The Crisis of Perception in Education: The Scientific and Historic Evolution of Systemic Educational Reform

Cynthia C. Phillips

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THE CRISIS OF PERCEPTION IN EDUCATION: THE SCIENTIFIC AND HISTORIC EVOLUTION OF SYSTEMIC EDUCATIONAL REFORM

by

Cynthia C. Phillips

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Arts
Department of Educational Leadership

Western Michigan University
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THE CRISIS OF PERCEPTION IN EDUCATION: THE SCIENTIFIC AND HISTORIC EVOLUTION OF SYSTEMIC EDUCATIONAL REFORM

Cynthia C. Phillips, M.A.
Western Michigan University, 1995

This study presents a literature synthesis that pertains to the evolution of systemic reform. A hermeneutic and heuristic template illuminates the historical tapestry of educational reform. Examination of the antecedents of four waves of educational reform, indicates that an impending paradigmatic shift parallels and perhaps prompts the evolution of systemic reform. The learning organization metaphor builds the synthesis for the following supposition: the history and philosophy of science drive the construction and deconstruction of mental models held by society. The crisis of perception alludes to the possibility that current mental models, established under the Newtonian paradigm, serve to motivate dysfunctional organizational behavior when interpreted through the lens of the emerging quantum paradigm.

This study compares the evolution of systemic educational reform to the nascent practice of the learning organization disciplines. Metamorphosis of organizational metaphors and natural selection of appropriate mental models contribute to the episodic evolution of educational movement.
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Cynthia C. Phillips
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CHAPTER I

INTRODUCTION

Statement of the Problem

The institution of education currently faces a dilemma of such magnitude that the imperative for change becomes increasingly insistent, yet examination of the last quarter century of reform initiatives discovers surprisingly little more than transient, superficial change. Analysis of the litany of previous reform initiatives points to a remarkable organizational resilience and stability over time. An unfolding of critical events from an etiologic perspective reveals that the piece-meal nature and narrow focus of efforts to reform the current educational system result in a maintenance of the status quo. "The more things change the more they remain the same," (Sarason, 1982, p. 32) rings true because of system design and dynamics. Systems, like education, behave in accordance to the same physical laws as the rest of the universe. When change confronts a stable system, inherent homeostatic mechanisms overwhelm and defeat any departure from equilibrium. If educators desire to transform the educational system, beyond current capacity and capability, they will need to develop a systemic perspective that pushes beyond the limitations of equilibrium.

The rigid form and mechanistic function of the existing educational system, problematic and sluggish today, results from successful organizational change management at the turn of the century. The massive organizational transformation and adaptation that led to the creation of the current public school system presents
historical evidence that the educational system possesses the capacity and capability for significant, enduring change. The metamorphosis of the current structure and purpose of education served as an evolutionary response to the societal transition from the decentralization and holism of the Agrarian Age to the centralization and mechanization of the Machine or Industrial Age (Ackoff, 1981; Cleveland, 1993).

The volatile transition period antecedent to such a dramatic organizational change heralds a shift in world view. When such a transition, or paradigm shift, occurs, organizations that align themselves accordingly to the emerging view continue to thrive. Successful organizations adjust to new assumptions and requirements during periods of paradigmatic shift. The development of an educational system capable of producing a labor force for the burgeoning factories was insurance that education would be a central player in the new mechanistic paradigm. A similar situation brews today.

Education today faces two fundamental problems: (1) another paradigm shift looms on the global horizon and (2) the majority of educators fail to perceive its existence. Civilization moves away from the Industrial Age embracing the emergence of the Information Age in a hyperbolic fashion (Wheatley, 1992). This revolutionary era, one of rapid social and economic transformation, demands organizations quickly embrace and adapt to the changes brought on by emerging technologies.

Organizational adaptation for the coming Information Age will involve a return to holism and interconnection that mirrors our current understanding of the nature and architecture of the universe. To thrive during the turbulent transition period that precedes a paradigm shift and beyond, organizations must be capable of recognizing and honoring their systemic nature. The new holistic paradigm proposes that organizations be flexible, web-like and capable of creating and celebrating
systemic relationships. Prosperity in the rapidly expanding global marketplace will require a new organizational paradigm. Margaret Wheatley (1992) referred to this new world view as the quantum paradigm.

Education today struggles to keep abreast, attempting to propel itself forward with the mechanistic reform strategies of a declining era. This rigid adherence to an increasingly dysfunctional paradigm creates a crisis of perception. The schism in education between mechanistic perception and quantum reality continues to widen as the influence of the emerging paradigm spreads. The crisis of perception in education reaches epidemic proportions and indicates that new more systemic strategies for reform must emerge if education intends to successfully rise and respond to the challenge of change.

This thesis addresses the crisis of perception in education in two ways: (1) it presents the scientific and historical antecedents of the current paradigm paralysis, and (2) it describes the resolution of paradigm parallax through the evolution of systemic educational reform. The evolution of an educational system able to prepare a technologically proficient labor force for the Information Age secures that education will continue to be a central player in the emerging quantum paradigm.

The introduction includes a brief discussion of the form and function of systemic reform and an argument that draws attention to potential controversy and misdirection within the present systemic approach to educational reform. The world view held by educators guides their interpretation and definition of systemic behavior and accordingly directs their actions toward educational reform. Therefore, what the educational reform movement labels as systemic reform from the remnants of the mechanistic perspective, may not hold up as systemic from the quantum perspective.

In summary, the incipient paradigmatic shift introduces parallax that precipitates a crisis of perception in education. The development of the perception
crisis in education parallels the escalation of the paradigmatic clash between the mechanistic and quantum world views. Systemic educational reform evolves as educators begin to alter their world views. Presentation of an iterative narrative format, that serves both as model and chronicle for the development of genuinely systemic educational reform, concludes the introduction.

The Form and Function of Systemic Reform

Educational reform serves as one of the current routes by which educators introduce change. Educational reform attempts to adapt the organization so that it remains in synchrony with the paradigms that govern society as a whole. Until recently, educational reform was characteristically a gradual, linear, and hierarchical process. Innovation of practice and pedagogy in education, historically, evolves through the process of diffusion. Innovation diffuses down from academic experts to front-line educators. Tinkering with the educational system, in this trickle down manner of reform, results in minor performance improvement that does not alter the design or operation of the original system.

The dominant, yet waning, mechanistic paradigm imposes strategic limitations that encumber organizational transformation. The design of a machine incorporates gauges, releases, and check valves that guarantee smooth, continuous operation. A successful machine will defeat change. A system with a machine blueprint optimizes the stability of specific operations despite random or deliberate fluctuations in the internal and external environment. Environmental and operational feedback serve to optimize current operation. Homeostasis generates stability and predictability over time.

The remarkable resilience and rhythmic predictability of the educational system provide evidence of the substantial machine influence. Despite the disruption
of multiple waves of innovation, the educational system remains within the limits set by the tolerance for change and variation built into the original design. In spite of the tremendous effort and number of initiatives mandating change and demanding progress toward transformation, a tight oscillation restrains the educational system from expansion beyond the limitations set by the factory design. The educational system exists in a relatively stable state. There are observable limits to growth that restrain, minimize and often reverse change in mechanistic systems over time.

Homeostasis creates an impasse, which now forces educational reformers to grapple with mechanistic, systemic impediments that are historical relics. The machine orientation of the current educational system consistently adapts and dilutes top-down innovation to return to the status quo from the bottom-up. Figure 1 illustrates this essential conflict restraining organizational growth and development. Therefore, if education, as an organization, desires to institutionalize lasting environmentally responsive change, educational reformers need to recognize that mere repetition of successful past administrative maneuvers only serves to exacerbate current stagnation. A change in system orientation and design becomes necessary to break the homeostatic deadlock that continues to defeat reform attempts.

The present mechanistic design and mode of operation were perfect for the factory model of schooling set in an age of slow, gradual change. The prevailing dilemma of systemic resilience and resistance to change becomes problematic when the rates of internal and external change demand that innovation accelerate faster than adaptation can keep pace.

Turbulent, catalytic and combustible changes characterize the external environment when society catapults toward a new world view. Education struggles to keep pace with the continual changes happening as a result of the eminent paradigm transition from the Industrial to the Information Age. If educational reform intends to
make an enduring contribution to the form and function of schooling, the liminal paradigm that guides educational system behavior must evolve in parallel.

![Diagram](image)

Figure 1. Forces Counteracting Equilibrium.

The systemic approach to educational reform presents a nascent discipline. It emerges now because of an increasing awareness among educational reformers that serious conceptual deficiencies belie previous efforts at gradual educational reform. "It means changing the system of norms: the regular and patterned ways of doing things—how power is distributed, how decisions are made, what our business is" (Brandt, 1993, p. 8). Legitimate systemic reform has the potential to evoke organizational transformation. It, by definition, goes beyond tinkering to orchestrate dramatic and therefore, wholesale and explosive changes in previously stable system dynamics.

The systemic reform movement attempts to incorporate new, more effective strategies for organizational transformation. The systemic reform movement continues to evolve and gain momentum as educational organizations learn more effective responses to the systemic problems brought on by the dawn of the
Information Age. The role that education eventually plays in the Information Age will depend on its ability to alter organizational responses to error. In a turbulent, chaotic environment it will be important to be able to appreciate and gain from mistakes. Organizations thriving in the Information Age invite change and embrace mistakes. Organizations facing decline and eventual demise, with the coming of the Information Age, avoid change and approach mistakes with an attitude of fear and trepidation. Organizations, like education, will need to achieve strategic advantage over their rapidly changing environment to flourish beyond the interim decades.

Hyperbolic rates of change are characteristic of an impending paradigmatic shift. The challenge of such a paradigmatic shift, as from the Industrial to the Information Age, is that indiscriminate acceleration of change is inevitable. If the educational organization desires to keep abreast with the rising tide of change, the organization will need to become more generative. Education, if sensitive and responsive to the escalating onslaught of environmental input, will again withstand as it did a century ago, the turning point of a societal paradigm revolution.

Systemic educational reform, fraught with manifold dimensions, evolves as the organization confronts a network of conflicting issues and attempts wholesale change. The futurists William J. Banach and Albert L. Lorenzo (1993) indicated that change does not present the primary challenge during turbulent times. They insisted rather, that the primary challenge organizations encounter during turbulent periods involves "doing something about change" (p. 27). Taking action requires that an organization be sensitive to change and be capable of appropriate responses. Organizations must learn how to abandon past reliance on forecast and the safety of the status quo, to accomplish and accommodate change through the trial and error of experimentation.
Learning presents a metaphorical expression for organizational experimentation and adaptation. Learning on the societal, industrial, educational and individual levels holds the key to tomorrow's economic success. Command of natural resources was extremely important during the first Industrial Revolution. Similarly, effective human resource utilization serves as the key to organizational negotiation through the Information Revolution. The evolutionary development of education into a learning organization supplies the antecedent behaviors necessary to survive the incipient paradigm revolution. This paradigm shift vanguards the Information Age.

Peter Senge (1990) identified that organizations create their own crises. Inaccurate interpretation of current reality often precipitates organizational crisis. The educational organization can begin to evolve beyond the constraints of dysfunctional perception by engaging in critical systemic analysis. Movement beyond equilibrium requires that education learn from the historical and systems science antecedents that create and maintain the present situation. The success of any reform initiative in the Information Age relies on its ability to maintain a climate that facilitates organizational learning. The cultural transformation that encourages universal acceptance of the new governing organizational paradigm requires a recognizable change in organizational perception. Systemic educational reform will result when the ascendant quantum paradigm promotes the development of systemic organizational behavior. A new understanding of what it means to be a system clarifies the importance of generating genuine systemic adaptations to cope with systemic problems.

