive learning. When employees see their job in line with customer satisfaction and value adding to organization, when they realize the relationship between their studies and other employees' work, and define relations once they did not noticed, they would understand how their actions affect other actions and processes, they would be using system-thinking approach.

4.7.2. Modelling, Simulation, Microworlds and Learning Laboratories

Systems thinking is a powerful tool for decision making and organizational change that combines process mapping and simulation. Process mapping is a technique used it the modelling of systems that shows both the external and internal boundaries and interdependencies of the system. It gives management an opportunity to test assumptions and share mental models. However, process mapping gives a static look at the organizational behaviour and to reveal consequences when changes are made within any elements in the system.

Simulation observes behaviour over time with the idea of process redesign. Since simulation enables to see the changes in the system over time, it provides management the necessary tools to predict potential consequences in case of a change in the model; therefore computerised models are seen as an essential part in the design of learning laboratories. The basic steps of modelling are as follows:

- The presentation of the behaviour examples that the system structures directly produce
- Testing whether this structure creates observed real life performance
- Specification of the behaviours that change as the properties of the structure change
- Specification of the leverage force points
- Testing of the thoughts with teamwork

After these steps the simulation study takes place.

Microworlds enable managers and management teams to begin learning through doing about their most important systematic issues. Microworlds compress time and space so that it becomes possible to experiment and to learn when the consequences of the decisions are in the future and in distant parts of the organization (Senge, 1994).

The concept of "microworlds" has first been used by Seymour Papert in 1970s to define learning for children. Today this concept is used in the simulation based learning literature.

Children learn to interact with people as they play with their dolls, they teach themselves the basic principles of geometry and mechanics as they play with blocks and learn the basic principles of a pendulum as they swing on a swing. All these objects; dolls, blocks, swing etc. are called transitional objects in the microworld (the playground) that prepares children to real life.

Managers create a microworld with transitional objects when they organize an outdoor team building activity for their employees that help them to improve their team-working performance.

However it is not possible to apply transitional objects concept to every problem. For example role playing exercises can help develop interpersonal management skills but they do not show whether the personnel policies in an organization are aligned with the manufacturing policies. The reason for this lack of ability is that few existing microworlds capture the dynamic complexity in management problems.

As a result of the technological innovations, especially computer models enable integrating learning about complex team interactions with learning about complex business interactions. These new microworlds allow groups to reflect on, expose, test and improve mental models while they help to predict the future with the testing of different scenarios in a small amount of time with very low costs (Senge et.al.,1999).

Learning laboratories are the kind of laboratories that illustrate in-depth inquiry and ideas that are missing from today's organizations and that microworlds are uniquely qualified to enable Learning laboratories give employees the chance to simulate certain scenarios, improve their mental models and their knowledge (Senge et.al, 1994).

4.7.3. Personal Mastery

Senge (1994) defines personal mastery as the discipline of continually clarifying and deepening our personal vision, of focusing our energies, of developing patience and of seeing reality objectively and accepts it as an essential cornerstone of the learning organization.

Senge et.al. (1994) used personal mastery concept for the personal development and learning discipline. People with high levels of personal mastery continually expand their ability to create the results in life they truly seek. This personal desire is quite important for organizations since organizations learn through people.

From the context of personal mastery learning does not only mean acquiring more information but also it means expanding the ability to produce the results that one truly seeks in life. It can be seen as a lifelong generative learning which organizations can never

practice unless they have people at every level who practice it. An important point in personal mastery is that it is not possible for someone to enhance the personal mastery of another person. He can only prepare the suitable supporting and encouraging environment for him.

Organization can strengthen personal mastery from two dimensions. Firstly they should continuously mention the value they give to personal mastery and secondly they should encourage on the job training. An organization committed to personal mastery can provide this environment by continually encouraging personal vision, commitment to truth and a willingness to face honestly the gaps between the two. From these two points, leaders should be good models for their employees. They should commit themselves to their personal mastery and should encourage their employees in their quest for personal mastery.

There have been various studies about personal mastery however from the learning organization philosophy, key concepts have been used by a composer Robert Fritz. Fritz suggests three concepts that are important in the process of achieving personal goals. These are personal vision, current reality and creative tension. He suggests that there is a creative tension between personal vision and current reality. While creative tension pulls the person to the desired direction (the goal), emotional tension pulls the person in the contrary direction. These two conflicting forces are called "structural conflict." The more a person comes closer to the aimed vision, the more structural conflict affects the person. However, any feeling of powerlessness, unworthiness, and the emotional tension should not damage the creative tension (Senge, 1990).

Fritz identifies three strategies for coping with the structural conflict each having some limitations. Letting the vision erode is one strategy, conflict manipulation in which the person tries to manipulate himself into greater effort towards the goal is another and willpower by which person overcomes all forms of resistance to achieve his goals is the third. Personal mastery is important in resisting the erosion of vision. According to Fritz vision is not important but what it does is important. Creative people use the gap between vision and current reality to create energy for the change (Senge,1994).

Subconscious is another dimension of the mind that helps the person to deal with complexity. It is observed that people with high levels of personal mastery have developed a higher level of rapport between their normal awareness and subconscious. These people focus on the objective they aim to achieve rather than concentrating on the tools or the processes.

It should be kept in mind that personal mastery adds value to both personal development and organizational development. People with high levels of personal mastery take more initiatives, and they are more responsible towards their jobs. That's why organization should support the personal development of their employees.

In classical organizations the development of personal mastery discipline is seen as a threat to the organization. The reason for this view is the lack of a shared vision and common mentals models in terms of professional life. In these kinds of organizations delegating authority to people may be risky since the employee may not be able to handle this responsibility. For this reason personal mastery should be seen as a whole with other disciplines. For example the systems view highlights creative tension, emotional tension and structural conflict concepts that characterize personal mastery. In addition it explains the importance of reason and intuition, forgiveness and relation with the world.

Systems thinking may hold a key to integrating reason and intuition. Intuition eludes the grasp of linear thinking with its emphasis on cause and effect that are close in time and space. The result is that most of our intuitions can not be explained with linear logic.

Senge (1990) defines another relation between personal mastery and systems thinking as seeing our connectedness to the world. This concept means "recognizing that external forces are interrelated with actions of the person and closing the loops."

Senge et.al., (1994) states that in order to encourage personal mastery some infrastructure changes have to be made in the organization. First of these changes is the development of a transformation and development department. This department will aim to transform employees to real students and will learn their requirements directly from them. The

discovery side of the organization will discover the answers of such questions: what are the current position of competitors?, what possible innovations can be made in the future?, what the people are likely to learn in the following years?. The discovery department will in advance share the answers of these questions with the employees.

The second kind of change in the organization is the specification of new performance appraisal system. The new system will be created by the mutual agreement of the employees and the decision makers within the organization. For this the supervisor will have to ask the following questions to his employee:

- What do you want to accomplish this year? What do you want to accomplish in the next few years, what is your vision?
- What assets are needed for you to achieve your objectives and what kind of responsibilities do you need?
- What kind of help do you ask from the company?
- What should I do, as your supervisor to help you accomplish your objectives?
- What is your definition of failure? What danger signals should I look for in time so I know to come to talk to you and help you?

The answers of these questions will be used in the specification of performance criteria. The answers of these questions will be useful for the employee in satisfying the performance criteria and also will be useful for the supervisor to observe the relationship between the employees' vision and of the organizations. A similar group of question should be prepared and asked to the candidates when hiring a new employee. By this way the vision of the candidates may be understood and the right person may be selected. Moreover, the newly employees will be directed to share a common organizational vision.

Another point is the need of testing personal vision against the company's culture. The employee should be aware that his vision does or does not meet with the culture of the organization.

Again from the personal mastery perspective, employees should be aware of the events taking place within the organization. They should be informed of a new downsizing or plant closing decision so that they can decide how to continue with their personal vision and they can prevent themselves from destructive emotional tension. Such an informational transparency should be adopted in an organization.

4.7.4. Mental Models

Mental models are images, assumptions, and stories which the person carries in his mind about himself, others, institutions, and every aspect of the world. As a concept it has been firstly used in the 1940s by a Scottish psychologist Kenneth Craik and since then it has been used by cognitive psychologists, cognitive scientists and gradually by managers. In cognition the term refers to both semipermanent maps of the world which people build up as a part of their everyday reasoning process (Senge,1990).

The differences between mental models describe the reason why two person observing the same event describe it differently. Individuals concentrate on different details. This property of human beings makes the team-work desirable. Mental models also shape the behaviour of individuals. However, since mental models are usually tacit they are often untested and unexamined. They are usually invisible unless they are looked for carefully. The core task of this discipline is bringing mental models and their affects on life to the surface. By this way mental models may be modified so that they serve people better in the world.

Among other five, mental models discipline is the most practical one and it offers the highest leverage for change. However it is also the most difficult one from which to start building a learning organization. It requires a great deal of perseverance to master this discipline since most people do not know how to build the skills of inquiry (holding conversations where the person openly share views and develop knowledge about eachothers assumptions) and reflection (slowing down the thinking processes to become more aware of how the person forms his mental models) into their thoughts, emotions and

everyday behaviour. Reflection and inquiry are the two concepts that have emerged from "action science" a field of inquiry developed by theorists Chris Argyris and Donald Schön.

The tools used in action science are quite simple. From the reflection ability perspective one tool is the diagnosis of the leaps of abstraction. Leap of abstraction is the generalization of momently taken pictures. These generalizations can not be testable and the assumptions considered in the past start to be considered as real. This slovens learning. Argyris explains the leaps of abstraction with the ladder of inference algorithm shown in Figure 4.1. (Senge et.al,1994).

