ABSTRACT

For organizations to survive into the next millennium they must learn to adapt rapidly enough to meet the discontinuous changes bringing about what Alvin Toffler calls the ‘Third Wave’. That is, successful organizations must learn how to learn.

To do this, a culture that is open, flexible, proactive, and experimenter must be established within the organization. But how can an organization fighting for its survival in to midst of intense, global competition create such a culture?

This paper explores this question by focusing on the environmental conditions most conducive to learning. If the gist of organizational learning is ‘detecting and correcting errors’, what we the environmental conditions that most readily allow for this error detection. To this end, the paper proposes a process that combines diagnostic instrument, the Learning Organization Profile, with computer modeling in order to learn the higher forms of abstraction and system thinking, one must learn about how to create one. This paper suggests that although there are many variables) and an organization’s learning environment (dependent variables) Is Unclear, or does it take some other form?

The purpose of this research is to provide the data that will enable organizations to determine what needs to be done to increase their Style to learn. This can be achieved by identifying the blocks to learning within an organization. Identifying these blocks will enable the organization to become more flexible, adaptive, open, and proactive, elements, which represent just some of the characteristics of a culture that would be conducive to organizational learning.

Over the last ten years much has been written about the learning organization. Although there has been a phenomenal increase in the awareness of the learning organization, we still do not have a truly clear picture of it, let alone knowledge of how to create one. This paper suggests that although there are many elements to consider when attempting to create a learning organization, experimentation may play a critical role. Reich (1991) supports this by saying ‘in order to learn the higher forms of abstraction and system thinking, one must learn to experiment He goes on to say ‘the habits and methods of experimentation are critical In the new economy, where technologies, testes, and markets are in constant flux’.

A method which allows an organization to take a ‘snap-shot’ of its current learning environment is proposed. This snapshot is obtained by having the organization complete the Learning Organization Profile (O’Brien, 1993), which measures an organization learning subsystems. The LOP Is a 100 item pencil and paper Instrument It is administered to organizational members in an attempt to obtain an understanding of the organization’s current learning subsystems. The instrument consists of ten categories which, says the author Michael J. O’Brien, constitute the learning subsystems of an organization. Table 1 is a listing of these subsystems as identified by the LOP.

Each of the above subsystems consists of ten separate questions. Each question within a given subsystem seeks to determine the level of environmental characteristic, which is present in that subsystem.

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That is, they begin to see connections between elements they never before considered associated. Although modeling has historically been used in the physical, social, and life sciences; its use in business has until recently, been limited to the analysis of "hard" variables. This limitation is giving way as technology that enables the measurement of "softer" variables becomes available. By measuring and simulation soft variables, organizational members will begin to see and understand the interconnectedness between seemingly disparate organizational elements.

An important component of this process, visual communication, has been widely researched by varied disciplines. It is beyond the scope of this paper to give a full accounting of this literature; however, some thoughts on the visual communication aspects of computer modeling and simulation are in order. For instance Alpers (1983) says that over 60% of our mental process power is devoted to visual processing. And McNeil (1992) contends that visualization process was key to enabling the ancient Chinese government bureaucracy to develop because of its use of ideograms to symbolize complex organizational processes. Latour (1986) makes the point that people go to great lengths to take complex visual data and transform it into something that can be quantified and turned into a comfortable cognitive artifact. Finke, Ward, & Smith (1992) tell us that mental model is another name for cognitive artifact. And that they can be thought of as "active constructions that represent the current or desired state of affairs, as well as information about how to get from one state to another."

Using mental models should enhance an individuals feeling of safety, since they can experiment with alternatives in the comfort of their own mind. As the level of comfort with the use of mental models increases, they will feel less inhibited to verbally articulate these thoughts which should lead to an increased level of experimental behavior and subsequently real learning. In addition to an individuals mental models, computer modeling can be used to create a safety net that can help an organization’s culture become more experimental. An additional benefit of explicating an Individual’s assumptions by visually depicting them, which is a by-product of the mapping process, is the understanding that occurs within the work group. We have all exclaimed at least once, what does she/he expect, I can’t read his/her mind? When we articulate our mental models we no longer need to attempt fruitless mind reading.

Advantages of mental models in problem solving are sighted by Glengberg, Meyer, and Lindem (1987) They say the advantages are that “they can be updated, can integrate information from a variety of sources, and can allow for the discovery of novel and emergent ideas. They go on to state that “[mental models] are ideal for many aspects of creative exploration, such as making predictions about hypothetical solutions, examining recommendations of various elements and considering extremes and limits of various situations” that is, use of mental models will allow us to predict the likely consequences of an action(s) before any physical effort or resource has been committed. In this way, the use of mental models will enhance experimentation with alternatives, which will enable learning to occur without the rear that de Geus (1988) says “Fences in our imagination” The critical role visualization to the mapping and modeling process proposed by this paper.