The educational reform movement currently lacks a systemic perspective consistent with the emerging quantum paradigm. The machine model for system dynamics promulgates obsolete and dysfunctional organizational behavior. "What we lack are systems- systems that are pervasive, woven together into a universal fabric of
public policy and institutional action that supports human resource capitalism" (Marshall & Tucker, 1992, p. 74). The future belongs to societies that can organize as national learning systems and embrace the notion of systemic influence through interconnection and interdependence. An organization must also be capable of mobilization, where reflective and deliberate actions follow experiential learning (Kolb, 1984). Systemic reform in education functions to support and facilitate the fruition of these ideas.

Educators with an interest in striving toward resolution of the stagnating reform riddle will learn to break with traditional isolationist, innovation and implementation schemas. Systemic reform by establishing connections, transforming metaphors, and presenting new paradigms creates something new. Reform, if firm in an understanding of quantum systems theory, can redirect the metamorphosis of education toward lasting change and improvement of student achievement for the 21st century.

The puzzle of describing the process of educational reform in the context of a global paradigm shift presents an analogy to the mythological challenge of the Gordian knot (Zimmerman, 1964). This knot appears so complex that it has neither an end nor a beginning. The intricately tangled web of the Gordian knot presents an inextricable conundrum. The metaphorical enigma for educators, with a penchant to study reform, is how to solve this penultimate puzzle. This metaphor challenges educators to envision the patterns that create the knot from a quarter century of reform. Educational reform activity, over time, exhibits a wave oscillation that reflects conflict between convergent and divergent forces influencing the change process. This thesis closely examines the reform conundrum and offers an interpretation of past behavior that can serve to direct the future behavior of educational reform. Systemic reform has the potential, consonant with the sword of
Alexander the Great (Zimmerman, 1964), to slice through the knot made by the gnarled confusion of previous attempts at educational reform. Systemic reform may chart the path for a new beginning.

The Form and Function of the Problem

The Factual and the Figurative Perspectives

This thesis examines, interprets and seeks to give shape to a chaotic collection of historical events representing twenty-five turbulent years of educational reform. Analysis of a wide body of literature reveals that there are distinct, but interconnecting, tributaries of pertinent scholarship that simultaneously illuminate and obfuscate the evolution of systemic educational reform. These tributaries contribute to the expanding stream of knowledge in a manner that models either factual or figurative interpretation. Independent, but complementary, examination of factual and figurative information facilitates discernment of the tumultuous, undulating journey of educational reform from a veritable ocean of commission reports, legislative mandates and initiatives.

The endless cascade of reform literature makes it increasingly difficult to develop an understanding of the nature of reform. The mounting accumulation of diverse and distracting opinion only serves to increase confusion. The harder the research community searches for terms and theories that confine and limit definition, the faster the task expands.

Education, as a system, exists under the influence of chaos. Systems theory dictates the quantum nature of current system behavior. Events unfold in a discontinuous and non-linear fashion. "The dynamics of nonlinear feedback systems are characterized by a combination of regularity and irregularity, of stability and
instability" (Stacey, 1992, p. 12). The system evolves over time traversing precarious periods of crisis and chaos to create new order.

Creation of a portrait of this process is the most difficult and thought provoking aspect of this project. Examination of the historical record for educational reform shows recurring cycles of effort confirming that the future is neither apparent nor discernible. The identification of pivotal developmental points and the long term patterns of event sequences present an arduous task. Accurate forecast and discernment become increasingly difficult when cause rarely occurs in the same temporal frame as effect. This random collection of events that appear to occur, at first glance, in isolation serves only to confuse. The evolutionary path of factual events that point to the future of educational reform remains inchoate without the judicious use of figurative language.

The factual and the figurative perspectives are the two fundamental "spins" that together elucidate the form and function of the problem facing educational reform. These opposing perspectives develop from the traditions of inquiry that focus on the investigation of the choate, or known, indicators and the inchoate, or unknown, agents that influence behavior respectively. Identification of a confounding duality across the panorama of reform scholarship leads to a startling realization. Bipolar tension, between the concrete nature of observable events and the abstract nature of guidance and interpretation by subliminal perspectives, presents a central and organizing theme throughout the literature on educational reform. Bipolar tension, such as that between the factual and the figurative perspectives, the historical and the paradigmatic, also describes the essence of the Heisenberg Uncertainty Principle (Giancoli, 1991). The Heisenberg Uncertainty Principle provides a key element in quantum mechanics, the branch of modern physics that drives much of the new paradigm literature.
The Heisenberg Uncertainty Principle introduces the theorems that describe and explain experimental observations of duality in the natural universe. This scientific principal asserts that when an investigator approaches certainty with one aspect of an inquiry, the possibility for certainty with respect to other aspects decreases. Accordingly, when examining nature, we perceive not the true face of nature itself, but the result of exposing nature to our inquiry. To paraphrase, as the measurement and evaluation of educational reform increases in detail, the more nebulous and hidden the influence of the figurative domain becomes.

Whenever a measurement is made, some uncertainty or error is always involved.... We expect that by using more precise instruments, the uncertainty in a measurement can be made indefinitely small.... But according to quantum mechanics, there is actually a limit to the accuracy of measurements. This limit is not a restriction on how well instruments can be made; rather, it is inherent in nature. It is the result of two factors... and the unavoidable interaction between the thing observed and the observing instrument.... To make a measurement on an object without somehow disturbing it, at least a little, is not possible.... We cannot measure both the position and [direction] of an object precisely at the same time. (Giancoli, 1991, pp. 752-753)

The Pedagogical Value of Metaphor

The volume of literature documenting the chaotic history of educational reform drowns out the importance of the underlying figurative contribution. Failure to learn from past mistakes contributes to the serious perceptual flaw plaguing educational reform. Ignorance increases expense, consumes time, and directly results from pandemic neglect of the pedagogical value of inchoate forces.

The great pedagogical value of figurative uses of language is to be found in their potential to transfer learning and understanding from what is known to what is less well-known and to do so in a very vivid manner. To appreciate these facts may be to make better use of them and to better understand them. Metaphors are necessary as a communicative device because they allow the transfer of coherent chunks of characteristics--perceptual, cognitive, emotional, and experiential--from a vehicle which is known to a topic which is less so. In doing so they circumvent the problem of specifying one by one each of the often unnamable and innumerable characteristics; they avoid discretizing the perceived continuity of experience and are thus closer to
experience and consequently more vivid and more memorable. (Ortony, 1975, p. 53)

Learning occurs most easily when one thing leads logically to establish connection with another. Once an event occurs it becomes stationary in time and amenable to cognitive reorganization and classification. Interpretation allows the mapping of chaotic events into schemas that make sense through the application of metaphors. How an organization classifies, interprets and learns from a sequence of events depends on the root metaphors that pilot the interpretive process. This guidance capacity of metaphor influences cognitive development on an individual and organizational level. "Metaphors can help or hinder one's ability to learn, develop and achieve. Through enabling metaphors [individuals and organizations] begin to visualize problems or concerns in new ways, thereby gaining new perspectives on them" (Pugh, Hicks, Davis, & Venstra, 1992, p. 41).

Meaning builds through constructive narrative analysis. Metaphors, in education, inform and create our notions of truth. Metaphoric perceptions come to hold a position of acceptance as the definition rather than mere description for reality when use of figurative expression is widespread and frequent (Cinnamond, 1987). Language and experience intertwine through interaction so that language creates and simultaneously limits reality in its own image. The use of metaphor paradoxically "opens to us experience in certain ways and closes us in others. It invites us to participate in the constitution of reality while, at the same time, barring us from the consideration of rival alternatives" (Perrin, 1987, p. 265).

The Formulation of the Problem

The very nature of the questions that develop during the formulation of an investigation, determines and limits the spectrum of possible answers. The framing
of a problem limits the scope and expansion of its solution just as container size limits volume. Organizational metaphors delineate the original dimensions of a problem that direct and focus the search for resolution. Organizational metaphors express the structural (Crocker, 1977) and scientific (Kuhn, 1970) paradigms that generate organizational behavior. The intractability of educational systems and their resistance to the implementation of enduring change through reform create problems with deep metaphoric (paradigmatic) roots.

The majority of the organizational problems binding educational reform initiatives stem from stakeholder convictions that originate in the Industrial Age paradigm. Education suffers from a belief in simple obvious solutions. The majority of individuals in contemporary organizations ascribe to predominantly linear mental models. Each mental model focuses on different parts of the system and each, as a lens, highlights different cause and effect chains (Senge, 1990).

Is it any wonder that the strategies that emerge often represent watered-down compromises based on murky assumptions, full of internal contradictions, which the rest of the organization can't understand, let alone implement? (Senge, 1990, p. 267)

During times of paradigmatic crisis, such as this, future action suffers from distortion and misinterpretation when an organization engages in reflection, if the lenses it employs are of the old paradigm. Discrepancies between "espoused theories" and "theories in action" are the result (Schön, 1983, 1987). Lip service to a change initiative indicates that action stems from inchoate paradigmatic influence. The language an individual uses to discuss the change process indicates the governing paradigm and points to the core metaphors that dictate how their organization really behaves.

The majority of reform initiatives have yet to connect with the powerful paradigm of the Information Age. Application of quantum theory to organizational
behavior facilitates interpretation of factual events. It accomplishes this by correcting previous misalignment and re-establishes balance to the weight of the figurative influences.

**The Alignment of Figurative Influence**

Quantum theory suggests that the universe is essentially an indivisible whole, even though on the surface it may appear to be divisible into separately existing parts. This means that at quantum theoretical levels of precision, the observing instrument and the observed object cooperate in an irreducible way. The metaphors that mold and determine organizational vision clearly limit and define the capacity for accurate measurement. Conversely, organizational measurement methodology, limits the dimensions of organizational vision. The element of perception from the figurative perspective and the element of action from the factual perspective therefore are inextricable components of the new paradigm.

An integrating thread extends the quantum perspective through the celebration of wholeness in physics. David Bohm (1980), champion of the quantum paradigm, criticized contemporary thought. He claimed that the analytic and reductionist perspective of the mechanistic paradigm contaminates the stream of contemporary collective thinking. He asserted that "fragmentation," the tendency of mechanistic scientific thought to isolate parts, persists as a significant limitation, "built into the very language of science (which is of course ultimately the outcome of the general language used in society as a whole)" (Bohm, 1971, pp. 10-11).

Similarly, remnants of the Industrial Age paradigm pollute the core of most educational reform (Bohm, 1979, 1981). It contaminates both the factual and figurative perspectives. It even continues to influence the newest wrinkle, systemic reform, in the fabric of change. The old paradigm relies on reaction and prediction.
It focuses on finding solutions. It strives to correct and avoid mistakes through the analysis of information.

The classical Newtonian view of the world is a deterministic one. One of its basic ideas is that once the position and velocity of an object are known at a particular time, its future position can be predicted if the forces on it are known. (Giancoli, 1991, p. 755)

The generative influence of the new quantum paradigm focuses instead, on the identification of problems and on learning from mistakes. Modern physics transcends the mechanistic view of the world (Giancoli, 1991). The machine metaphors of the old paradigm retreat to uncover emergent metaphors for the quantum universe. Quantum metaphors describe and mirror the conceptual map for learning to elevate the importance of systemic, evolutionary processes (Bateson, 1972). Understanding the nature of systems illuminates and transforms the learning process at the core of organizational evolution.