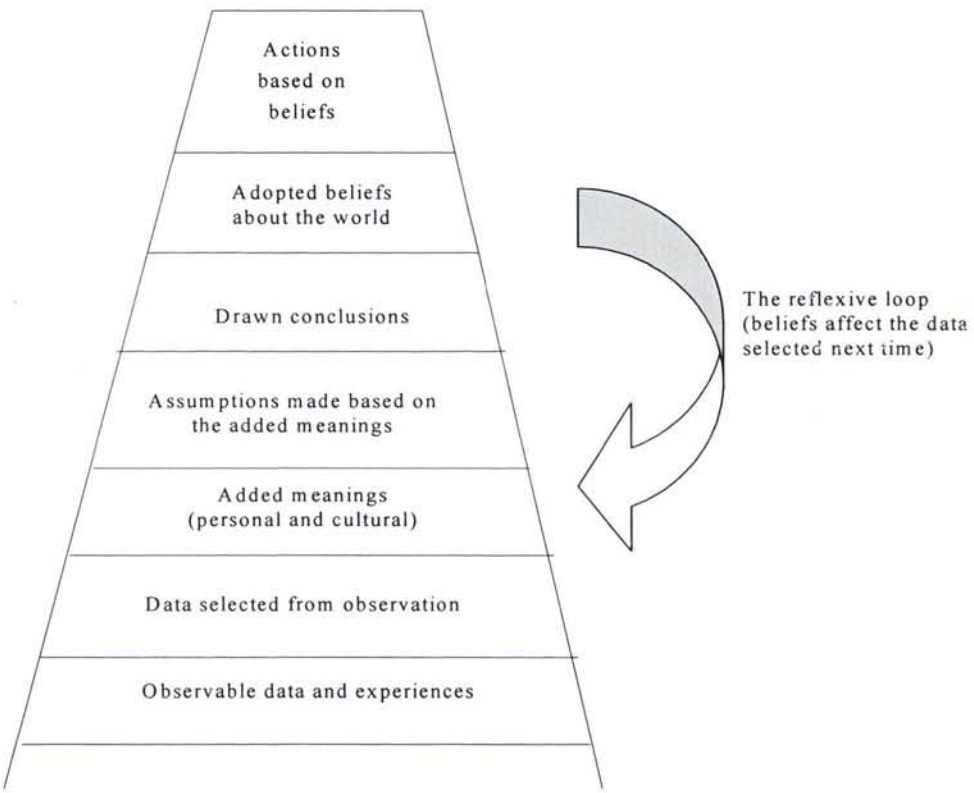

Figure 4.1. Ladder of inference (Senge et.al., 1994)

When ladder of inference is applied in teams it becomes a very useful tool. Ladder of inference has three main advantages:

- It helps the person to become more aware of his thinking and reasoning (reflection)
- Helps the person to make his thinking and reasoning more visible to others
- Helps inquiring into others thinking and reasoning (inquiry)

Another tool is the "left hand column" technique shown in Figure 4.2. suggested by Argyris and Schön (1996). Left column technique has three main steps. In the first step a problem is selected. In the second step the conversation about the problem is written on the right side. In the last step thoughts about every dialogue that are not mentioned are written. The left column is considered as a learning source.

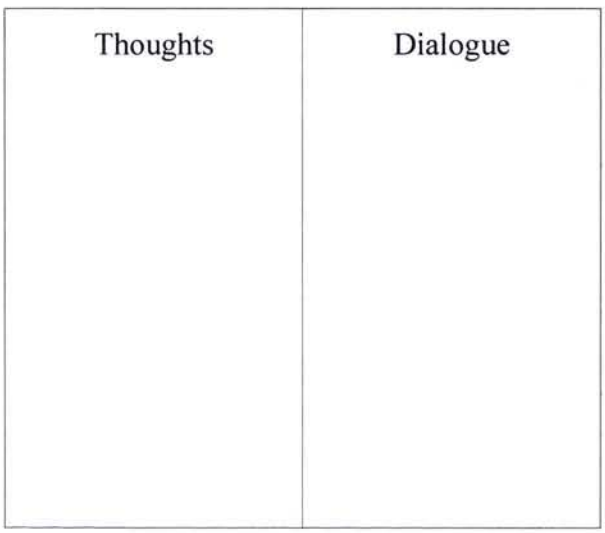

Figure 4.2 Left column technique. (Senge, 1990)

By this way it is possible to lift the assumptions up to the surface and to understand how assumptions affect behaviour. Again it is possible to face with problems and learn from them and also solve the problem and support the development process (Senge et.al , 1994).

By the use of mental models and team-working many different problem solving methods can be developed. One of these methods is known as perspective view. In this method a circle is drawn into a wheel shaped paper in which the problem is written. The wheel is divided into equal slices in which the names of the team members are written. For the problem being explored cards with the names of eight or more stakeholders are prepared. In the next step the wheel is turned. At each turn it stops, the team members name stops in line with one of the stakeholder and presents his point of view related with the problem. Comments about the problem are mentioned by all members and these are written on the stakeholders cards. After all comments are recorded the wheel is turned for the next time. After all decisions are recorded, they are examined by the team members. By this way it is

possible for the team members to understand eachothers views. Figure 4.3 represents the perspective view wheel.

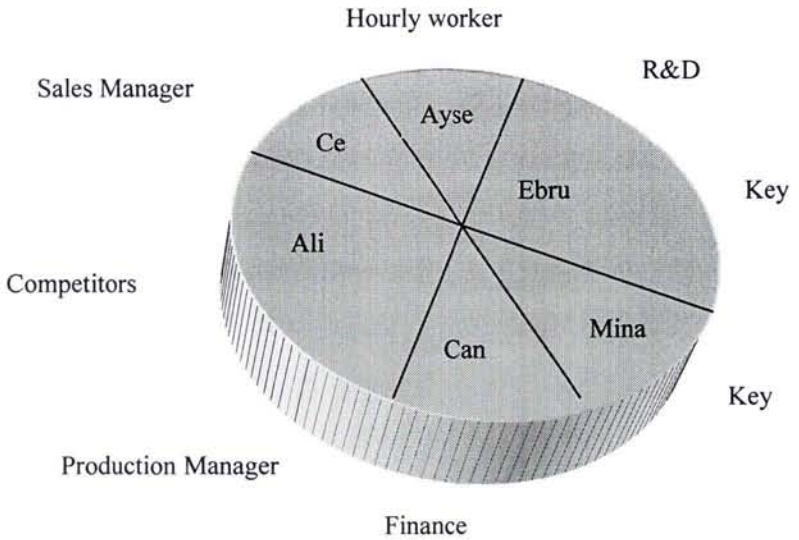

Figure 4.3 Perspective wheel (Adapted from Senge et.al., 1994)

Another method used in figuring out the mental models is balancing inquiry and advocacy. Advocacy creates the supportive cycles in systems thinking however it is not sufficient to break the ties. Stopping the vicious cycle can be possible by inquiry. Inquiry includes asking for the viewpoints of the employees. The most productive learning occurs when managers combine skills in advocacy and inquiry.

One method used in defining and testing mental models is creating scenarios. Scenario planning technique has first developed in Royal Dutch/Shell Company. Royal Dutch Shell scenario planners anticipated the oil shortages of the 1970s. When the OPEC oil embargo became a reality in 1973-1974, Shell responded differently from other oil companies. Shell lowered down its investments in refineries and designed refineries that could adapt to whatever type of crude oil was available. It forecasted energy at a lower level than its competitors did and quickly accelerated development of oil fields outside OPEC. Therefore, Shell, which was the weakest in the seven oil companies before the crises, became the strongest after the crises.

Other ways to define/diagnose mental models are the use of systems thinking view and micro-worlds.

Systems thinking and mental models can not be drawn apart from eachother. Systems thinking without the discipline of mental models, loses much of its power. Two disciplines go together because one focuses on exposing hidden assumptions and the other focuses on how to restrucutre assumptions to reveal causes of significant problems. Integrating systems thinking and mental models will not only improve the mental models but will also change the ways of thinking: shifting from mental models dominated by event to mental models that recognize longer-term patterns of change and the underlying structures producing those patterns (Senge et.al., 1994).

Mental models are also important for learning laboratories. When reflection and inquiry exercises are a part of learning laboratories, laboratories become applications of mental models where people can increase their ability to talk about their assumptions. These laboratories are also important for team exercises.

4.8.5. Shared Vision

The term vision comes from a Latin word videré, which simply means, where we want to go in the future. However without being shared this definition has no meaning for a learning organization. Similar to individuals, people throughout the organization carry in their hearts and minds a shared visions picture. Shared vision is vital for the learning organization because it provides the focus and energy for learning. While adaptive learning is possible without the vision, generative learning occurs only when people are striving to accomplish something that matters deeply to them.
Marquardt (1996), explains the importance of shared vision for the learning organizations as follows:

1. Shared vision provides the energy, concentration and desire to learn. Vision helps people to achieve what they aim.
2. Vision creates an objective.

3. The aim of achieving the objective forces the person for new types of thinking and behaviour. In a stress causing condition shared vision supports the learning process.
4. Strong and productive learning occurs especially when one aims to overcome problems that affect them seriously. People with shared vision and values are ready to inquire their own thoughts.
5. Shared vision guides strategic thinking and strategic planning in organizations, creates procedures and strategies on the way to becoming a learning organization. With the involvement of the employees the organizations vision; a shared vision is developed. The involvement of people quickens achieving the objectives.
6. Shared values and creating meaning is important in deciding which information to store and which to transfer.
7. Shared vision encourages risk taking and experimenting. People become enthusiastic in trying new approaches which helps the organization to reach its vision.

From systems thinking perspective, vision creates a supporting cycle since its shared for the organization and since it supports creative tension. However its not the emotional tension that creates the cycle but the different views of employees and the polarization caused by the different visions. Mental models discipline helps to avoid these polarizations.

The creation of shared vision is a never-ending process. First step is giving up traditional notions that visions always come from an organization's institutionalized planning processes, from top management. The enrollment and commitment of all employees are required in todays vision statement creation process.

Building shared vision is only one part of a larger activity: developing "governing ideas" for the enterprise, its vision, prupose or mission and core values. These governing ideas answer three critical questions: "What?", "Why?" and "How?".

Vision seeks an answer for "what?" question. What is the picture of the future that we seek to create?. Mission seeks an answer for the "why?" question. Why do we exist? And core values seek an answer for "how?" question. How do we want to act consistent with our

mission along the path toward achieving our vision?. These concepts describe how the company wants life to be on a day to day basis while pursuing the vision (Senge,1990).

Activities towards achieving the vision requires achievable goals. These goals define what the individual is required to accomplish in the proceeding few moths and show the milestones that should be achieved (Senge et.al, 1994).

4.8.6. Team Learning

Since this discipline analysed in Classification of Learning According to Levels Approach, it will not be mention in this section again.

4.8. Marquardt's Learning Related Systems Organization Model

According to Marquardt (1996) when companies connect the five different sub system of learning organization process shown in Figure 4.4., they will be more rapid and more succesfull to become a learning organization. All these components are necessary in order to pass from unlearning organization to learning organization.