Software packages now available make it possible to measure and analyze less definable or “softer” elements; they can be visualized, and quantified via the use of various computer programs. The ithink™ mapping and modeling program is a good example. Through its use, an organization can map its perception of their current environment. The program operates under the premise that the elements within a system are stored at some point (s0 within the system. That is, the operating assumption is that of a stock and flow nature. The map in figure 2 depicts a very simple system. Specifically, the system of a human resources effort. The assumptions of this map are that: (1) individuals are hired; (2) they exit training and flow to graduation; (40 now they enter the Pros category where they stay until they; (5) quit and flow out of the system. The map also depicts the information flow between quits and hires, as well as the dynamic element, change in quits along with its own information flow.

FIGURE 2
ROOKIE/PRO MODEL

After the mapping process is completed a mathematical model of to environment brings into life. The modeling process takes the power of to mapping function one step higher by enabling organizations to experiment in ways that would otherwise be impossible. Figure 3, below, illustrates the graphic output of the previous map are depicted by graph lines one & two. Specifically, graph line one shows what can be expected to happen to the level of Pros within this system based on the assumptions of the mathematical model. Graph line two shows the same for the stock of Rookies. It is not hard to see that this system is going to have the same problems maintaining equilibrium between the stocks of Pros and Rookies. The dynamic in this model is the change in quits. Its job is to introduce a one-time change in the amount of quits to occur in the third month. Prior to the one-time change in quits, the information flow between the quits and hires elements acts to maintain the balance of heirs to quits so that the system stays in equilibrium. The effect of this one-time increase in the number of quits threw the system off such that hires could not catch up, and the Rookies peaked at 90, while the number of Pros within the system declined until they reached their low point at 20.

Discussion
Learning organization defined. In a recent paper, Jones and Hendry (1992) offer a listing of themes in an attempt to paint a picture of the learning organization. Theirs themes have been extracted from a sample of definitions they cite in their recent paper: Transformation, change, participation, innovation, altering the way people work, adapting, management style, delegation, and fostering employee involvement. Following are some of the definitions from which theirs themes have been extracted

A Learning organization: "is an organization which facilitates the learning of all its members and continuously transforms itself." Pedler, Boydell, and Burgoyne (1988)

* "facilitates participative (Horizontal) and innovative (vertical) development within and between people and institutions, commercially, technologically, and socially. It thereby transcends not only the business enterprise but also the hierarchical institution"
"builds and continually renews its competitiveness in all functions"

-Penn (1990)

- may be just another label for good practice!

Bell (1991)

- emphasizes adaptability (which is) the first stage in moving forward toward learning organizations. This is why leading corporations are focusing on generative learning which is about creating, as well as, adaptive learning, which is about coping

Senge (1990)

The major themes from these definitions seem to point to an exploratory culture and an openness to questioning current solutions and processes (Argyris and Schon, 1978). Senge (1990) suggests this exploratory culture and openness is motivated by the dedication to continually expand one’s ability to create the results truly desired. These definitions and themes, then, offer a framework for the effort of establishing a clear picture of the learning organization.

Relevant literature. The literature has a varied collection of definitions of learning, containing many distinct elements; however Shuell (1986) has articulated a definition that is broad enough to incorporate both the cognitive and behavioral theories. “Learning is an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience.” The element of focus here is the change in behavioral capacity, for learning involves “developing new behaviors or modifying existing ones”

Garvin (1993) proposed that organizational learning incorporates behavioral aid cognitive theories of learning. He suggests that organizational learning moves through three ‘overlapping stages’. The first aid second stages are cognitive aid behavioral learning aid the third is performance improvement Cognitive learning occurs first since organizational members are initially exposed to new ideas aid begin to third differently. Behavioral learning occurs as organizational members internalize new earnings aid begin to change their behavior. Finally, the performance review can be used to provide feedback needed to determine the effect these changes have had on a number of organizational functions.

Malcolm Knowles (1970) focuses on the appropriateness of the tenting method He writes that the application of pedagogy, the art aid science of teaching children, to the education of adults is a major reason that adult education has failed to meet its potential, aid suggests we rethink our archaic conception of the purpose of education, namely the transmittal of knowledge’. Knowles (1970) writes tout a new theory, andragogy, emerging to replace pedagogy in adult education. The technology, ‘the art aid science of helping adults learn’. Is better suited to the needs of adult learners due to their ‘problem-centeredness’ orientation; they are motivated by the application of their new learnings to real-life problems they are currently experiencing

Richardson (1992) discusses two additional orientations, our local spatial and temporal orientations and tells us that these are at the core of many of our ill-conceived business decisions. Overcoming these orientations will be necessary for any organization seeking to compete effectively in today’s more highly interdependent reality. Today, organizations must be able to understand how their local actions will affect not only themselves but others within the larger, ‘non-local’ environment Gavin reiterates—Ball (1991) Richmond’s message saying ‘employees] must continually ask, how do we know that’s true…. they must push beyond the obvious symptoms to assesses underlying causes often collecting evidence when conventional wisdom says it is not necessary’. This awareness represents a substantial departure from pest habits of thought which historically have made the learning blocks so powerful. How can such habits of thought be overcome?