In the systems view the process of evolution is not dominated by 'blind chance' but represents an unfolding of order and complexity that can be seen as a kind of learning process, involving autonomy and freedom of choice. (Capra, 1982, p. 288)

The process of understanding and celebrating system dynamics therefore, becomes a learning process. A system behaves as a system whether we, as observers, acknowledge and control that behavior or not. Patterns of behavior continue to exist whether we observe them or not. In spite of the uncontrollable and unpredictable nature of system dynamics, organizations have the choice to learn to optimize chaotic conditions and take advantage rather than fall prey to resistance or ignorance.

Learning organizations themselves may be a form of leverage on the complex system of human endeavors. Building learning organizations involves developing people who learn to see as systems thinkers see, who develop their own personal mastery, and who learn how to surface and restructure mental models, collaboratively. Given the influence of organizations in today's world, this may be one of the most powerful steps toward helping us 'rewrite the code,' altering not just what we think but our predominant ways of thinking. In this sense, learning organizations may be a tool not just for the
evolution of organizations, but for the evolution of intelligence. (Senge, 1990, p. 367)

This thesis attempts to discover a systemic lens through which to observe the evolution of systemic reform. The flurry of reactive behavior, characteristic of current reform initiatives, masks a genuine, silent systemic undercurrent. Recognition of the emerging quantum paradigm illuminates the importance of the learning organization as an evolutionary factor.

The metaphor of the learning organization provides a concept map, or template, to clarify and illuminate the truly significant patterns that continue to evolve. The disciplines of the learning organization provide a model for a systemic lens. They are the elements that build understanding of how an organization learns to thrive on the edge of chaos. Apparently, change happens all around us. Examination of organizational responses to such pandemic change over time precipitates the formulation of several questions. Educators aligning with the quantum paradigm will call for the development of an organizational methodology that intensifies systemic pattern recognition, delineates appropriate action and generates the ability to learn from prior mistakes. In summary, collective contemporary theory reflects on the nonlinear nature of organizational evolution in the Information Age.

The Form and Function of the Narrative

Description of the multitude of forces simultaneously influencing and hindering the transformation of education requires a narrative that mirrors the quantum nature of systemic reform at the dawn of the Information Age. This thesis chronicles the evolution of education into a learning organization. Narrative describes the volatile and often tortuous developmental process that characterizes the evolution of a complex and highly convoluted system.
The four chapters of this thesis that follow document and interpret the metamorphosis of the systemic educational reform movement. The first chapter prepares and documents the foundation and model framework that directs the unfolding of the thesis narrative. The second chapter presents a synthesis of the governing paradigms, from the systems science figurative perspective and the historical factual perspective. The second chapter also includes the development of a template that describes influential evolutionary factors and defines the current state of educational reform in the United States. The next two chapters, III and IV look back to collect historical antecedents and forecast in preparation for the collaborative direction of systemic educational reform. The final section, Chapter V, serves as a post-modern reflection on the development of this body of knowledge and speculates on points beyond.

Chapter I establishes paradigmatic evolution as the root metaphor that provides the substructure for the narrative interpretation. The organizational metaphors that stem from two conflicting paradigms, the waning mechanistic paradigm of the Industrial Age and the waxing quantum paradigm of the Information Age, establish the cognitive groundwork of all reform. Organizational metaphors govern perception and therefore also serve as the behavioral foundation for educational reform (Clancy, 1985; Taylor, 1984).

Organizational perception, built with elements gathered from the historical and the systems science perspectives, provides the basis for this metaphorical foundation. Elements of the factual and figurative perspectives blend to illuminate the learning organization as the emerging metaphor in education. This introduction concludes with the suggestion that disciplines of the learning organization (Senge, 1990) can serve as a beacon to guide and evaluate the evolution of educational reform. The disciplines of the learning organization precipitate the cultural changes
necessary to catalyze the much needed organizational transformation of the current educational system. The concepts developed in this chapter build the narrative foundation.

The second chapter will develop and present an application of the learning organization model that serves as a template to guide and simplify discussion. It serves as a systemic lens to develop interpretation of past events and as a model to pilot the implementation of new schemas for educational reform. This chapter elaborates on the metaphor of the learning organization as a systemic approach for systemic problems. The model derived in this chapter erects a framework, the System Development Template, that guides the development of the central textual body of the thesis.

The System Development Template will focus attention on the evolution of learning organization disciplines from within the educational organization. This multidimensional model consists of both heuristic and hermeneutic elements. The System Development Template provides a systemic framework for an exploration that reflects the iterative evolution of the subject under investigation. This dual model incorporates both the factual and figurative perspectives. It consists of five iterative levels that sequentially analyze the attainment of each of the learning organization disciplines (Senge, 1990).

The third chapter of this thesis contains three sections that analyze the initial evolutionary iterations of the educational reform movement and elaborates on the factual and figurative elements contributing to the synthesis of shared organizational vision. The three viewpoints that point to the synthesis of a shared vision for the future of education are as follows: (1) the systems science perspective, (2) the paradigmatic perspective, and (3) the historical perspective. These three dimensions provide a more accurate interpretation of the current reality that confronts education.
The first of the three viewpoints addresses the systems science perspective of education and the figurative relationships that govern change. This section addresses the systemic nature of the problems facing education today.

Narration of the evolution of educational reform, from the systems science perspective, begins with a brief presentation of pertinent historic background information. The tightly interwoven problems that currently confront education require explication. A paradigm shift explains the need to address educational reform from a new platform. Discussion follows to chronicle the natural resistance of organizational culture to change. This initial level of iterative analysis presents the background research that leads to the development of the personal mastery discipline (Senge, 1990).

The second viewpoint continues the iterative analysis describing, in detail, the evolution of the scientific paradigms that create education's currently dysfunctional organizational perspective. This second iteration examines the figurative antecedents of the systemic reform movement. This section describes the personal and organizational reflection processes necessary to initiate the development of new mental models (Senge, 1990) in support of systemic reform.

The third viewpoint examines the creation of a shared vision (Senge, 1990) for education from an historical perspective. The educational reform literature employs a wave metaphor to describe recent renovation efforts. This metaphor presents the evolution of systemic educational reform as four sequential waves that establish the prevailing limits and extent of reform initiatives.

The fourth chapter of this thesis contains two sections. The fourth chapter presents collaboration, and the end of isolationist behavior, as the missing link in the evolution of successful systemic reform. A brief literature review of inter- and intra-institutional collaboration in the first section, establishes the importance of the
elements of team learning to the transformation and redesign of the educational system. The team learning discipline (Senge, 1990) leads to the creation of an interactive, community wide communication network. Essentially institutions, that intend to survive the paradigm shift, must develop trusting relationships and engage in two-way communication with their internal and external environments. Organizational evolution depends on continuous innovation and improvement. Innovation and improvement rely on feedback mechanisms to gather and disseminate the information essential for organizational growth and change.

The fourth chapter, concludes with a final section describing the discipline of systems thinking. Systems thinking (Senge, 1990) results when an organization diligently practices the antecedent disciplines of personal mastery, mental models, shared vision and team learning. The development of systems thinking leads to the initiation of organizational resonance and the rapid dissemination of innovation and improvement school reform.

A genuine systemic perspective shifts the focus of educators from perpetuation to generation. A new lens can energize a stagnant teaching organization to become a responsive, adaptable, learning organization. A new lens creates the change in perception that precipitates organizational transformation. Our evolving educational system currently aligns with the limitations of a declining Industrial Age. Development and practice of the vanguard learning organization disciplines serves as vital preparation for a position of responsibility in the emerging Information Age.
CHAPTER II

THE SYSTEM DEVELOPMENT TEMPLATE

This chapter focuses on the development and description of a theory of practice as it pertains to educational reform. This chapter serves to introduce and blend the ideas from several disciplines that the narrative task requires. The creation of a model that outlines the narrative for this thesis will appear prior to theoretical description and analysis. Elements from biology, physics, history, and sociology contribute to the development of this model, the System Development Template. The narrative requires a model because of the complexity of the subject under discussion. The model developed in this chapter guides and facilitates discussion of the rise of systemic reform in education. The System Development Template has the capacity to not only describe and interpret, but to project as well.

The eight main themes that comprise the body of this thesis are briefly introduced in this chapter. These themes present the important factors influencing the development of systemic educational reform. This literature review research project directed toward the study of the emergence of systemic educational reform uncovered a myriad of conflicting issues. This interdisciplinary literature survey culminates in the conception of the System Development Template. This new model makes it possible to synthesize a more holistic picture of the past, present and future of systemic educational reform.

The first section in this chapter presents the three prime thematic threads that weave the descriptive canvas for the narrative foundation. The first theme, with roots in biology and sociology, introduces the symbiotic relationship between industry and
education. Recognition of this crucial systemic relationship provides the conceptual canvas for creation of the narrative. The second theme establishes evolution as the metaphor of choice to guide and inform discussion of the development of systemic educational reform. The third theme contributes the historical and systems science perspectives that are necessary to develop an accurate analysis and interpretation of the events leading to the development of systemic educational reform. This conceptual canvas provides pertinent background information that establishes the logic behind the creation of the System Development Template.

The second section presents the fourth theme that sketches the outline of the System Development Template. This blueprint describing the template architecture, like a drawing, has two dimensions. The two dimensions, concrete and abstract, allow for discussion that is both analytical and interpretive. A heuristic process element (Gorman, 1992; Moustakas, 1990), The System Development Staircase, portrays the concrete dimension. This process element of the template guides analysis and classification of the discrete, non-linear evolutionary events that culminate with the systemic reform movement. A hermeneutic interpretive element (Alejandro, 1993; Gallagher, 1992; O'Neill, 1994), the System Development Spiral, portrays the abstract dimension. This interpretive element guides the synthesis of a linear, yet dynamic and systemic explication of evolutionary milestones. The dual nature of the System Development Template simplifies and directs examination of the complex causal event chains leading to the emergence of systemic educational reform.

The third section details the four remaining themes that color the projection function of the narrative framework. The fifth theme develops from the problem statement identifying the crisis of perception currently experienced by education. The heuristic and hermeneutic functions of the System Development Template bring this
situation into sharp focus. The sixth theme establishes the learning organization as an evolutionary ideal. The seventh theme addresses the paradox of reform that develops from the crisis of perception in education. The System Development Template highlights the flow of historical events and scientific misinterpretations that have made the crisis inevitable. The eighth theme suggests that the disciplines of the learning organization, which serve as the foundation for the heuristic function of the model, can also direct and anticipate future milestones along the evolutionary path being carved by the educational system. Application of the System Development Template opens the conceptual door to reconsider and re-evaluate the portent and potential of past reform initiatives. A fresh look, using a new paradigm, points out that events, previously miscast as ineffective, may be valuable learning experiences in disguise.

Together the portrait, portrayal and projection functions of the System Development Template begin to unravel the mythical Gordian Knot. The System Development Template serves as a concept map, gathering all the important pieces of information to make coherent sense of the tangled tour of systemic educational reform.