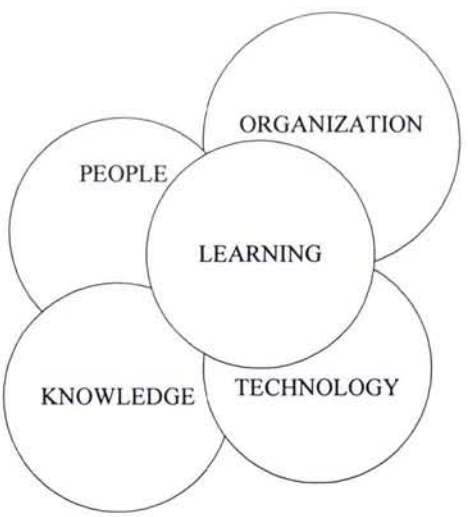

Figure 4.4 Related systems learning organization model

The core of the system is learning and this dimension penetrates inside the other four sub systems. Learning takes part in individual, group and organizatinal level. Marquardt's system thought skills, Senge's learning disciplines; mental model, personal mastery, team

learning, shared vision and dialogue are necessary in order to maximize organizational learning.

Each of other sub systems are necessary in order to increase the effect, quality and continuity of learning. Five sub systems, complement each other and follows a pattern of one within the other. Non existence or weakness of one sub system, decreases the affect of the other sub systems' on a large scale.

4.8.1. Learning Subsystem

In learning sub system and learning levels, the crucial ways of learning for organizational learning and critical organizational learning skills mentioned. (Figure 4.5). These points are examined in Senge's five discipline heading in this thesis.

Figure 4.5 Learning sub system (Marquardt, 1996)

4.8.1.1. Basic Strategies Directed To Learning Sub System

Marquardt (1996), suggests ten strategies in order to set up learning sub system.

Learning programs should be applied to the whole organization starting with small groups.

1.) Increasing the dialogue discipline in the organization.

2.) Setting up the individual development program.

3.) Encouraging and applying the systems thought.

i. Focusing on lever power areas.

ii. Analysing the main causes that lie under problems

iii. Focusing on response relations, not events.

iv. Focusing on the processes.

v. Looking person and problem as a part of only one system.

vi. Perceiving the difference between systems thought and partial thought.

4.) Applying scenario and scrutinizing tecniques for anticipatory learning. Scrutinizing the past and present cases may give information about how probable changes influence the organization.

5.) Supporting diversity, multi-culturedness and global thought in the system

4.8.2. Organization Subsystem

Learning organizations second sub system is its own that learning arise. This sub system has four dimensions: vision, culture, strategy and structure (Figure 4.6)

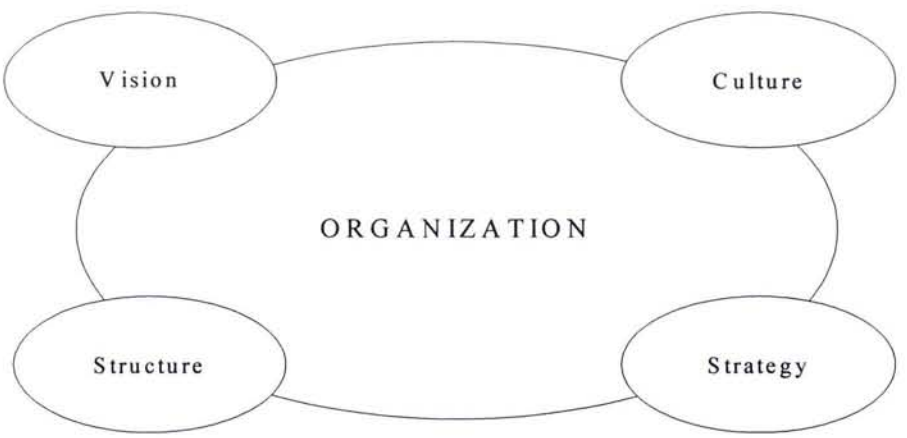

Figure 4.6 Organization sub system. (Marquardt, 1996)

4.8.2.1. Basic Strategies Directed to Organization's Subsystem

Marquardt (1996), recommends the following strategies in order to establish organization's sub system.

- Organizing vision improvement meeting.
- Top management's support should be taken for learning organization and learning projects.
- In order to set up a continuous learning company environment, individuals learning should be awarded and supported.
- Realizing and awarding the learning in individuals and teams.
- Stating learning as a part of all policies and processes.
- Showing purposeful projects and establishing superiority centers.
- As a learning activity using performance measures in financial and non financial areas.
- Creating appropriate physical environment, area and time for learning.
- Setting up a learning desire everytime and everywhere.

4.8.3. Human Subsystem

The human sub system of the learning organization is composed of the employees, manager or leader, customers, sellers, allied partners and society. All the groups in Figure 4.7 have value in a learning organization and every group needs learning authorization and delegation.

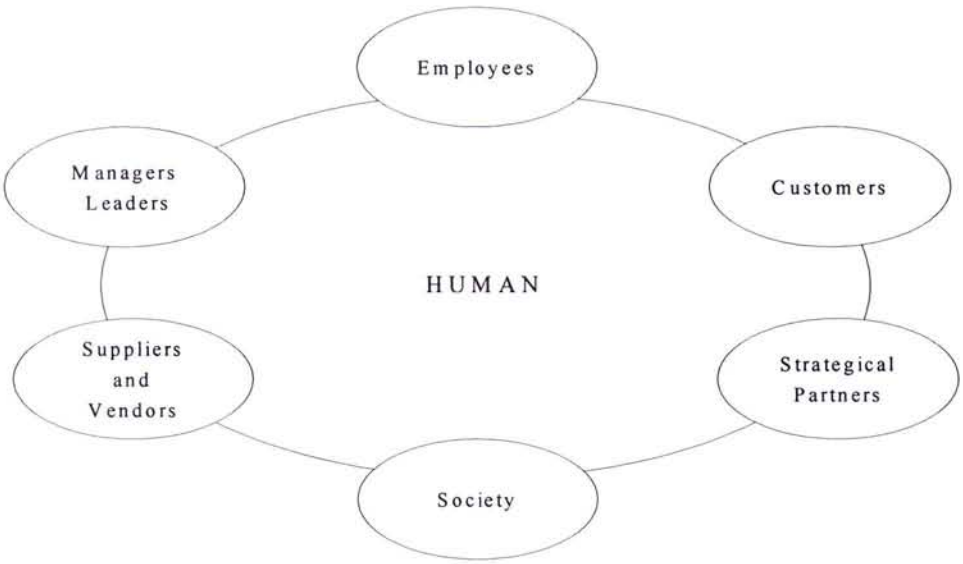

Figure 4.7 Human sub system (Marquardt, 1996)

4.8.3.1. Main Strategies Directed to Human Subsystem

Marquardt's (1996), suggestions for establishing human sub system can be summarized as personnel policies that award the learners; establishing self managing working teams; supporting employee learning and producing; leaders participation in the learning process and projects; maintaining the needs of learning and improvement of individuals and organizations; providing the participication of customers in organizational learning; providing the training opportunities for the society.

4.8.4. Information Subsystem

Information sub system expresses the information which the organization obtains and generalizes. It includes obtaining information, storage, production, transfer and usage (Figure 4.8.)

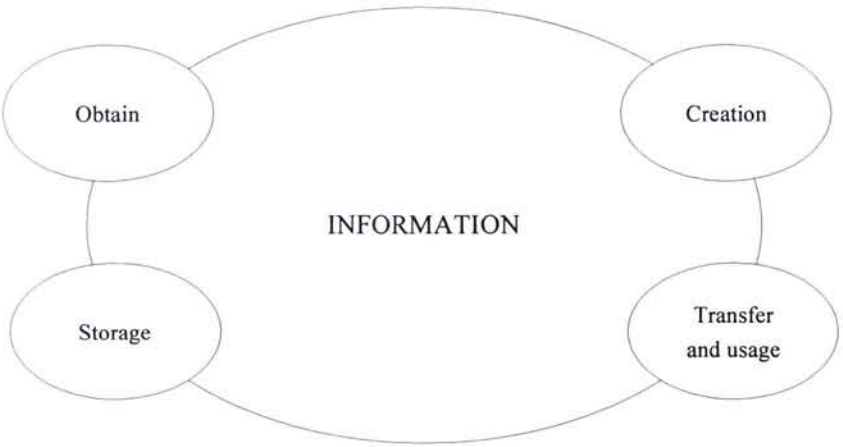

Figure 4.8 Information sub system. (Marquardt, 1996)

4.8.4.1. Obtaining Information

Organization obtains the information from internal and external sources. External sources can be benchmarking studies, conferences, consultants, newspaper, books, and periodicals; television, video, and films; economic, social and technological inclinations; customers, competitors, suppliers etc.; new personnel; partnerships, joint ventures, and entrepreneurship. Internal sources can be the knowledge level of the employees; learnings from experiences; learning from errors and etc.

Whether the information is obtained from internal or external sources, there are two points that should be taken into consideration. The first point is that the information, and the collected information may not show one to one match. Information goes through filters of norms, values and procedures. Secondly, information may not always be gained consciously. Learning organizations try to form structures that are capable of gaining information consciously.

4.8.4.2. Production of Information

Production of information implies the new information that is created via creation of solutions of problems and notion. While gaining of information is adaptive, production of information follows a generative pattern. Production of information is not only the duty of R&D department but of all the individuals and departments in the organization.

4.8.4.3. Storage of Information

Storage of information refers to coding, organizing and representing and placing of evaluated information where any individual, at any time and from any place can reach. Since the basis in learning organizations is creating reachable information and spreading it, it is a must to get use of technological developments that would provide and assist the construction of such a system.

4.8.4.4. Transformation and Recycle of Information

Information components of organizational learning are independent and related to eachother rather than being continuous and consequent. Collection and distribution of information are carried out through multichannels.

Transformation of information may be through concious tries like reports, boards, briefings and guidance and also unconscious tries like changing a job, informal speaches, and stories. Similarly transfer of information can be mechanic or electronic or via communication of individuals.

4.8.4.5. Basic Strategies of Information Subsystem

Marquardt (1996), suggests the following strategies in order to construct an information subsystem:

- Creating the expectation that every individual is responsible of collecting and transfering information via formal methods like meetings and conferences or informal methods like social contented meetings.
- Arranging inter-organizational learning acts like internal comparison reports and audits referring to gaining and sharing information.
- Develop a learning model that facilitates organizational learning.
- Supporting task rotation and mixed team structures in order to maximize organizational information transfer.