Nonaka (1988) suggests that the creation of chaos in an organization is an antecedent to the self-renewal that must take place to overcome the habits. To create chaos an organization needs to continually pose the question ‘what do we live for? to its members. Organizations with the ability to continually re-evaluate their assumptions aid decisions will have the ability to ‘get outside the box’ surrounding their habits of thought

Charles Handy’s Learning Wheel Theory suggests that we consider leaning as a wheel that begins with questioning, learning to the theorizing, than to testing, and finally to reflection. The power of this model lays in reflection, causing more questions to emerge to another cycle with more re-evaluation. Since reflection leads to new questions, aid new learnings, why are so few of a., experiences today are reflected upon? Part of the answer lays within the perception that reflection ‘just takes too much time’. Schon (1983) cites this as a reason why organizations generally do not have cultures fostering, even allowing for, much reflection.

Schein (1983) notes that at least three different types of leaning are important to organizations at different points in their development (1) knowledge acquisition and insight (2) habit aid skill learning, and (3) emotional conditioning and leaned anxiety. The first type of learning is difficult to achieve, causing individuals to become frustrated and anxious. Culture is a big determinant of the second type of learning. The culture of management is built on the assumption that mistakes will occur, however, that the same mistake should never be made more than once. Habit and skill leaning, however, take much practice and many mistakes before the new skill becomes learned. Here, Senge tells us that we can speed this kind of learning by providing practice fields aid coaching in a psychologically safe environment Lastly, emotional conditioning is the most potent type of leaning of the three, and is associated with Pavlov’s ‘carrot versus sick’ argument

Pavlov showed that when a behavior is leaned through fear, anxiety alone Is sufficient to keep the behavior going even If additional stimulus is no longer administered But when behavior Is leaned through reward. Un leaning of a behavior can occur much more easily. This means that avoidance behavior learned through punishment is more stable than behavior learned through reward. Behavior learned through punishment however, does not let the learner know what the ‘correct’ behavior is and is not conducive to trial and error learning. Therefore, when people are punished across a wide range of behaviors they are ‘likely to limit themselves to narrow aid safe ranges of behaviors for fear of making
The process explored in this paper enables people to step out of their day-to-day routine to question, hypothesize, test and reflect. This process enables learning to occur by reducing organizational members' fear of making mistakes. The ability of this process to compress time and space is critical so that the results of an individual's actions are made explicit. This feedback is critical to gaining an understanding of the power and interconnectiveness of our actions. The mapping, modeling, and simulation process, then, should be thought of as a methodology upon which burgeoning learning organizations can rely to practice, risk-free, the alone and behaviors that will speed up their ability to learn.

The goal of this process is to make complex systems understandable, as many forms of modeling methods exist. A central theme is discernible: provide feedback which clearly connects a person's actions with the results obtained. This goal fits well with Argyris and Schon's (1978) description of double-loop learning. Specifically, double-loop learning requires organizations to become self-reflective about what they should be doing opposed to what they have already done. Argyris and Schon chose a heating system as a metaphor to describe this concept. The thermostat is a single-loop system because it seeks only to keep the system at a predetermined homeostasis. In systems theory, this is known as a negative feedback loop. The equivalent double-loop system, however, would ask whether the temperature is at the best level for the given conditions.

Double-loop learning enables an organization to transform itself from a reactive to a proactive orientation for decision-making. This change signals a critical and necessary realization for organizations seeking to become learning organizations. From here, research, then, will progress, enabling organizations to feel safe enough to experiment, view the results of its actions, and continue to learn by asking yet more questions. This process will have the way to continual learning by allowing individuals the confidence to say by doing.

Research design. The study is designed as a survey research project to test the assumption of linearity between an organization’s learning environment, and its learning subsystems. Linearity is defined by Berry and Feldman (1985) as “an equal amount of change in the mean value of V associated with a unit increase in X, holding all other independent variables constant.” Conversely, if a given number of unit increases in an independent variable, X, yields different values of the dependent variable, Y, then the relationship between the two variables is said to be nonlinear. Since O’Brien’s LOP assumes that each one of the learning subsystems, the independent variables, equally influence the overall learning environment of an organization, the dependent variable, the relationship between these is postulated to be linear and additive. The motivation to test the degree of linearity is predicated on the belief that this assumption presents a somewhat simplistic view of learning theory, organizational behavior, group dynamics, and organizational learning.