A Portrait of the Narrative Foundation

This section examines the symbiotic relationship between industry and education. The metaphor of evolution serves to describe the approach of a second, technological Industrial Revolution. The section concludes with discussion of the historical and systems science perspectives that contribute to the emergence of systemic educational reform. This section presents the background information required to paint a three dimensional portrait of the evolution of systemic educational reform.
The Symbiotic Relationship Between Industry and Education

Ray Marshall and Marc Tucker (1992) in their book, *Thinking for a Living: Work, Skills and the Future of the American Economy*, documented the parallel growth and development of American industry and education. They described the alliance between industry and education as a persisting symbiotic relationship. Biologists apply the term symbiosis to associations that are mutually beneficial. Observation over time shows that industry and education, as related subsystems, are on a parallel, common course. The recognition and inclusion of this symbiotic, systemic relationship are the first steps in the development of an accurate model to analyze and interpret the events leading up to the emergence of systemic educational reform.

Industry and education are but two of the many diverse yet integral elements that contribute to the behavior of a much larger, all encompassing, social system. Systems are more than the sum of their parts. They are the product of their relationships and as such, social communities are dynamic systems. They not only subsist within a larger, universal whole but also actively influence the regulation of their common external and internal environments.

Change in any of the interconnecting regions of the system evokes developmental stimuli that reverberate throughout the system. Change, although stimuli appear to occur in isolation, triggers systemic response. Systemic response, in organizations as well as in organisms, dictates that the initial response becomes the new stimulus to direct and modulate the next response. This iterative process initiates what engineering refers to as a continuous feedback loop.

The ebb and flow of information exchange between systems and their internal and external environments share dynamics similar to biological homeostasis.
Imbalance in the internal or external environment precipitates one of two responses. The system, depending on its design and architecture, will either (1) seek equilibrium and return to the original stable condition, or (2) seek disequilibrium and reach a condition of uncertain stability. This systemic paradox is at the heart of the problems facing educational reform.

Organizations, like industry and education, and the environments they share, are under the influence of powerful systemic forces. The rate at which the entire societal community experiences quantum leaps in technological advance is increasing (Cleveland, 1994; Wheatley, 1992). This technological acceleration began with the dawn of the Industrial Age. Industry responds and radically changes to gain strategic advantage at each juncture. Historians observe that educational requirements and pedagogy alter accordingly (Tyack, 1974, 1993). The schools, as the front-line supplier of the industrial work force, need to be capable of responding in kind. This symbiotic relationship drives the majority of reform initiatives since before the turn of the century.

Currently, the rate of industrial change is faster than the rate of educational adaptation. According to Marshall and Tucker (1992), the majority of our students are leaving school with minimal mastery in academic areas and totally without the critical thinking skills they need to survive in the world of tomorrow. They stated that, "those American corporations that are using or are moving toward high-performance work organization report that the most serious obstacle they face is a shortage of well-educated and highly skilled labor" (p. 65).

We enter a second, more challenging revolution as the end of this century draws near. The curriculum and pedagogy of contemporary American education no longer evolve at a rate that matches the needs of a changing industrial marketplace. They are lagging behind, continuing to provide the industrial needs of a bygone cen-
tury. For education to expedite the transformation necessary to match the acceleration of industrial organizational growth and development, the rate of effective reform will need to increase. The lessons learned by industry serve as effective guideposts to direct the transformation of education.

The large, multinational American firms that have survived and prospered in the 1980's have done so by restructuring their operations from top to bottom, using highly skilled, highly paid labor and wholly different methods for managing and organizing the work of the organization than they had in the past. By doing so, they succeeded in raising productivity levels greatly, producing a much higher quality product while actually reducing their costs. This is very similar to the challenge American education faces: to make an enormous improvement in educational achievement at a modest increase in cost. The lessons our best firms have learned, we believe, hold the key to great advances in our schools. (Marshall & Tucker, 1992, p. 110)

Recent organizational development efforts to improve business and industry provides a vast reservoir of new knowledge. Advances in organizational development supply the raw materials necessary to formulate a more coherent strategy for revolutionary change in education. The blueprint for radical reform and reconstruction of our schools needs to follow the same principles that direct innovative American industrial organizations. The current transformation of industrial organizations serves as a template to guide educational reform. Industrial exemplars rescue themselves from the brink of chaos and ruin by significantly increasing productivity without increasing costs. Industry learns to capitalize on disequilibrium. Generative learning (Senge, 1990) develops in organizations that champion a systemic perspective on change.

The Metaphor of Evolution

In 1982 Richard Nelson and Sidney Winter proposed a theory of economic competition founded on the ideas of Charles Darwin. They presented the theory that economic success in the technological second Industrial Revolution (Nelson &
Winter, 1982) is analogous to biological survival. The second, technological
Industrial Revolution they refer to is the also known as the Information Age. Quick
adaptations, through innovative implementation of strategy and allocation of vital
resources, render organisms and organizations flexible enough to thrive under
conditions of radical environmental change and cultural chaos.

Organizational change compares to biological evolution. Evolution, as a
metaphor, for organizational transformation, provides the figurative foundation for
the narrative. Organizational evolution is comparable to biological evolution because
the form and function of organizations, like that of organisms, are inextricable and
interdependent. The synergy between form and function optimizes productivity and
resilience; however, organizational synergy occurs only when accurate assessment of
environmental stimuli drives organizational response.

Social beings may change their form and habits in the long process of
biological evolution. A community or an organization can change only if its
entity can draw upon experience, draw inference from reflection, and change
behavior based on the light of those reflections. (Wheeler, 1980, p. 100)

The metaphor of evolution serves as an ideal foundation upon which to build a
descriptive, historical narrative. Evolution, by definition, describes the process of
change. The development of systemic reform continues to follow an evolutionary
path. The study of evolution is a historical and scientific discipline. Reflection on
past organizational experience and the interpretation of historical and systems science
perspectives currently serving education, focuses attention on the evolutionary nature
of the change process.

The historical perspective provides valuable insight through the identification
of cyclical behavior patterns that occur over time. It also provides the opportunity to
learn from previous mistakes. The systems science perspective presents an important
element because it provides the rationale and framework for understanding and facilitating change from within organizations.

The Historical Perspective

The significance of the historical stance is not only in what it tells us about the manifestations of a particular problem over time, or in what one learns about the efficacy of remedial actions, but also in what one learns about the system qua system—that is, the features of the system in which the problem arises and recurs or remains constant but unremarked until it is seen (again) as destabilizing the system. (Sarason, 1990, p. 34)

Understanding the development of systemic reform in education begins with an examination of its antecedents. Reform in education, until 30 years ago, always adopted the organizational reform efforts that were proven successful in the industrial setting. The last thirty years of educational reform mirrors the efforts of industrial transformation stalled at the mid-century mark. Adherence to the mechanistic paradigm, dominant during that era, effectively isolates the educational system from surrounding external information and sustains the commitment of organizational resources to a stagnant pattern. Stiff cultural currents resist altering that pattern in educational circles today. Educators, on the whole, accept the mechanistic system design popular at the turn of the century. "What ever changes they seek to make do not require altering the nature of the relationships among those who make up the system" (Sarason, 1990, p. 14).

The emergence of the quantum paradigm precipitates a cascade of dramatic changes in the societal, and therefore industrial and educational, environment. Industry, in contrast to education, develops an increased sensitivity and generative ability to respond in an environment experiencing drastic technological change. The design of industrial systems evolves at faster rate than that exhibited by education.
Accordingly, industry sets the precedent and paves the way to guide educational reform.

The realization that the process of educational reform, in the United States, often fails to successfully mirror the development of social and industrial reform, provides a unifying theme to this chronicle. Educational reform, because of antiquated system design, fails to recognize and confront the intractability of schools despite recent efforts. Educational reform is superficial and cosmetic, not fundamental. If education continues this strategy denying the quantum nature of change and ignoring the obvious lessons of history, the clarion call for systemic redesign will pass unheeded.

John Goodlad (1987) elaborated on the significance of a blended scientific and historical perspective. He pointed to system dynamics as instrumental in instilling the realization that unless we mold the behavior of everyone in the system, the existing system will defeat efforts at reform. As it currently stands, each new wave of reform learns nothing from earlier efforts and comes up with recommendations that have failed in the past. Acceptance and maintenance of past system dynamics form the basis for the current operational definition of reform. "Change will not occur unless there is an alteration of power relationships among those in the system and within the classroom" (Sarason, 1990, p. xiv). The orchestration of successful wholesale systemic change requires an intimate understanding of the contributions made by the historical and systems science perspectives.

The Systems Science Perspective

One can see, touch, and interact with people and things, but not with the abstraction we call a system. System is a concept we create to enable us to indicate that in order to understand a part, we have to study it in relation to other parts. It would be more correct to say that when we use the concept system, it refers to the existence of parts, that those parts stand in diverse
relationships to each other, and that between those parts there are boundaries of varying strength and permeability. Between system and surround are also boundaries, and trying to change any part of the system requires knowledge and understanding of how the parts are interrelated. (Sarason, 1990, p. 15)

Education struggles with major systemic problems. Education, as a system, seeks purpose and structure through a dynamic interrelationship with the environment. It becomes imperative that educators come to understand and appreciate the interactive communication network that forms an integral part of their systemic identity. Education, at its' core, lacks a systems perspective and therefore suffers from an identity crisis.

The narrow, archaic perspective held by education presents severe limitations to its' capacity to exchange information and respond to societal influence. The pervasive problem of isolationism creates the dysfunctional behavior that systemically sabotages the past 30 years of educational reform. The development of systemic reform directly results from the search for a systemic identity.

Industrial organizations have a clearer sense of their systemic identity and therefore, begin much earlier to closely parallel the developmental path of the societal system. Industry develops tight, highly interactive, systemic connections. The pioneering beacon of industry provides guidance as to what requirements for change lie ahead for education. Organizational renewal in industry drives the generative process responsible for the recent cultivation of systemic education reform initiatives.

The events that lead industrial organizations to develop effective systemic disciplines in the corporate milieu are the subject of a great deal of theorizing. Organization theorist, Peter Senge (1990) identified organizations capable of sustaining systemic responses as learning organizations. The practice of the learning organization disciplines catalyzes pivotal systemic developmental events. Drawing on the success of industrial transformation, it follows that the learning organization
model can serve as a powerful lens to focus closer and more meaningful examination of the evolution of systemic educational reform.

If education intends to follow the model path of the learning organization, education must first begin by practicing the prescribed disciplines: personal mastery, mental models, shared vision, team learning and systems thinking (Senge, 1990). This chapter presents the design of a template that facilitates documentation of the nascent art and practice of learning organization disciplines in the field of education. The practice of the five disciplines provides the true systemic perspective that current educational reform initiatives so desperately lack. This thesis examines the developmental process that instructs the transformation of education from a teaching organization to a learning organization. This functional shift from a centripetal content focus to a centrifugal process focus requires major structural reorganization.

A Portrayal of the Narrative Template

This section presents the process and interpretive elements of the System Development Template. The design of this dual model facilitates discussion of the evolution of systemic educational reform. The two elements of this model are as follows: (1) the heuristic staircase model, that explains and predicts the development of systemic educational reform; and (2) the hermeneutic spiral model, that provides interpretation of historic events and those events still unfolding.

The Process and Interpretive Elements of the Template

The knowledge that educational organizations operate as social systems, is essential to a teleological description of the theory and practice of educational reform. This thesis must also be systemic in the nature of its form and function to successfully catalogue the elements contributing to the evolution of systemic educational reform.
This is tough to accomplish. A theoretical template facilitates the intricate examination of educational reform. This dynamic, holistic model guides the investigation of systemic educational reform through its' evolutionary progression.