- Training of emloyees that store and put information into reuse. This may not necessarly be limited with this portion of the employees but all individuals in the organization.
- Developing an information base that would satisfy the needs of learning and values of the organization.

4.8.5. Technological Infrastructure

According to Marquardt (1996), the three main titles of tecnological infrastructure are Information Technology, Technology Based Learning, and Electronical Performance Support Systems, Figure 4.9.

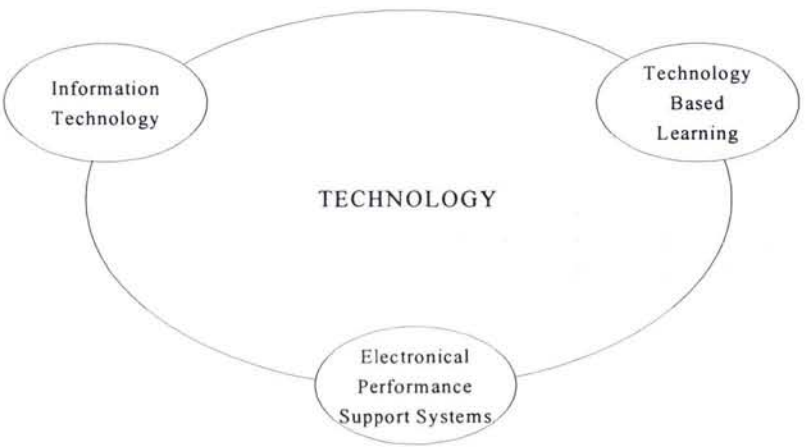

Figure 4.9 Tecnological Infrastructure. (Marquardt, 1996)

4.8.5.1. Information Technology

Information technologies have important effects on organizations. For example; it takes part in improving communication since it provides to go beyond hierarchial structure. Electronical mail, home video conference, and similar opportunities make direct communication location-independent. In a similar manner, by the aid of portable business stations, information technologies free employees from the bounders of location dependency. It also reduces the number of levels in the hierarchial structure however on

the contrary provides the advantage of increasing the control time. And in addition, employees can work in a more autonom structure.

Information technologies provide management better understanding of external changes and closer relationships with leaders and employees in the organization. Besides, measurement and evaluation of critical success factors can be held easier and faster.

4.8.5.2. Technology Based Learning

Technology based learning comprises of workouts with tape, and computer based mass communication tools in order to store and distribute information and knowledge.

This new technology based learning has a more flexible learning process since it is under the control of employee. It can be stopped when needed and restarted again, can be moved. Even multidimensional in touching, listening and seeing, learning, in line with the spread of developed technology, would provide the chance of having innercycle conferences, online educational seminars, and similars, and also bring other innercycle opportunities.

4.8.5.3. Electronical Performance Support Systems

Electronical Performance Support Systems, with the least number of employees and the shortest time possible, provides, stores and distributes information via written texts, vision or voice based databases, through all levels, in order to support the employees to get the organization to the best performance level in its operations.
An electronical performance support system should be comprised of the following aspects:

1. **Knowledge Profile:** These are accumulated records that are taken containing information, knowledge, attitude, and performance levels for each employee. It may also comprise performance evaluations. These profiles provide the control for decision taking process, check whether the right decision is given or whether it is given by an authorized and educated person. Besides these profiles provide the necessary database for human resources department with respect to performance

evaluations, additional training and improvement program needs, deciding whether the employee is ready to take the program and so on.

2. **Expert Information Base:** It is used both in external information like industry, market and rivals and also in internal informaiton like labor policy, processes, financial data. Before storing the information, it has to be organized with recpect to the electronic system and employee, in order to be used efficiently.
3. **Inner Cycle Help:** For every program and application in electronical performance system, there has to be a user-friendly help screen and information.
4. **Integrated Education and Business Help:** An employee may need to implement a special procedure in the performance support system. The explanation of reasons for the necessity of a decision taken, and the numeric reasons to take such a decision could be a part of the program. Thus the system both supports decision making and problem solving processes.
5. **Electronical Integrated Reference System:** This system stores the users guide of system equipment, detailed procedures, processes and all documentation of organization. Also company or names of individuals, telephone numbers and addresses that would provide resource for new information may exist in the system.
6. **Inner Cycle Documentation:** When new materials are added or updated, database should also be updated without losing time. Continuous developments of workers should also be included in the inner cycle doucumantation.
7. **Monitoring, Evaluation, and Feedback System:** this component controls the activities of the users and evaluates its conformity with these activities. Worker can easiliy detect a defective item and can correct the process. System can show personal knowledge improvement methods by the aid of profiles.
8. **Connection to External Applications:** An application in the environment should be capable of sharing the information with other applications.

Performance support systems provide the combination of human and machine labor. However unless human factor does not function properly, performance support system can not provide the benefit it actually can.

The basic benefits of electronical performance support systems are as follows:

- Improves both work performance and information level.
- Provides help at the time and place the worker needs.
- By the aid of the computer uses expertise of a specialist for lever power.
- Accelerates the process of recording learning to memory and on work training.
- Reduces the time and cost of training.
- Increases flexibility in employees' tasks.
- Provides opportunities of training for hardly reachable employees.
- Reduces documentation of user's guides, improvements and similars.
- Increases the adequacy and authorization of workers.

4.8.5.4. Basic Strategies for Technological Infrastructure

Strategies that Marquardt (1996) suggests for technological applications are as follows:

- Encouraging and diverting the use of technology to provide reachable information.
- Establishing technology based learning centers.
- Use of interrelated video training and making it widespread.
- Especially by using software and simulation techniques, providing self or group learning and improvement.
- By using career improvement systems, introductory tools, decision making tools, idea analysis, analysis of feedback chains of a learning team or department, and similar tools and technology in the organization, increasing personal and collective knowledge.
- Increasing the technological responsibilities of management and human resources departments.

4.9. Transfering to a Learning Organization

In order to become a learning organization, there is not a certain, and clearly definable way. Each organization has to define its own ways and methodology in order to become a

learning organization. Since learning is continuous and has no end, this transfer also refers to a never-ending process. Thus for no organization, it can ben certainly said that it is a learning organization.

Marquardt (1996), suggests an action list derived from implementations of leader organizations that apply learning organization philosopy. The steps of this list are as follows:

1. Possession and determination in order to become a learning organization and to learn.
2. Combining learning with strategic targets and applying it in all processes.
3. Providing the sharing of vision.
4. Understanding the importance of systems thinking and its implementation.
5. Providing that leaders are role models for learning.
6. Making continuous learning an inevitable part of the culture of organization.
7. Developing strategies that for the organization as a whole.
8. Lessening bureaucracy.
9. Providing the sharing of delegation of authorization and responsibilities.
10. Establishing structures that would increase learning and provide circulation of information.
11. Determining and implementing the most appropriate technology for learning activities.
12. Encouraging learning in levels of individual, team, and organization and continuous adaptation, improvement and learning to become a learning organization.

4.10. Organizations that Cannot Learn

Organizations that survive in the future, would be the ones that could adapt to rapid changes, that could divert this process and taht could become learning organizations. Learning organizations emerge the synergy that provides the appropriate environment for idividuals to improve themselves in a teamwork concept. As a result of this situation which can be named as organizational learning, organizations gain advantage in the demolihing

competitive environment and become leaders. However, nowadays, there are many organizations that cannot learn.

Management experts think that companies can not diagnose their diseases thus cannot go through treatment also. Some companies and associations could not derive lessons from their reasonably long past experiences and could not establish a system that would provide formally non-individuality, attain the least time with the least cost, and create an effective and efficient process. They still encounter problems they used to face fifty years ago. Todays demolishing competitive environment requires new techniques, however the basic is to posses the ability to learn. Diseases of not learning are not bounded with the mentioned ones in this study however still, it will illumiate some basic diseases and provide correct diagnosis and treatments.
These diseases can be listed as follows;

- Denying the problem.
- Not sharing the information.
- Not learning from mistakes.
- Avoiding production of information.
- Not understanding the structure and the system.
- Hiding behind past success stories.
- Guaranteeing learning with training.

5. THE APPLICATION OF OOAD TO "ORGANIZATIONAL LEARNING, ADAPTATION, AND MANAGEMENT SUPPORT SYSTEM"

Corporations are becoming information-based organizations that depend on continuous flow of data for virtually every aspect of their operations. However, the volume of information increasing faster than the capacity to process it. Thus organizations and decision makers are drowning in their own data. Analysis emphasizes an investigation of the problem and requirements, rather then a solution. "Analysis" is a broad term, best qualified as in requirement analysis (an investigation of the requirements) or object analysis (Larman, 2002).

Unfortunately "analysis" and "thought" are frequently treated as synonyms, but analysis is only one way of thinking; synthesis is another. In analysis, something that we want to understand is first taken apart. (Ackoff, 1999)

Design emphasizes a conceptual solution that fulfills the requirements, rater then its implementation. Analysis and design have been summarized in the phase' do the right thing (analysis), and do thing right (design).

Object-Oriented Analysis and Design (OOAD) emphasizes representation of objects, their attributes and operations of the objects.

During the object-oriented analysis, there is an emphasis on finding and describing the objects or concepts in the problem domain. For example, in the case of the library information system, some of the concepts include Book, Library and Patron.

During the object-oriented design, there is an emphasis on defining objects and how they collaborate to fulfill the requirements. For example, in the library system, a Book object may have title attribute and a getchapter() method.

5.1. Object Oriented Analysis and Design: Model of Reality

When we analyze organizations as a system, we create models of the application domain of interest to our business. The model can be very specific and highly specialized, or it can cover a whole enterprise. In either case, the model represents an aspect of reality and is built in a manner that helps us to manage complexity and understand the business reality. The model is always much simpler than reality, just as any toy model is simpler than the real thing. In our case, however, if the model is rich enough, we can manipulate it to help us invent or redesign our businesses. We built models so that we can better understand the system we are developing (Richard, 1997).

Through modeling, we achieve four aims:

1. Models help us to visualize a system as it is or as we want it to be.
2. Models permit us to specify the structure or behaviour of a system.
3. Models give us a template that guides us in constructing a system.
4. Models document the decisions we have made.