The survey for this study uses two instruments: the Learning Organization Quotient (LOG) and the Learning Organization Profile (LOP). The purpose of the LOG is to yield scores on the dependent variable, a self-report measure of the degree to which the respondents organizations matches the description of a learning organization. The LOG instrument provides scores on each of the ten independent variables. The LOP, was created by Michael J. O’Brien, and was donated for use in this study.

After both parts of the survey are completed, a regression analysis will be conducted to determine the degree linearity between the independent variables. Then, the data from this will be weighted to the extent that the individuals queried are also asked to recommend someone they know who has an interest in and knowledge of learning organizations.

Subject selection will be conducted via use of a purposive sampling method (Babbel, 1992). This method will be augmented by the use of snowball sampling (Babbel, 1992). Purposive sampling is used because of the need to identify those organizations/subjects that have knowledge of the subject, scores, and ratings because the individuals initial queried are also asked to recommend someone they know who has an interest in and knowledge of learning organizations.

The dependent variable is measured by the degree of match between our definition of a learning organization, and the subject’s own organization.

The measurement of the comparison is made on a seven point scale, with a score of 1 representing a poor match, and 7 a good match, between the two organizations.

The independent variables for the study are the subsystems of the LOP. Each of the ten subsystems contain ten of the 100 items that comprise the LOP. The items of the LOP instrument measure the independent variables within the respondents organization.

The data analysis will provide the information needed to determine the degree of linearity between the learning subsystems (independent variable) and the overall level of organization learning (dependent variable). The information will also enable the completion of the maps and models, which reflect the relationships among the independent and dependent variables.

The map and model creation occurs during the entire research process. After completion of the data analysis, maps that reflect the actual data will be created. Specifically, the quadratic equations that emerge from the regression analysis will be applied as the mathematical relationships of the model.
Conclusions and Future Work

The LOP snapshot - The data provided from the LOP by itself is valuable for an organization in that it will give the organization an understanding of how each serving subsystem rates in comparison to other subsystems. Later, as more data is gathered, an organization will be able to compare their respective subsystem scores against similar organizations within the same Industry. This ability will assist the organization by providing baseline measures against which they can compare their -I subsystem areas. Identification of the weaker subsystems is the first step toward planting interventions to strengthen these areas.

Mapping, modeling and simulation. A powerful function of this process lays in the seemingly unimportant task of mapping the organizations current system. Through this effort important insights emerge for the Individuals involved in this process. Specifically, individual’s mental models are explicated through this process, which enhances an Individual’s understanding of the assumptions held by themselves and others. This understanding should then lead to questions about the fundamental relationships between the elements within the system.

This questioning provides impetus for the next phase of the process modeling. Like mapping, modeling relies on the visual communication process, however it goes one step further. Specifically, modeling requires the participants to think about how the relationship depicted in the map actually worked. To answer these questions, mathematical and/or graphic relation must be created to depict the nature of the relationships. The effort inevitably leads to disagreements about the nature of the relationships, which lead nicely into the final phase of the process: simulation.

The simulation process provides answers to why the elements within a system act as they do. By conducting ‘what-if’ scenarios, participants can test their own mental models in real time, and view the results of their actions. That is, the ‘what if’ analyses will illustrate the effect(s) on an organization’s overall learning system when changes are made to selected variables. For instance, if it was suggested by a group member that a particular map does not correctly depict the system, the Individual could reconstruct the map to reflect his/her thoughts. After building the new map, simulations would be conducted to determine the system changes brought about by the change in relationships among the elements of the map.

Organizations benefit The benefit from the ability to first identity, then simulate the learning blockages within an organization seems obvious; however, there are some long-term, more subtle, benefits that should be highlighted. As members of the organization get used to the modeling process, the fear of trying something new will begin to dissipate. Organizational members will begin to understand that trying something new can be rewarding, even fun. This experience will motivate the individual to be more open to new ideas and alternatives. This openness will lead to a greater level of experimentation within the environment. And with the increase in experimentation, the organization will begin to break those habits of thought that have become such formidable blocks to learning for the organization. By breaking these habits of thought, the organization will start thinking outside of the ‘box’ that has narrowed the scope of its past alternatives. By breaking out of this box, then, the organization begins a paradigm shift that can lead the way to continual learning.

Figure 5, below, attempts to graphically illustrate the preceding statement. The figure is offered as a closing thought about the potential he process offers and will hopefully motivate individuals to consider the possibilities for organizations that seek to continually expand their ability to learn.

Future work.

Following are the major categories that have emerged as areas for which additional research is needed. The motivation for this additional research is predicated on the belief (that)he information is needed for organizations to be able to, as Argyris say, detect and correct the errors that are inhibiting organizational leaning.
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