The evolution of systemic reform in education, for many, describes the search for the one best solution; but, in actuality evolution documents the making of dynamic decisions in the face of reality. This type of convoluted situation requires a template for thorough explication. What kind of characteristics must a functional developmental template possess to facilitate the description and analysis of a theory modeling the practice of educational reform?

Unraveling the Gordian knot (Zimmerman, 1964) of educational reform requires two separate models: (1) one to guide the analysis of reform through the deconstruction and reordering of factual historical events and (2) one to guide the interpretation of reform events through reflection and the construction of figurative, higher level meaning. The System Development Template blends factual and figurative information and allows for analysis of action and interpretation of perception. This thesis presents the System Development Template, a two-part systemic model, to facilitate the analysis and interpretation of educational reform from historical and scientific perspectives.

Untangling the Gordian knot of past educational reform action requires the reordering and reflective capabilities of a systemic perspective. Reordering brings the purpose and pattern of chaotic events into clearer focus. Reflection stimulates individuals and organizations alike to begin the cognitive progression from reliance upon elementary description and analysis of facts to participation in the complex collation and synthesis of meaning. Information bits that seem as separate, quantifiable snapshot entities begin to layer, and coalesce into a single more coherent image. The relevance and effectiveness of the action taken in any situation increases
in direct proportion to the clarity and accuracy of the image held for the situation. Application of the System Development Template to the issue of educational reform mediates a similar transformation. The new dynamic, motion picture image more precisely portrays the dynamics of system behavior.

Decisions are made continuously, events are forever unfolding and with each event completed comes changes in events anticipated. A theory of practice must work *in progress*. The still camera and snapshot metaphors associated with traditional scientific inquiry need to be replaced by the motion camera metaphor. (Sergiovanni, 1984, p. 280)

Such a template is indispensable not only to sift through the large amount of accumulating literature but also to inform and direct future reform initiatives. Much of the foundation for the building of this model comes from the theory of practice literature (Sergiovanni, 1984). Sergiovanni (1984) stated that informed actions require input from three branches of science. Descriptive science considers the portrait of what is. Interpretative or hermeneutic science portrays what events mean. Normative science projects a vision of what ought to be. The model this project requires must incorporate elements that allow for description, projection and interpretation. Such a template would need to have heuristic and hermeneutic functional capacity to simultaneously provide a process element for classification of events and an interpretive element to derive meaning from observed action.

The System Development Template also includes a process element that serves as a behavioral analysis tool. It contributes description and analysis of factual events. The process element of the model examines historical events. It functions in the cataloging of discrete action quanta as they unfold in real time. Proper classification and prioritizing of events occurring along several similar timelines completes the first critical step. The process element untangles the many threads that make up the Gordian knot of educational reform.
The System Development Template that follows, includes an interpretive element, that illuminates the cognitive models piloting the perceptions of individuals and organizations. Recognition of these mental models, that continuously color and often causes distortion in our thinking, provides the second crucial step in the creation of an accurate portrayal of systemic educational reform. It serves to increase levels of understanding, facilitate learning and ultimately change behavior.

Ricoeur (1979) stated that metaphor becomes a model for changing our perception. The guiding influence of the figurative, or metaphorical, perspective has been absent in previous historical accounts of the waves of educational reform. The interpretation of meaning is a critical component to the development and analysis of a potential theory of practice. Understanding of organizations comes from examination of the cultural artifacts that demand inquiries move past historical, factual description to include metaphor, "interpreting the shadow and substance of observed events" (Sergiovanni, 1984, p. 281). "One needs to explain nature, but to understand culture;...to 'cognitively assimilate' natural phenomena one has to grasp their meaning" (Bauman, 1978, p. 84).

Metaphor plays a major role in the development and presentation of this thesis. The System Development Template integrates metaphoric interpretation with analysis of reform initiatives. The System Development Template draws heavily from the illustrative metaphor of the learning organization. The System Development Template employs the metaphor of the learning organization as a systemic lens through which to observe and understand the historical evolution of educational reform. The System Development Template also sets the learning organization as an exemplar that serves to evaluate and direct the scientific evolution of educational reform. The learning organization metaphor serves as a mirror and as an example, reflecting the current realities and future possibilities for systemic educational reform.
The description that follows establishes the rationale, documents the development, and demonstrates the operation of the System Development Template. The process element together with the interpretive element constitute this innovative theoretical model.

The Process Element

The heuristic function of the process element untangles the massive knot created by the many conceptual and event threads converging on a single point. The heuristic function, or classification element of the template, serves to delineate the description of what is and project the normative direction the evolutionary process requires to achieve what ought to be. The heuristic function captures the discrete steps, or quanta, that characterize the evolutionary journey of systemic reform.

To construct a process element, to direct discussion and analysis of discrete events in educational reform, I blend a developmental problem solving heuristic (Sarason, 1990; Sergiovanni, 1984; Ricoeur, 1973) with the systemic design approach principles of Banathy (1992). In this new age, when cause and effect are becoming increasingly distant, the application of a systemic research perspective to the issue of educational reform provides a unique analysis advantage.

The process model takes the form of an evolutionary prototype. This prototype has two heuristic elements that function as lenses. One lens focuses on the functional or systemic complexity of the reform and the other focuses on the placement of events along a developmental time continuum. These lenses focus in parallel on the systemic problem under scrutiny.

The process model, that results from the combination of these two lenses, resembles a staircase. The staircase model, presented here, functions similarly to that discussed in quantum mechanics (Giancoli, 1991). The staircase model illustrates the
quantum perspective. In physics a staircase represents the variation and uncertainty of energy and position of electrons; this model places the most energetic electrons at the top. Here a staircase model classifies the iteration of events relating to the evolution of systemic educational reform. This model places events exhibiting varying degrees of systemic relationship in the following manner: the higher the position of the event on the staircase, the more systemic the reform. The staircase model represents increasing levels of functional complexity while retaining a fundamental simplicity in architectural design. In addition, it facilitates a deep understanding of systemic reform. A model illuminated by the quantum paradigm can succeed even though the process of system development, like the behavior of electrons, does not always follow in discrete steps. The quantum nature of the staircase model accounts for the discontinuous and non-linear nature of the evolutionary process.

The Interpretive Element

The hermeneutic function of the interpretive element reunites these separate threads to create a collective, cohesive account. The hermeneutic function, or interpretive element of the template, serves to translate and integrate the significance of historic events that occur along the evolutionary path (Sergiovanni, 1984).

Sergiovanni (1984) offered cogent advice, in Leadership and Organizational Culture, on how to accomplish the interpretative task of examining complex events for guidance that illuminates future action.

Traditional conceptions of theory and practice have not been able to capture the complexity and sensitivity needed to accommodate to the teleological, praxis and human qualities of educational policy and administration. Needed, nevertheless, is some theoretical framework, some systematic mode of analysis, some series of cognitive maps which can help in understanding and informing administrative practice. Recognizing the complexity of the problem and the shortcomings of traditional conceptions of theoretical science
is not to eschew theory. Needed is a theory which can accommodate to practice. Such a theory would not seek truth in an effort to expand the knowledge base in a particular discipline but would seek informed practice. (Sergiovanni, 1984, p. 279)

The interpretive element conforms with the concept of theory of practice and molds a more integrative and unifying understanding of the scholarship and practice behind systemic reform in education. Sergiovanni (1984) used a watershed metaphor to describe interpretation of the elements of thought and practice in education. He stressed the importance of developing a model to guide the orchestration of change in education. He strongly pressed for a model to direct scholarly inquiry and practice in education so that "seemingly independent and competing views of reality be brought together in a reasoned and integrated fashion" (p. 275).

The watershed metaphor is a good one because it allows normative and interpretive branches from the mainstream [of traditional descriptive science] to develop individual identities and integrity but to still feedback, later on in the course of the stream, as tributaries, building new life in the body of scientific and practical knowledge. (Sergiovanni, 1984, p. 275)

A sound model to guide interpretation of educational reform is important because many reformers fail to recognize that they do have implicit theories about how to achieve change. Sarason (1990) believed that these implicitly held theories are the primary source of reform ineffectiveness. He stated that educators believe "change can come about by proclaiming new policies, or by legislation, or by new performance standards, or by creating...ambiance, or all of the preceding" (Sarason, 1990, p. 123). This erroneous conception gives only secondary importance to individuals and harkens assembly line improvement that ignores the contribution of line workers. People accomplish change through behavior motivated and driven by their perceptions. To institutionalize change, the perceptions of the individuals responsible for implementation of the change must change concomitantly.

Theory is supposed to change our perception of phenomena in a certain context and that change requires actions consistent with change. Educational
reform rarely derives from whatever we reason by theory but rather from opinion, anecdote, an uncritical acceptance of research, or a desperation. (Sarason, 1990, p. 123)

The Heuristic Nature of the System Development Template

The heuristic function of the System Development Template allows for the categorization and re-synthesis of historical events. This section presents the rationale that leads to the creation of the staircase element. In addition, the staircase element models the parallel evolution of the learning organization and the quantum paradigm.

The Creation of the Staircase Model

The Oxford English Dictionary (1989) defines heuristics, as the branch of logic behind the art of discovery, invention and truth. The Morrow Book of New Words (1982) elaborates stating that heuristics encompass, "the social science of the creation of models as a working hypothesis of a goal or solution" (p. 123).

The use of heuristics as a discipline dates back to Greco-Latin antiquity. This practice is evolving to become a mode of epistemological inquiry addressing the question, "What do we know?" It has an orientation deep in the realm of thought and a perspective that places great weight on the development of theory.

The staircase model (Figure 2) has two complementary heuristic elements. These elements represent a useful way of describing the relatively discontinuous sequence of "action, events, and influences that intervene between initial knowledge about an idea, product, or practice, and the actual adoption of it" (Lionberger, 1960, p. 23). The first heuristic element examines events and serves to collate and summarize several opinions from the literature that focus on the implementation of change. The
Figure 2. The System Development Staircase.
second heuristic element serves to layer an additional hierarchical function that reflects and models the general evolutionary progression of systemic change.

The first heuristic element establishes the levels of principles and essences that order and classify the events contributing to the evolution of systemic educational reform. These levels, based on the disciplines of the learning organization, also form and direct the rest of the discussion within the body of the thesis narrative that follows (see Table 1). This table compares the five disciplines of the learning organization with the levels of the System Development Template under construction.

The second heuristic element models the evolutionary progression of systemic educational reform. This element describes the relationship between the degree of systemic reform and the degree of internal and external communication that an educational organization exhibits. Systemic educational reforms begin to emerge as educational systems begin to recognize and celebrate their systemic nature. Table 2 compares the observable organizational behavior present during the diffusion of innovation (Lionberger, 1960) and the implementation of systemic reform initiatives (Lieberman & Miller, 1990).

These two elements merge to establish the connections over time between the principles and essences that prepare for change implementation and the actual change process. The disciplines of the learning organization initiate the change process. Change spreads through diffusion to build reform. The risers, or levels, of the System Development Staircase reflect this developmental relationship between disciplines of the learning organization (Senge, 1990), the steps in the diffusion of innovation (Lionberger, 1960), and the building blocks of the systemic reform movement (Lieberman & Miller, 1990). Each event in the evolution of systemic educational reform can be placed on the appropriate step irrespective of the order in which they occur. The staircase model allows for classification of the, seemingly random,
quantum occurrence of individual reform events to bring education closer to a coherent understanding of current reality.