With object-oriented analysis, we model reality with objects as our building blocks, hoping to eliminate the shortcomings of a modeling paradigm based on functions. In the object-oriented paradigm, we describe our world using object types (classes) and describe services of these object types. Then we model the behaviour of the world as a sequence of messages that are sent between various objects. By using, this form of analysis, we can more easily design and implement "Organizational Learning, Adaptation and Management Support System" in an object-oriented manner and achieve the benefits of doing so.

5.1.1. Define Use Cases

Requirement analysis may include a description of related domain processes; these can be written as use cases.

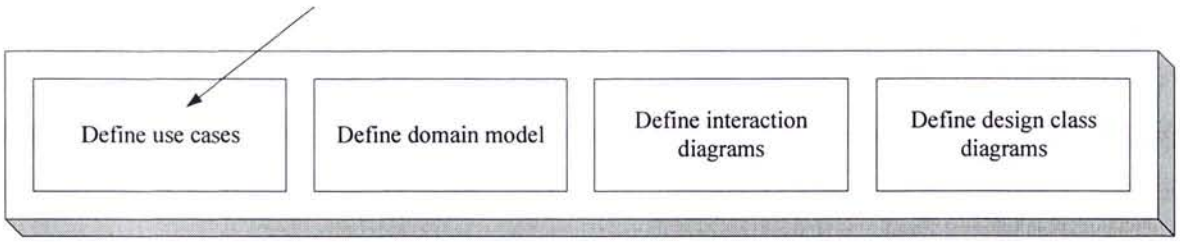

Figure 5.1 Object-oriented analysis and Design process stages.

Use cases are not an object-oriented artifact, they are simply written stories. However, they are a popular tool in requirement analysis and are an important part of the Unified Process.

5.1.2. Define a Domain Model

Object-oriented analysis is concerned with creating a description of the domain from the perspective of classification by objects. A decomposition of the domain involves an identification of the concepts, attributes, and associations that are considered noteworthy. The result can be expressed in a domain model, which is illustrated in a set of diagrams that show domain concepts or objects. Note that a domain model is not a description of software objects; it is a visualization of concepts in the real-world domain.

5.1.3. Define Interaction Diagrams

Object-oriented design is concerned with defining software objects and their collaborations. A common notation to illustrate these collaborations is the interaction diagram. It shows the flow of messages between software objects, and thus the invocation of methods.

5.1.4. Define Design Class diagrams

In addition to a dynamic view of collaborating object shown in interaction diagrams, it is useful to create a static view of the class definitions with a design class diagram. This illustrates the attributes and methods of the classes.

5.2. What is UML?

The Unified Modeling Language (UML) is a language for specifying, visualizing, constructing and documenting the artifacts of software systems, as well as for business modeling and other non-software systems. (Rumbaugh et.al., 1999)

The UML has emerged as the de facto and de jure standard diagramming notation for object-oriented modeling. It started as an effort by Grady Booch and Jim Rumbaugh in 1994 to combine the diagramming notations from their two popular methods, the Booch and OMT (Object Modeling Technique) methods. They were later joined by Ivar Jacobson, the creator of the Objectory method, and as a group came to be known as three amigos. Many others contributed to the UML, perhaps most notably Cris Kobryn, a leader in its ongoing refinement. (Rowlett, 2001)

The UML was adopted in 1998 as a standard by the OMG (Object Management Group, an industry standards body), and has continued to be refined in new OMG UML versions.

The UML is called a modeling language, not a method. Most method consists, at least in principle, of both a modeling language and process. The modeling language is the notation that methods use to express designs. The process is their advice on what steps to take in doing a design. We can use any process with the UML. The UML is process independent, although optimally it should be used in a process that is use case driven, architecture-centric, iterative and incremental.

5.2.1. A Conceptual Model of the UML

To understand the UML, you need to form a conceptual model of language, and this requires learning three major elements: the UML' s basic building blocks, the rules that dictate how those building blocks may be put together, and some common mechanisms that apply throughout the UML.

5.2.1.1. Building Blocks of the UML

The vocabulary of the UML encompasses three kinds of building blocks:

1. Things
2. Relationships
3. Diagrams

Things are the abstractions that are first-class citizens in a model; relationships tie these things together; diagrams group interesting collections of things.

There are four kinds of things in the UML;

1. Structural things.
2. Behavioral things.
3. Grouping things.
4. Annotational things.

These things are the basic object-oriented building blocks of the UML. There are four kinds of relationships in the UML:

1. Dependency.
2. Association.
3. Generalization.
4. Realization.

5.2.1.2. Diagrams in the UML

A diagram is the graphical presentation of a set of elements, most often rendered as a connected graph of vertices (things) and arcs (relationships). You draw diagrams to visualize a system from different perfectives, so a diagram is a projection into a system.

The UML includes nine such diagrams:

1. Class diagram
2. Object diagram
3. Use case diagram
4. Sequence diagram
5. Collaboration diagram
6. Statechart diagram
7. Activity diagram
8. Component diagram
9. Deployment diagram

In this thesis, UML notations including relationships and diagrams that are used to model of "Organizational learning, adaptation and management support system" using OOAD perspective are explained briefly.

5.3. Implementation, Control and Learning

Implementation is the detailed description of planned solution ways according to who, what, where, when, and how questions. Control monitors all decisions, including the decisions taken during implementation process, and their assumed results, whether they do satisfy the expected outcomes in the beginning of the process. If the expectations determined during the decision making process are not met, control operation conducts researches in order to determine the reasons. Control mechanism suggests instructions and solution formulas that would cover the difference between expectations and realized results. Controlling also possesses the responsibility of conducting the necessary corrections if expectations are beyond reasonable levels. Controlling is the most important method to apply in order to realize organizational learning in the fastest, effective and efficient way. All actions, including unrealized decisions depend on assumptions and expectations. Thus, since the deviations from assumptions have important effects on learning, it has to be under control. When the results of the decisions taken, during the design process or marketing process of a product, are not monitored, they create important

opportunities for learning. Most decisions might result in unsuccessful outcomes if not implemented in the correct manner. Therefore if people in charge of implementation of the decision are different than the ones who has taken the decision, they ought to be in direct connection and communication with each other. This will reduce errors in implementation process to the most appropriate level.

Even if control without learning can increase performance, it is an obstacle for avoiding continuous errors. In this manner, learning and organizational learning, is not a concept of coincidences. On order to realize learning, by Ackoff's terms, "learning-and-adaptation support system" is needed. Learning may be gained from making mistakes. However, in order to learn from mistakes they must be detected. Detection requires information. Then the cause or source of the mistake must be identified. This identification requires understanding. Finally, successful corrective action must be taken and this requires knowledge. A complete learning system should be able to perform these activities, in other words it should be able to detect errors, identify them and take corrective action by using the information, understanding and knowledge.

The mistakes mentioned above may take two forms, errors of commission and errors of omission. Errors of commission are doing something that should not have been done and errors of omission are not doing something that should have been done. Organizations should detect and correct both of these mistakes in order to survive.

In order to accelerate learning and provide continuous learning, decisions that are made should be monitored. This kind of learning which is called "deutero-learning" occurs when the mistakes that are made in correcting the mistakes are identified and the corrected. Moreover, most learning involves replacing something known or understood with something new. This activity brings into the concept, unlearning. (Ackoff, 1999)

5.4. Application of OOAD to Ackoff' s Learning Model

Today' s business environment is diverse and dynamic. A decision maker needs a system that can support him in different problem situations. In other words, we need a learning

and decision support system that helps decision makers to take required decisions and obtain learning between individuals in organization.

Ackoff's, "Organizational Learning, Adaptation and Management Support" (OLAMS) model may be modified according to the organization's structure, business and environment. The model builds upon work done in the areas of learning, organizational learning, decision making and software agent. The complexity of the design of the system comes from the implicit complexity of the processes of control, learning and adaptation. This model incorporates architectural components that make the system amenable to learn how to learn and adaptive.

The ways of increasing control can make a system more efficient, but cannot change a system from doing wrong thing to doing the right thing. Control can only increase the efficiency with which a system carries out its functions. To increase the effectiveness one must understood why it is doing what it is doing and whether what it is doing is the right thing. To transform an organization that is doing the wrong thing or producing wrong the product or services one to that is doing what's right usually requires its comprehensive redesign. (Ackoff, 1999)

Know-how constitutes knowledge. With knowledge alone, we can increase the efficiency of a system but not its effectiveness. An increase in effectiveness requires understanding, but even understanding is not sufficient. To increase the effectiveness of a system we must be aware of why it does what it does (understanding) and whether it ought to be doing it (wisdom). Therefore if a system is doing the wrong thing, wisdom is required to identify the error and correct it. (Ackoff, 1999)

The Unified Process (UP) has emerged as a popular modeling technique and software development process for building object-oriented systems. There are several disciplines in the UP, but the following three are the important ones.

- Business Modeling: When engaged in large-scale business analysis or business process reengineering, this includes dynamic modeling of the business processes across the entire enterprise.
- Requirements: Requirement analysis for an application, such as writing use cases and identifying non-functional requirements.
- Design: All aspects of design, including the overall architecture, objects, operations, functions and the like.

5.4.1. Business process and requirement analysis of the OLAMS system

Determining the business processes and requirements of OLAMS model is the first step to develop strong model. Requirements contains answers to questions like functionality, usability, performance, operations etc and requirements may be developed, explored and recorded in the use-case models.

5.4.1.1. Use case model of the OLAMS system

Writing use-cases-stories of using a system is an excellent technique to understand and describe requirements. Use case diagrams are one of the UML diagrams to help keep it simple and understandable for all stakeholders of the system. However, the UML defines a use case diagram to illustrate the names of use cases and actors, and their relationships. There isn't one best format to document use cases, but we will use shared format is the template available at www.usecases.org.

Use Case UC1:OLAMS System

Primary Actor:

Decision Maker

StakeHolders an Interests:

- Decision Maker: Analyzes information, knowledge, understanding and takes required decisions to achieve ends plans
- Decision Implementer: Carryout motivational messages and implement decisions.

- Data Provider: Collects data and IKU.
- Organization: Wants to accurately obtain learning between individuals, eliminate decision mistakes and develop a adaptive decision support system.
- Decision Support System: DIKU processing and recording.

Preconditions:

Success Guarantee (postconditions):

Learning is obtained. DIKU are stored. Decision record is saved. Decisions are implemented. DIKU are filtered, classified and condensed. Errors are corrected. Symptoms and presymptoms are reviewed and updated.