Table 1
A Comparison of Change Implementation Principles and Essences

<table>
<thead>
<tr>
<th>Principles (Theory Behind Practice)</th>
<th>Essences (High Level of Mastery, Convergence of Disciplines)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Organization</strong></td>
<td><strong>System Development Model</strong></td>
</tr>
<tr>
<td>Senge (1990)</td>
<td>(Heuristic Under Construction)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Description</th>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Mastery</td>
<td>Personal growth and learning</td>
<td>Research</td>
<td>Application of systems theory to education.</td>
</tr>
<tr>
<td>Mental Models</td>
<td>Exposure of hidden assumptions</td>
<td>Reflection</td>
<td>Examination of organizational metaphors.</td>
</tr>
<tr>
<td>Shared Vision</td>
<td>Development of common vision through inquiry</td>
<td>Revolution</td>
<td>Purpose-seeking.</td>
</tr>
<tr>
<td>Team Learning</td>
<td>Alignment and development of capacity to learn</td>
<td>Redesign</td>
<td>Inter- and intra-instructional collaboration</td>
</tr>
<tr>
<td>System Thinking</td>
<td>Ability to recognize and act on dynamic internal and external organizational relationships.</td>
<td>Resonance</td>
<td>Internal/external symbiosis.</td>
</tr>
</tbody>
</table>

**Elements of the Heuristic Function**

The heuristic element of the System Development Template functions to describe and analyze concrete events. The model not only orders events into
categories that reflect the achievement of learning organization disciplines, but also classifies events according to the dominant paradigm that influences organizational behavior.

Organizational perceptions aligning with the industrial paradigm drive the events that dominate the lower portion of the staircase. Synthetic elements, those that are additive, rely on the old paradigm to maintain a synchronous internal and external environment. Evolutionary development from positions low on the staircase, occur in a slow and linear fashion.

Organizational perceptions aligning with the quantum paradigm drive the events that dominate the upper portion of the staircase. Synergetic elements, those that are multiplicative, rely on the new paradigm to foster an organizational symbiosis capable of excelling in chaotic internal and external environments. Evolutionary development here is explosive and non-linear.

**Synthesis.** A second layer of the heuristic element, in the lower portion of the staircase, combines personal mastery, mental models and shared vision as important contributions to organizations seeking systemic change. Together they synthesize a motivating, empowering force that encourages and directs individuals to embrace organizational development. In concert these three disciplines serve to establish the internal communications network that is vital to organizational adaptability and survival. Internal communication and feedback are central to the development of a clear sense of purpose. This organizational purpose cements commitment to organizational goals and establishes a clear, desirable organizational vision for the future.
Table 2
A Comparison of Change Implementation Practices

<table>
<thead>
<tr>
<th>Practice (Observable Organizational Behavior)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffusion of Innovation</td>
</tr>
<tr>
<td>Lionberger (1960)</td>
</tr>
<tr>
<td>Building Blocks of Reform</td>
</tr>
<tr>
<td>Lieberman &amp; Miller (1990)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stages</th>
<th>Description</th>
<th>Blocks</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>Individual learns of new idea, practice or product.</td>
<td>Restructuring</td>
<td>A rethinking of the structure of the school.</td>
</tr>
<tr>
<td>Interest</td>
<td>Individual gets more information about new idea, practice or product.</td>
<td>Governance</td>
<td>A two-pronged focus on a rich learning environment and a professionally supportive work environment.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Individual weighs the merits of the idea, practice or product.</td>
<td>Instruction</td>
<td>A rethinking of curriculum and instructional efforts to promote equality for all students.</td>
</tr>
<tr>
<td>Trial</td>
<td>Individuals try the idea, practice or product.</td>
<td>Partnerships</td>
<td>A recognition of the necessity for building partnerships and networks.</td>
</tr>
<tr>
<td>Adoption</td>
<td>Individual decides if idea, practice or product is good enough for full-scale use (doesn't always end as acceptance.)</td>
<td>Comments</td>
<td>A recognition of the increased and changing.</td>
</tr>
</tbody>
</table>

Shared vision, personal mastery, and mental models (Senge, 1990) together synthesize organizational alignment and goal focus for the institution of education. Shared vision is the culmination of the first three disciplines. It provides motivation built on the foundation of personal ownership empowering staff to examine current...
practices. Shared vision reshapes the organizational direction through an iterative process. The iterative development of shared vision in an organization parallels the iterative nature of the change process.

Every school system exists in a different environment and changes at different rates. Recognition of the iterative nature of the change process becomes important because the change never ends. The change process requires continuous evolution, not one time change. Although the application and implementation may be unique from district to district, the possibility exists to have a common unifying focal point upon which to base systemic reform. The synthesis of shared vision provides the focus of reform efforts in the lower tier of the staircase model.

Edward Whitacre, Jr. CEO of Southwestern Bell believes in the power of this rallying cause:

My business experience has taught me that well-chosen expectations are crucial to the success of any venture. The right goals can energize the people involved in a project. The wrong ones can leave them foundering and ineffective. That's true not only in the business world, of course, but in any effort to change the status quo. (Newman, 1990, p. 1)

The shared vision, to be effective in driving educational reform, needs the assistance of a communication network. Language is an important component of the communication network. Gerald Pine and William Keane (1989) solicited that the collaborative language of educational improvement is the best thematic foundation for the development of a shared vision for education. They believe that the language of school improvement, on the other hand, is isolationist and neglects the inclusion of systemic connections. They assert that central to educational improvement is the organizing principle that public schools, ISD's, universities, community colleges and state departments of education are interrelating and interacting parts of a single educational system.
Systemic reform must, by definition, be systemic. It vision born out of relationships through the quality internal communication that drives systemic reform. For systemic reform to spread beyond a single institution, a companion network of external communication must develop. When reform occurs without strong external communication, it constrains local innovation to that single institution. A blend of internal and external communication is necessary to maintain the adaptability of an organization.

**Symbiosis.** A second layer of the heuristic element, in the upper portion of the staircase, combines the final two learning organization disciplines, team learning and systems thinking (Senge, 1990). These disciplines evolve as educational systems adopt an organic coherent approach to reform. Collaboration results when shared vision fuels a consistent reform approach.

Thomas (1980) presents a compelling analogy that compares collaboration to symbiosis. In a society facing the challenges of evolution, the interrelationships among once separate and independent subgroups become increasingly important as organizations find themselves ecologically bound to each other. Autonomous organizations cannot continue to operate independently, and indeed recognition emerges through collaborative effort that organizations can learn to improve their effectiveness (Pine & Keane, 1989).

Senge (1990) asserts that systems thinking "contemplates the whole pattern which is perceived as a constellation" (p.11). Systems thinking recognizes the interconnection of each institution under systemic influence. The essence of systems thinking is understanding and "seeing the interrelationships rather than linear cause and effect chains" (Senge, 1990, p. 73). Systems thinking sees the process of change as dynamic, rather than as a series of static snapshot events. Systems thinking leads
to systems design and systemic change. Systems thinking applies holistic, information age science to the behavior of organizations.

It views the educational problem situation as a system of interconnected, interdependent and interacting problems, seeking to create the design solution as a system of interconnected, interdependent, interacting and internally consistent solution ideas. The systems design approach seeks to envision educational arrangements and the entities that attend to those arrangements as a whole system that engages and should be designed in view of the synthesis of its integrating parts. (Banathy, 1991, p. 12)

Team learning and systems thinking (Senge, 1990) are the symbiotic, collaborative disciplines that serve as the means to achieve change within an organization. These two elements together allow organizational lines of communication that promote effective interaction with elements external to the system. An external communication network provides the feedback needed to maintain what Joyce, Hersh, and McKibbin (1983) call a "homeostasis of change" with the environment. This external network initiates the evolution of inter-institutional collaboration. In a rapidly changing environment system survival demands organizational collaboration. Collaboration further promotes flexibility and adaptability.

**Synergy.** The coupling of vision (internal communication) and collaboration (external communication) makes a pivotal contribution to the evolution of systemic educational reform. The synergy that results when an organization combines vision with collaboration creates a powerful catalyst for change. Vision and collaboration are communication elements interwoven into the context of the learning organization.

Synergy denotes a process whereby distinct agents acting in collaboration with each other produce a total effect or result which is greater than the sum of the separate effects generated by the agents acting independently. (Cooper & Morey, 1989, p. 12)

Collaborating partners employ strategies that promote synergy. Synergy facilitates a commitment to and achievement of a shared purpose. Through
communication networks linking internal and external environments, each can readily identify a stake and role. To achieve systemic reform, collaborative strategies must engage the participating partners simultaneously in reflection and action. Collaborative strategies also need to include elements that "promote trust and respect among the partners, patience, perseverance and a tolerance for ambiguity. The strategies must also encourage and support each partner's distinct contributions of expertise and perspective" (Cooper & Morey, 1989, p. 13). The description of these critical strategies matches those of team learning and the resulting synergy is analogous to the products of systems thinking.

Bratman (1992) predicts that the preparation of systems learners will be a fundamental charge of learning institutions. Institutions that do not perceive themselves as systems will not do well at preparing systems thinkers. The learning organization suggests a systemic solution to the systemic problems facing the educators of tomorrow. Organizational transformation addresses the needs and practices of the rapidly evolving workplace.

A failure to build community support is fatal. Unless the public presses for the same changes education reformers want, they won't occur. This means that those who want to change schools must be good at the public relations aspect of educational change as well. (Newman, 1990, p. 10)

The main tenets of an effective organizational transformation are relationships and communication. Communication and trust build the supportive community that serves as a common foundation. This foundation of community support depends on a stable framework of human relationships. The presence or absence of internal and external communication and relationships will be the determining factor in the success or failure of systemic educational reform.
The Hermeneutic Nature of the System Development Template

The hermeneutic function of the System Development Template allows for interpretation of the pivotal events driving the evolution of systemic educational reform. This section presents the rationale for the creation of the spiral that illustrates this element. The hermeneutic element models the processes necessary to accurately assess and interpret organizational evolution.

The Creation of Interpretive Model

The Oxford English Dictionary (1989) defined hermeneutics as the art of interpretation. Hermeneutics describes "the art and science of interpretation distinguished from exegesis or practical exposition" (p. 243). Ricoeur (1973) stated that the history of hermeneutics, as a discipline, dates back to Greco-Latin antiquity. Hermeneutics evolves to become a mode of epistemological inquiry addressing the question, "How do we know?" It has an action orientation and a perspective that places great weight on the development of contextual meaning. Sergiovanni (1984) confirmed that historical events, like those leading to the development of systemic reform in education, lend themselves to hermeneutic inquiry because they remain stable in time.

Post hoc analysis of events reveals new insights and illuminates more vividly the meaning of these events, but the events themselves as facts of occurrence do not change. Contrast history with the fast paced, ever evolving, and dynamic nature of educational policy and administration. In these fields we are concerned with events occurred, presently occurring, and likely to occur. The necessity for understanding the meaning in studying these events remains important but is tempered by the bounded rationality of time unfolding and the necessity for action. (Sergiovanni, 1984, p. 283)

Rather than a linear progression, hermeneutics promotes understanding by going in circles. The classic circular metaphor of hermeneutic analysis refers to an endless examination of events layered upon events. Hermeneutic analysis seeks to
deepen and enrich meaning. Neither meaning nor understanding are ends in themselves for organizational development. They are avenues that improve organizational practice by providing a route to better information access and utilization.

The circle can also be put in terms of the part-whole relations: we are trying to establish a reading for the whole text, and for this we appeal to readings of its partial expressions; and yet, because we are dealing with meaning, with making sense, where expressions only make sense or not in relation to others, the readings of partial expression depend on those of others, and ultimately of the whole. (Taylor, 1971, p. 4)

Sergiovanni (1984) employed a hermeneutic spiral to illuminate theories of administration practice. There are two key distinctions in his hermeneutic spiral that are important to include in the creation of the spiral elements of the System Development Template. First, he distinguished that descriptive knowledge, knowledge of what is, differs from normative knowledge, knowledge of what ought to be. Second, he distinguished that world views are either from an abstract, theoretical perspective or from a concrete, practical perspective. The hermeneutic element of the System Development Template adapts these insightful distinctions and integrates them into a model for interpretation and forecast of systemic reform.

Elements of the Hermeneutic Function

The System Development Template under construction has two hermeneutic functions: (1) a spiral that models the theoretical interpretation of events in progress, and (2) a spiral that models the practical interpretation of historical events in detail. The first spiral model serves as a coarse focus lens. The coarse focus spiral considers three elements in an iterative sequence that builds levels of general understanding. The second spiral model serves, when necessary, as a fine focus lens. The fine focus
spiral considers four elements in an iterative sequence that includes historical detail and documentation for pivotal events.

The coarse focus spiral facilitates holistic interpretation. The three part grid creates a descriptive portrait of the system, a general historical evaluation that adds a dynamic portrayal of the system over time and a systemic application or projection that generates a wholistic interpretation.

The fine focus spiral accelerates discernment through the unfolding of historical events in great detail. The four part grid distills and clarifies the meaning of discrete historical events through the description, application, analysis and transformation of contributing systemic elements.

Each spiral operate in the same manner, during a single iteration, a spiral path traverses each of the operational elements on an interpretive grid. Understanding of complex systemic issues increases in direct proportion with the increase in spiral diameter. The iterative models develop a comprehensive picture. They present a picture of the evolution of systemic educational reform. Systemic awareness expands each time the developmental cycle repeats itself.

The Coarse Focus Spiral. The first hermeneutic function of the System Development Template consists of an interpretive trio that underlies spiral iterations (see Figure 3). The coarse focus spiral models the application of theory of practice concepts to systemic change. This spiral allows for explanation of the systemic elements contributing to a situation and the development and implementation of systemic solutions to reform issues.
Sarason (1990), Sergiovanni (1984) and Ricoeur (1973) suggest three-dimensional investigative techniques for effective examination of systemic problems. Their methods establish the foundation for the three layers of discovery that make up the coarse focus grid (see Table 3). A wide range of organizational research literature contributes to the creation of the coarse focus hermeneutic function of the System Development Template. Table 3 lists the three interpretive grid elements that construct the coarse focus spiral and also compares the iterative functions of this segment of the System Development Template with other systemic problem solving schemata from the literature.
Table 3
A Comparison of the Hermeneutic Layers of Selected Interpretive Schemata

<table>
<thead>
<tr>
<th>Schema Under Construction</th>
<th>Selected Schemata from the Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of the Element</td>
<td>System Development Template</td>
</tr>
<tr>
<td></td>
<td>Sergiovanni (1984)</td>
</tr>
<tr>
<td></td>
<td>Ricouer (1973)</td>
</tr>
<tr>
<td></td>
<td>Sarason (1990)</td>
</tr>
<tr>
<td>Description of the current Situation</td>
<td>Portrait</td>
</tr>
<tr>
<td>Creation of historical perspective</td>
<td>Portrayal</td>
</tr>
<tr>
<td>Interpretation and application of systemic thinking</td>
<td>Projection</td>
</tr>
</tbody>
</table>
Sarason (1990) states that the first step in the investigation of a systemic problem is to survey the system as if it were born yesterday. The System Development Template develops an objective description of the current situation from an examination of the present and recent past. The first element in coarse focus grid generates a comprehensive understanding of the present and new past that have contributed to a situation. It creates the descriptive foundation or portrait of a situation.

The most important diagnostic Sarason suggests is the deployment of history as an instructional variable. He presents a fundamental question that so far has been absent from the myriad of governmental and business reports calling for educational reform, "What is it about the system that has led to the cyclical appearance of the problem if it has occurred previously?" (p.33). The second coarse focus grid interpretive element evaluates the historical evidence leading up to a situation. It generates a dynamic portrayal. Understanding that informs and enables mobilization for future action flows from this dynamic interpretation.

The first and second coarse focus grid elements broaden systemic awareness. Traversing the grids in sequence reaches higher level of understanding. They transform the perception of observers attempting to comprehend the events under scrutiny. The nature of the system if the first level of understanding arises from the first element. This first level of understanding undergoes transformation as the second level historical perspective highlights misconceptions.

The third and highest level of understanding relates school systems to the larger social system. The third interpretive grid element leads to a systemic interpretation of the situation and facilitates the projection of adaptive solutions to problems the first two elements encounter.
The elements of portrait, portrayal, and projection contribute to the synthesis of a systemic panorama. This panorama illustrates what the educational system should be reforming toward. Each element of the trio completes one evolutionary level of developmental drama. Appreciation of the evolutionary journey of systemic educational reform increases as each element unfolds. Completion of each trio of the interpretive coarse focus model generates a dynamic view of the system as it evolves to become the view for the future.

The Fine Focus Spiral. The second hermeneutic layer of the System Development Template consists of an additional interpretive quartet that underlies the projection phase of the coarse focus spiral iterations (see Figure 4). The fine focus spiral closely examines the application of theory of practice concepts to systemic change. This additional spiral allows for explanation of the complexity contributing the development and implementation of systemic solutions to reform issues.

The sequential processes of description, application, analysis, and transformation reiterate building an expanding base of understanding with each complete revolution. Completion of each iteration of this fine focus interpretive cycle builds a comprehensive and elaborate view of the system as it evolves to become the view for the future. Description of each of the four quadrants comprising the fine focus spiral function of the System Development Template follows. This description, illustrated in Table 4, borrows from previous mention of hermeneutic nomenclature (Sergiovanni, 1984) and reflects additional contributions from the literature (Boehm, 1988; Kolb, 1984)

The first quadrant description, presents the concrete facts for the situation from a practical perspective. This quadrant collates facts of the situation to develop a
descriptive narrative for the current state of reality. This quadrant presents the answer
to the question, "What is it?"

The second quadrant, application, describes the concrete, observed facts for
the situation from a theoretical perspective. This quadrant examines the causal
relationships, scientific laws and theoretical frameworks that help delineate, interpret
and predict social facts at issue. This quadrant brings the cognitive maps, models and
theoretical frameworks of individuals to bear on collective action. Application serves
to tie events together and establish causal linkages. This quadrant presents the answer
to the question, "Why is it the way it is?"

Figure 4. The Fine Focus Element of the System Development Spiral.
### Table 4
Comparison of Hermeneutic Quadrants

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hermeneutic Model</td>
<td>System Development Template</td>
<td>Theory of Practice</td>
<td>Life-Cycle Process Model</td>
<td>The Learning Cycle</td>
</tr>
<tr>
<td>Quadrant 1</td>
<td>Description (What is it?)</td>
<td>Practical Descriptive</td>
<td>Determination objectives, alternatives &amp; constraints</td>
<td>Concrete Experience and Reflective Observation</td>
</tr>
<tr>
<td>Quadrant 2</td>
<td>Application (Why is it?)</td>
<td>Theoretical Descriptive</td>
<td>Evaluation of alternatives, identify, resolve risk</td>
<td>Abstract Conceptualization</td>
</tr>
<tr>
<td>Quadrant 3</td>
<td>Analysis (What should it be?)</td>
<td>Theoretical Normative</td>
<td>Develop, verify next-level product</td>
<td>Planning for Implementation</td>
</tr>
<tr>
<td>Quadrant 4</td>
<td>Transformation (How could it be?)</td>
<td>Practical-Normative</td>
<td>Plan next phases</td>
<td>Active Experimentation</td>
</tr>
</tbody>
</table>
The first quadrant creates a snapshot of the situation. The second quadrant creates a motion picture of its development. This dual examination develops "keener descriptions of reality and more powerful causal explanations of events and activities" (Sergiovanni, 1984, p. 288). Together they make allowance for changes in situation, meaning and relevance.

The third quadrant, analysis, presents normative ideals for the situation from a theoretical perspective. This quadrant looks at the values, ideals and cultural imperatives that govern behavior. Analysis investigates the hopes, aspirations and intents of the individuals contributing to the situation; analysis accomplishes this by looking at actions, attitudes and language systems. This quadrant presents the answer to the question, "What should it be?"

The fourth quadrant, transformation, presents normative ideals for the situation from a practical perspective. This quadrant implies goals and standards that guide the intent of the system from its new more informed position. This quadrant presents the answer to the question, "How could it be?"

The third and fourth quadrants complete one iteration of the fine focus spiral. The third and fourth quadrants create a vision of the future for the situation. Comparison of intention with actual practice highlights discrepancies between "espoused theories" and "theories in use" (Schön, 1983). The four quadrants of the fine focus grid generate an ideal image of how an educational institution might function in the evolution toward excellence.

The Complete System Development Template

Figure 5 illustrates the complete System Development Template. The interpretive, hermeneutic spiral elements merge with the descriptive heuristic staircase element. The narrative presented in the body of this thesis follows this
Figure 5. The Complete System Development Template.
template. The evolution of systemic educational reform unfolds step by step, iteration after iteration. One complete iteration of the coarse focus spiral describes each level of the staircase, from research, to reflection, through reflection. The descriptive and interpretive elements generate an accurate, three dimensional understanding of the current reality facing education. The lower tier models the events and perceptions that contribute to the conundrum of educational reform.

The renovation level adds the fine focus spiral to delineate the episodic waves of educational reform. This intricate middle tier represents the evolution of systemic educational reform through the metaphor of the shared vision discipline. In addition, the events contributing to each successive wave of educational reform also mirror the evolution of the industrial paradigm that occurs in parallel. Each step builds as evolution progresses toward the learning organization and beyond.

The redesign and resonance levels blend the descriptive and interpretive elements to build hope for the future of educational reform. Educational reform evolves away from the synchronous behavior and the synthetic relationships characteristic of the industrial paradigm toward the symbiotic behavior and the synergetic relationships characteristic of the quantum paradigm. The upper tier models the eventual achievement of learning organization status for education.

A Projection for the Narrative Framework

This section presents discussion of the predictive potential of the System Development Template. This first iteration through the projection quadrant briefly describes the nature of theory and models, elaborates upon the crisis of perception facing education and the resulting reform paradox, and proposes that the evolution of the learning organization provides a clear beacon to direct the educational reform movement.
The Transient Nature of Theory and Models

A theory is a transient explanation for empirical events and relationships. It draws attention to the relationships between variables. A theory stimulates the development of new understanding by providing avenues for further inquiry. A theory is useful for prediction. It can anticipate the occurrence of events not yet under observation. Theory construction in education often occurs through the development of a model (Ary, Jacobs, & Razavieh, 1990).

A model is a simple representation of the complex. We develop models to gain insight into elusive, perplexing problems. A model is only as accurate as its' interpretation. We use models deductively, to increase understanding through prediction and simulation. A simple model can increase understanding effectively. A model can be so effective that it orchestrates its own obsolescence. Lit by the accumulation of new information, an old model fails to further illuminate. "Models are not modified as empirical data are accumulated; they are either retained if the data confirm them or abandoned if the data do not confirm them" (Ary et al., 1990, p. 17). When the depth of understanding increases, new models must evolve to accommodate the developing body of empirical evidence.