Main Success Scenario (or basic flow):

1. Organization and its environments generate DIKU.
2. DIKU received by decision support.
3. DSS processes the relevant DIKU.
4. Decision maker request IKU in acceptable format.
5. Decision maker analyzes provided IKU

   → Decision maker repeats steps 4-5 until the decision maker satisfied with provided IKU
6. Decision maker takes a decision.
7. Decision record is prepared by decision maker and stored by inactive memory unit.
8. Decision Implementer carry out motivational messages and implement decision.
9. Comparison mechanism compares expected effects of assumptions and outcomes.
10. Diagnosis function analyzes difference between expected effect of assumptions and outcomes if significant difference exists, if not experiment record stored for future reference.
11. Diagnosis function prescribes a corrective action.
12. Corrective actions are taken and comparison repeats steps 9-10 until no significant difference occur.
13. Symptom and presymptom records will be reviewed and updated depend on corrective changes.

The UML diagram of previous use case template is given below (Figure 1.2)

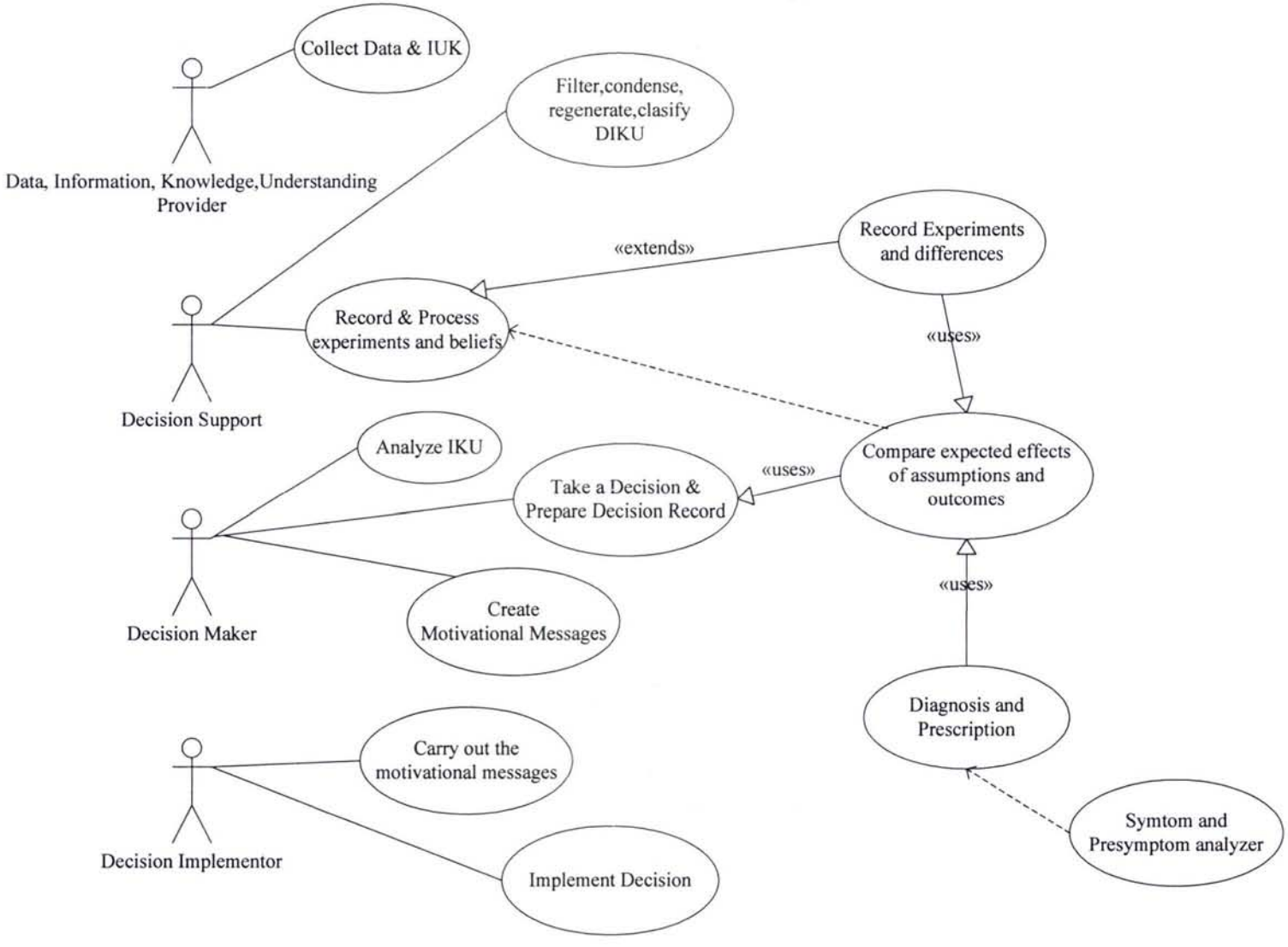

Figure 5.2. Use-case diagram of the OLAMS system.

A previous use case diagram is an excellent picture of the OLAMS system content; it makes a good context diagram, showing the boundary of a system, what lies outside of it, and how it gets used. It serves as a communication toll that summarizes the behaviour of system and its actors.

OLAMS is an interactive system consisting of three computerized major components: Decision record & process subsystem, comparison subsystem and diagnosis subsystem. With the knowledge and other capabilities embodied in these components, a Decision Support System (DSS) is intended to help a decision maker interactively solve managerial decision problems.

The three-component architecture is capable of managing data; fitting data into models, which supplied by decision maker and providing information, knowledge, and understanding to reach decisions. By manipulating DIKU, the decision maker is able to examine various scenarios and their consequences. The components of the system as a whole, contribute to the quality of decisions that are taken by decision maker.

Nevertheless a system based on the above architecture mainly provides passive rather than active or intelligent support for decision making. A system, which provides passive decision support barely, achieves its design objectives as the user's experiences, knowledge, and expertise change.

Changes in environments make a DSS that initially completely meets the design objectives obsolete. Furthermore the increasing complexity and diversity of managerial environment require that a DSS not only take an active role, but also be able to adapt to changing needs of decision makers. These considerations have led to attempts to improve the usability and/or functionality of a DSS by strengthening its components and/or adding new components to make whole system into which obtains learning.

However use-case diagrams have not ability presents all interactions and message passing between objects. Therefore another UML diagram that is "sequence diagram" needed to present dynamic view of whole system.

5.4.1.2. Sequence diagram of the "OLAMS" system

Before starting a implementation of model, some further investigation of the problem domain is useful. Part of this investigation is the clarification of the input and output system events related to our OLAMS system, which can be illustrated in UML sequence diagrams.

A system sequence diagram is a picture that shows, for a particular scenario of a use case, the events that external actors generate, their order, and inter-system events. All systems are treated as a black box; the emphasis of the diagram is the events that cross the systems boundary from actors to systems.

By using previous use case diagram of the OLAMS system, sequence diagram given at Figure 5.3. is created.

5.4.1.3. Domain Model: visualizing concepts of the OLAMS system

A domain model illustrates meaningful conceptual classes in a problem domain; it is the most important artifact to create during object-oriented analysis. (Stevens, 1999)

Using UML notation, a domain model is illustrated with a set of class diagrams. It may show:

- Domain objects or conceptual classes
- Associations between conceptual classes
- Attributes of conceptual classes

Noun phrase identification is a useful technique to finding conceptual classes, suggested in linguistic analysis:

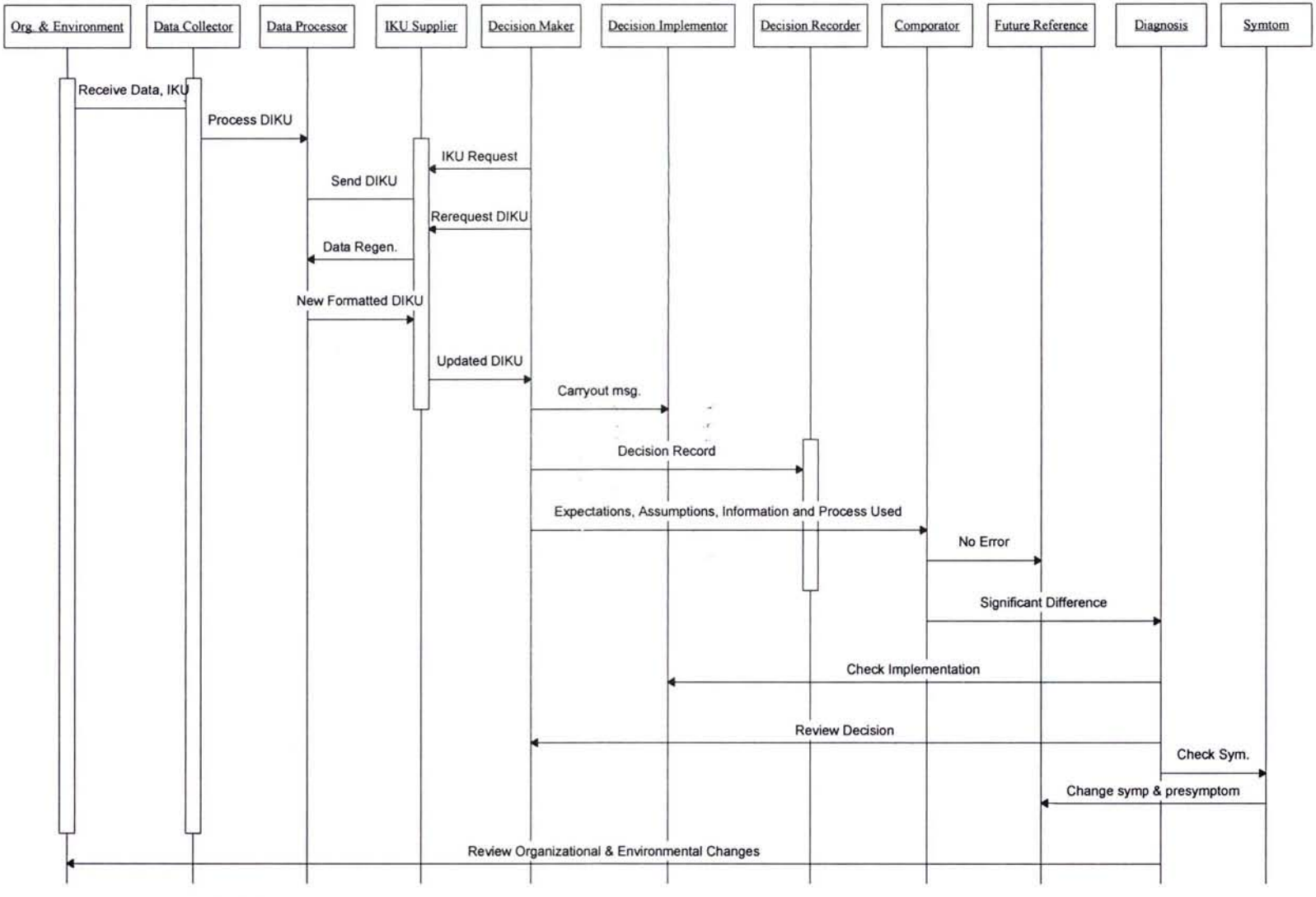

Figure 5.3 Sequence diagram of the OLAMS system.

Identify the nouns and noun phrases in textual descriptions of a domain, and consider them as candidate conceptual classes or attributes (Abbot, 1983).

5.4.1.4. Noun phrase identification of OLAMS system

The major characteristics of the system behaviour of DSS are adaptation and learning. These characteristics can be regarded as a general goal in the knowledge-level.

The proposed model begins with the generation of data, information or understanding about the behaviour of the organization and its environment. The data collector class receives these inputs where they are stored. With the advent of information technology, the amount of data that is collected, stored and retrieved is exploding. The aggregate of data allows the decision maker to induce decision rules for similar problem situations or multidimensionally examine the underlying relationships among data. Multidimensional analysis helps the decision maker explore business opportunities or formulate problems.

This feature is especially important during the initial stages of the decision making process. However one should note that the system should be able to filter the incoming data, information, knowledge and understanding for relevance so that overabundance of irrelevant data is prohibited. Data processor class provides filter, condense, organize, classify and decompose of data, information, knowledge and understanding (DIKU).

Once a request of support message comes form decision-making class, the information, knowledge and understanding are transmitted to the decision-making class over DIKU supplier which responsible to take required pattern of DIKU. If the decision maker is not satisfied, additional request of support is sent to the Data Processor class with new formulation of the decision needs. Data regenerator class have responsibility of regeneration of data with new formulation and may have artificial intelligence (AI) ability to fill the require gaps and it can also renew request DIKU from organization and its environment. This request fulfillment cycle continues until either the decision makers have all the information, knowledge or understanding they require or until they run out of time before taking the decision.

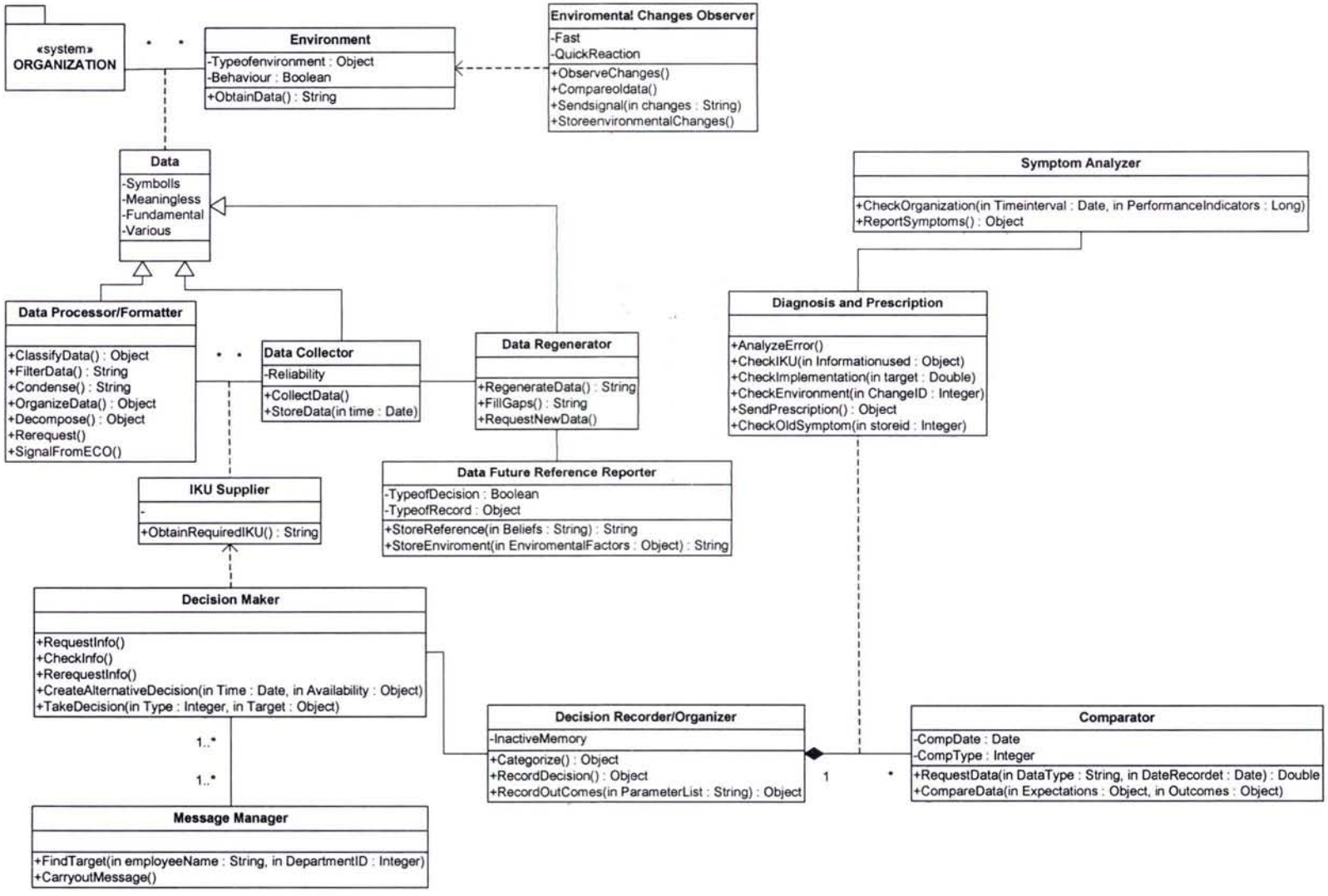

Figure 5.4 Class Diagram of the OLAMS system

When a decision is taken two kinds of outputs is obtained. "The decisions to do something" or "the decisions to do nothing". Whenever a decision is taken, it must be recorded in decision recorder class, which categorize and record decision. Decision recorder also has operation called "Record outcomes". Consequently, if the decision is about doing something, then motivational messages and instruction should be prepared and sent to message manager & implementer class in the system whose responsibility is to carry out the instructions or whose motivation is the target and implement the decision.

The decision support function, by using the monitoring requirements, checks the validity of the expectations, assumptions and information used in making the decision and during its implementation. When the information about the validity of the expected effect, relevant assumptions and information are obtained, these should be sent to the decision recorder and comparator class in the form of monitoring reports. In the decision recorder class and comparator class a comparison is made between the actual and expected effects and of the assumptions and relevant occurrences using the monitoring reports and decision report.

If the comparator does not find any significant difference between the expectations and assumptions, then a record of comparisons is prepared and entered in the decision recorder class in a retrievable form –in a file-. If a significant difference is found then this difference is reported to the diagnosis and prescription class as a deviant. Diagnosis and prescription class finds out the reason for this difference and prescribes a corrective action.

If the information, knowledge or understanding used in decision-making class was in error, then the decision support system or the symptom and presymptom analyzer should be changed. If the decision-making class was in error, then a change in this subsystem should be made. If the decisions were correct however the implementation was faulty then the behaviour of the organization that were responsible of implementing the instructions and motivational messages should be changed. Lastly if an unanticipated change has occurred in the environment, then by changing the decision support function, decision-making function or the behaviour of the organization, the organization must become less sensitive to such changes. Through these types of corrective changes, the diagnosis and prescription function assures both learning and adaptation.

The OLAMS system also includes a symptom and presymptom analyzer function, which regularly analyzes the internal, and external performance indicators and reveals some of them as symptoms and presymptoms. If symptoms or presymptoms are found they are sent to the diagnosis and prescription class. Once a diagnosis is obtained the threats and opportunities are revealed and reported to the decision making function.

When the diagnosis and prescription function prescribes a change in the system, a diagnostics and prescriptive record of it is prepared and sent to the decision recorder class and comparator where its contents are compared with the decision support functions monitoring report that was prepared in response to the monitoring required of the prescriptions (decisions) issued by the diagnosis and prescription function. Once again the deviants are checked and if exist they are reported to the diagnosis and prescription function where again a corrective action will be taken. The corrective action may include a change in the diagnosis and prescription function or may be any of the type of changes previously mentioned.

Finally, information and opportunities may be sent to the decision making function by a source within the organization or its environment.

As a result, individuals or organizational units may carry out these functions of the proposed system. If the related organization is small then even a single individual may carry out the system. In addition all the functions except diagnosis and prescription can be automated to some degree and that with minor modifications, this system can be made to support the learning and adaptation of individuals.

After creating class diagram of proposed model by using any UML based software like Rational Rose, Visio, etc can automatically create a main body of the software with OOD perspective. Programmer may write required function codes into prepared main body of the software by using any object-oriented programming languages like C++, Java, Smalltalk, etc. Ms-Visio screen and object codes can be seen in following Figure 5.1

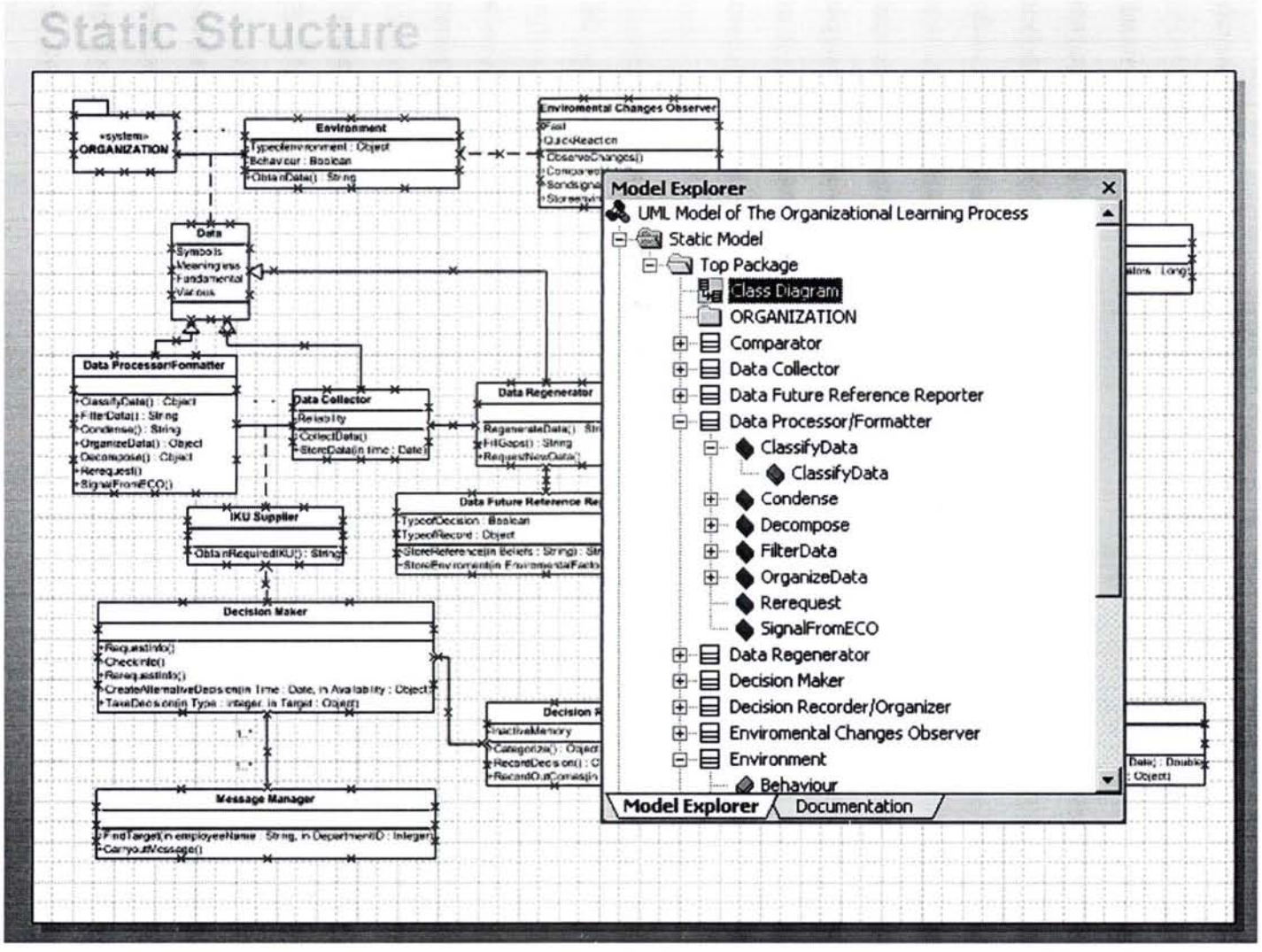

Figure 5.5 Ms-Visio Object Code Screen

6. CONCLUSION

The main objective of this study is to design a model that provides an exact understanding of learning and organizational learning theories and it's implementations by using object oriented analysis and design techniques.

The suggested model is based on Ackoff's organizational learning model. This model is designed by unified modeling language (UML), which is used to convert the business models that have been designed by object oriented analysis and design techniques into software components.

This model has been developed by using three main diagrams of the unified modeling language. The first diagram is the use – case diagram; the behavior and the boundaries of the learning model are determined with the use – case diagram. The individuals and their possible actions, those have an effect on learning process in the whole organization, are presented briefly as probable scenarios.

The second diagram, sequence diagram, which is based on the use – case diagram, provides a detailed visibility of the relationship and the interactions (message passing) between the objects in the learning model. As a result, the sequence diagram emphasizes a scenario's improvement due to time and its dynamic behavior.

The use – case and sequence diagrams of the unified modeling language only document the learning model to provide an easy understanding for the individuals.

The last and the most important "class diagram", is the third step for the implementation of the learning model. The class diagram determines the attributes, the operations, methods and the relations of the objects those create the learning model.

Microsoft Visio 10.5 constructs the main body of the code for the learning model while locating the objects of the class diagram using unified modeling language to create the

learning model. In this manner, the constructed code can easily be converted to computer software.

The model focuses on creating a structure that makes explicit knowledge more usable and valuable. By creating the structure that makes it easier to transform tacit knowledge into explicit knowledge, it will be easier for the other individuals or organizations to benefit from knowledge.

Modeling learning has its own difficulties that require great attention, sufficient time and explicit knowledge; the unified modeling language covers these requirements and simplifies the conversion of learning into a model and implementation of learning in business environment.

The proposed model in this study procures learning. The following suggestions can be given for future studies:

- The main source code of this learning model can be completed by any of these object oriented programming languages (e.g. C++, Java, Smalltalk)
- Artificial Intelligence (AI) can also be added to some parts of the learning model
- The model can be implemented and tested in any organization as a learning model.

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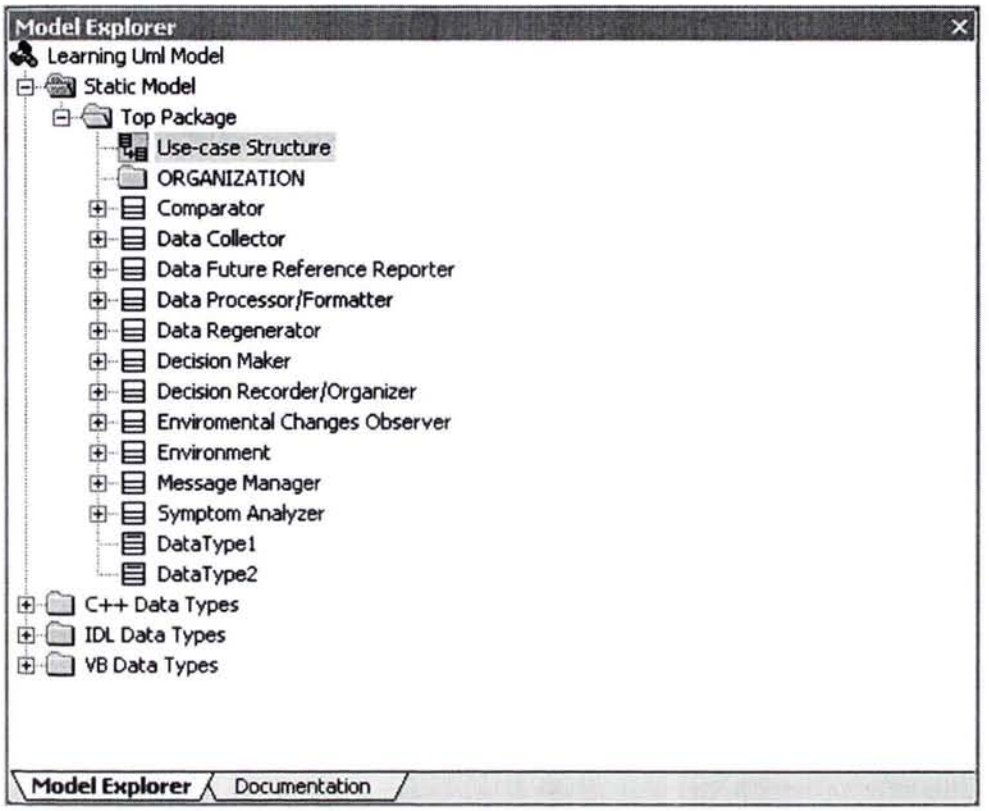
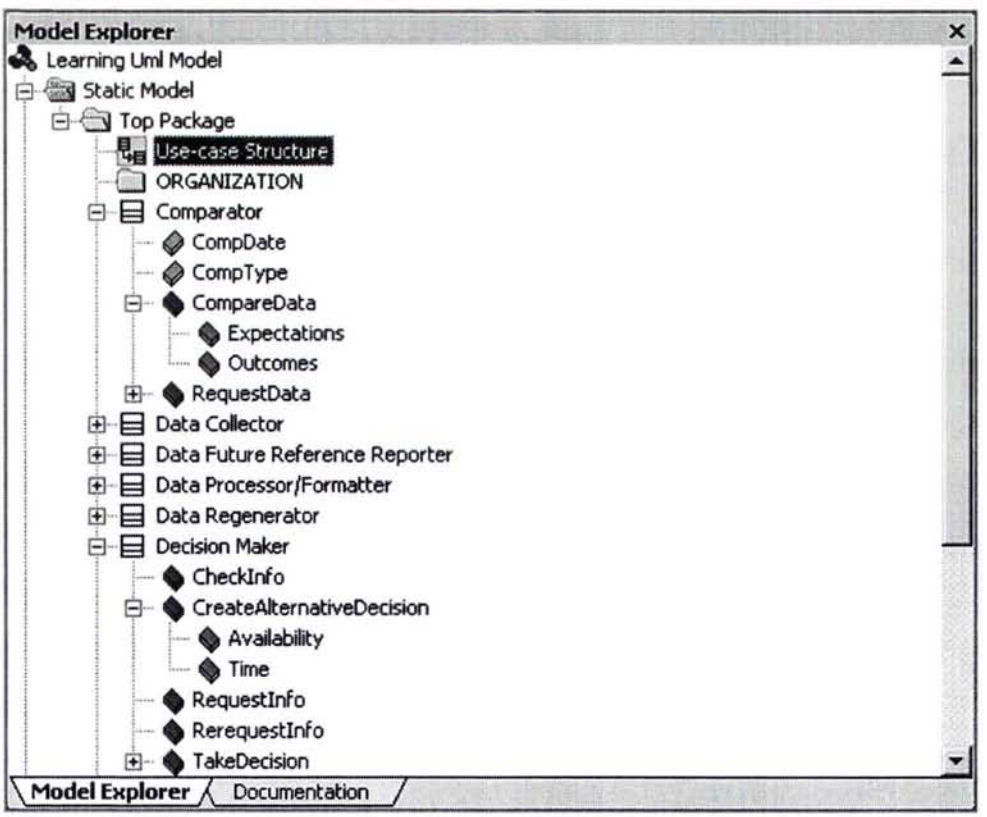
APPENDIX : MODEL EXPLORER





AUTOBIOGRAPHY

Fırat Doğan was born in Ordu in 1978. He graduated from Medreseönü Highschool in 1994. He completed his Bachelour's degree in Electric and Electronic Engineering, Sakarya University. Currently, he is working as a research assistant in Computer Engineering Department in Dogus University.