Organizational learning occurs in the context of our mental models. Thomas Kuhn (1970) referred to these underlying assumptions and governing ideas as
paradigms. Models "filter the information that we perceive; we make meaning by fitting the information into our current mental models and adjusting them appropriately; and we use the mental models to influence how we act" (Cleveland & Plastrik, 1993, p. 9).

Theory is supposed to change our perceptions of phenomena in a certain context and that change requires actions consistent with change. Educational reform rarely derives from whatever we learn from theory but rather from opinion, anecdote, an uncritical acceptance of research, or a desperation. (Sarason, 1990, p. 122)

The Crisis of Perception

The widening gap between our mental models and reality presents a serious consequence of the rapidly changing world. A rift between actuality and our lagging interpretation of reality increases the likelihood of counterproductive, dysfunctional action. Senge (1990) asserted that "the inertia of deeply entrenched mental models can overwhelm even the best system" (p. 178).

Pierre Wack (1985), a senior planner for the Shell Corporation, was referring to the microcosm of the oil embargo when he stated that, "unless we influence...the mental image, the picture of reality held by critical decision makers, our scenarios would be like water on a stone" (p. 84). Without a strong, compelling vision, the permanence of educational reform is as lasting as the elegance of a wave of water passing over the beach. Attention fixes on a moment of brilliant beauty only to have the glistening water recede and evaporate. The power of the water eventually polishes the stones to sand, and the sediment will outlast time. The changes educational reform attempts are fleeting because the endemic culture and structure of education can no longer keep pace with the rate of change in the external environment. The waves of innovation and reform are ineffective because the nature of society continually outstrips the capacity of education to react and adapt.
Contemporary research shows that most of our mental models are systematically flawed. They miss critical feedback relationships, misjudge time delays, and often focus on variables that are visible or salient, not necessarily high leverage. (Senge, 1990, p. 203)

The mental model most educators hold of their system present one of the fundamental problems concerning educational reform today. The present general model of how the institution of education operates has fatal imperfections. The flaw lies in the incoherence of our perception. We misinterpret the type of system that most correctly defines education. Sarason (1990) commented that each group of reformers acts in isolation. Each new population knows that education functions as a system, but has a viewpoint of education from a particular perspective. Each new vantage, by its narrowness, precludes understanding of any other standpoint. This compares to the humorous fable that portrays three blind men arguing over the attributes that most accurately describe an elephant.

Cleveland (1993) suggested that if "we have not achieved systemic change, it is because we are trying to change complex systems without understanding some fundamental truths about how systems behave" (p. 2). Our mental models, our paradigms, about the system of education need to undergo a fundamental shift. The term metanoia refers to this fundamental paradigm shift (Kiefer, 1989). Educational reform requires a metanoic transformation to respond to the current crisis of perception. A metanoic (Senge, 1990) transformation pushes educational reform to evolve and achieve systemic proportions.

**Evolution of the Learning Organization**

The current educational institution creates its conceptual framework and motivation to change in response to urgent prompts from the surrounding external societal and political environment. Parallel ideas emerging from the business sector
heavily influence the progress of educational reform. Historically, signals from industry provide vital information to education on how to deal effectively with external change. The vision that drives successful educational reform develops when education transfixes on industry.

The systemic forces that beleaguer prior attempts at educational reform, "will win out over the most noble vision if we don't learn how to recognize, work with and gently mold those forces" (Senge, 1990, p. 355). Educational reformers beginning to examine the evolution of the learning organization recognize its' increasing importance. This pioneering model of organizational development in industry provides a source of fresh clues.

To avoid the pending monumental identity crisis, education needs to overcome the current era of stagnation. Education needs to emerge as a learning organization. Education needs to become an organization capable of recognizing change in the environment, formulating a systemic plan of reform, taking systemic action and reflecting on the results of the action.

Contemporary American educators hold a vision that appears neither coherent nor compelling. Educators do not yet have a vision to share. Having a "shared vision is vital for the learning organization because it provides the focus and energy for learning" (Senge, 1990, p. 206). Internal ideological reform creates a coherent vision. Coherent vision presents a necessary component to generate a collaborative cultural foundation. The external framework of effective structural reform requires a collaborative foundation.

Burns (1978) stated that purposeful change flows from vision illustrating the future state we wish to conceive. Vision paints the picture of what we want to create. Systems thinking reveals the creation of what we currently have. "As people in an
organization begin to learn how existing policies and actions are creating their current reality, a new more fertile soil for vision develops" (Senge, 1990, p. 231).

**The Paradox of Reform**

There is a paradox between the reform outcomes we observe and those we desire. Education is attempting to apply bits and pieces of the learning organization philosophy without practicing the disciplines upon which systems thinking builds. The educational reform outcomes we currently seek can only result if education operates an open social system. The learning organization is an excellent example of an open social system. Senge's (1990) description of a system typifies an open system; his disciplines that culminate in systems thinking, apply to open social systems.

Not all the systems we encounter are open. If educational reformers intend to apply the disciplines of a learning organization effectively, they must first sort out system theory. The educational reform movement has enough information to desire to change what it wants to produce but not enough understanding to follow through.

Application of the Argyris (1976) model of theory-in-practice demonstrates that systems thinking merely represents the espoused theory of educational reform. Theory-in-practice constrains education to the machine age. Structurally we approach the issue of reform as if education were a closed, machine type system. Education thinks systematically, retrofitting the machine, rather than practicing systems thinking.

Popular interpretations of systems tend to use inappropriate mechanical models. Education must transform its perception of what it means to be a "system." Bela Banathy (1991) and Joel Barker (1985) both refer to this persistence of a mistaken belief as, "paradigm paralysis." The interpretation of current experience
using outdated models and metaphors is extremely misleading. Fixation on solutions provides the litmus indicator of obeisance to the lingering industrial paradigm.

If the old paradigm won't work, something fundamentally better suited to the task is needed, a paradigm that illuminates the whole, not just the parts; one that is synthetic, rather than analytic; one that integrates, rather than differentiates. This new paradigm is systems thinking. (Betts, 1992, p. 38)

The development of a new form requires stepping beyond actions that re-form to those that transform. An organization espousing systems thinking, "that does not include the idea of purposefulness and motivation falls back upon a mechanistic model" (Banathy, 1992, p. 151). The contrary, counterproductive activity currently plaguing educational reform is a symptom of paradigm paralysis. Tight tethers to old, familiar norms and values restrain movement forward toward the promises of the new paradigm. The reform movement stagnates, caught in a futile oscillation between new ideas and old beliefs.

A dynamic, unrelenting tension characterizes the current cumbersome transition period. This intractable tension is what Getzels (1982) referred to as the "problem of the problem." This thesis studies this dynamic tension using the System Development Template.

Educators agree that something is presently wrong. The imperative for change serves as an obvious thread throughout the history of educational reform. However, stakeholders experience discomfort in the present disquieting uncertainty of chaos. Organizational disparity in the identification of problems facing education leads to organizational discord. Organizational discord obstructs the pursuit of appropriate solutions. "Leaders in education must cope with the uncertainties of reform in order to determine who should be doing what, if anything, and for what end" (Jacobson & Conway, 1990, p. 182).
The evolution of educational reform is an incessant, cyclical search for the one best solution to one single problem. The persistent undercurrent issues are, however, complex and multidimensional. Systemic social problems currently challenge education. Systemic problems demand systemic solutions. "It appears that America's educational system is at a juncture where creative design may have more meaning that reasoned replications" (Jacobson & Conway, 1990, p. 193).

The formulation of the problem is often more essential than its solution...To raise new questions, new possibilities, to regard old questions from a new angle, requires creative imagination and marks real advance in science. (Einstein & Infeld, 1938, p. 92)

The Learning Organization as a Beacon

Education is observing the success of metaphor and paradigm driven changes in business and industry. As a result, education has a nascent awareness of its systemic nature and is beginning to address systemic problems.

Education expresses the desire to serve a changing world marketplace. Education is striving to redefine its form and function. Education is searching for the tools that will transform it. This thesis uses the System Development Template to discover and document the complex processes behind the evolution of systemic educational reform.

The disciplines of the learning organization (Senge, 1990) are an integral part of the System Development Template. They serve as a beacon providing a template and model developmental framework for discussion of systemic educational reform. Personal mastery, mental models, shared vision, team learning and systems thinking are the systemic organizational tools education must acquire. The disciplines of the learning organization provide the framework for the narrative of this thesis.

Systemic structure is the domain of systems thinking and mental models. At this level leaders are continually helping people see the big picture: how
different parts of the organization interact, how different situations parallel one another because of their common underlying structures, how local actions have longer term and broader impacts than local actors often realize, and why certain operating policies are needed for the system as a whole. (Senge, 1990, p. 353)

Lasting change will only occur if educators are willing to continue to question their current piecemeal practices and to replace them with more effective systemic initiatives. The fundamental metaphors and principles that guide and nurture the behavior and practices of school system staff will need to change. It is urgent that we successfully apply research findings and organizational behavior principles to school system problem solving situations (Murphy & Schiller, 1992). We must be willing to create a coherent, collaborative vision. We must also be willing to develop a new paradigm for schooling that redefines the form and function of education for the 21st Century.

Agreement builds today that societies no longer need to restrict themselves to adaptive reaction in response to evolving cultural values and unfolding world events. Society can act instead as a catalyst to consciously direct the forces of change toward the achievement of specific social goals and values on a moment to moment basis. The processes that mold a desirable technological society require the creation of a compatible educational system.

In times of rapid changes and massive societal transformations we should do more than maintain the status quo and we should be more than interpreters of what has been. We should take an active and creative role in societal development. After all, it is the education that we provide that defines the future by engendering and nurturing the beliefs, the values, the competence, and the behavior of future generations. (Banathy, 1991, p. 47)

Society begins to take a new proactive systemic stance. The increasingly technological and economically lagging American society seeks excellence and equity in the education of its youth. Education needs to consider taking up a central
position determining the normative definition of equity, setting high standards for excellence and establishing what values are crucial for society to uphold.

This chapter provided the System Development Template as a model that will facilitate the investigation and document the evolution of a new paradigm for schooling based on the quantum paradigm. The evolution of educational reform progresses as educators begin to practice the disciplines of the learning organization.

The following chapter closely examines the history of educational reform and chronicles the analogous development of a shared vision for education. A shared generative vision for education evolves through the synthesis of individuals, within the organization, practicing the disciplines of personal mastery and mental models. Chapter III, Vision Through Synthesis, describes the additive, synthetic influence of learning organization disciplines on the early evolution phases of educational reform.
CHAPTER III

VISION THROUGH SYNTHESIS

Synthesis describes the integration of separate elements to form a coherent whole. This chapter presents the separate elements that contribute to the synthesis of a shared vision for educational reform. This chapter describes the evolution of shared vision within the educational reform movement from a scientific and historical perspective. The System Development Template serves as the model to guide the discussion that chronicles the emergence of systemic educational reform.

The heuristic and hermeneutic functions of the System Development Template illuminate the progressive evolution of learning organization disciplines in education. The disciplines of personal mastery and mental models are antecedents for the emergence of shared vision. Use of the System Development Template shows that the practice of personal mastery and mental models provokes the educational reform movement to search for a shared vision. It also highlights the burgeoning influence of the scientific perspective on organizational development.

This chapter has three sections. Each section concentrates on describing the evolution of a single learning organization discipline. Each section examines and catalogues the development of learning organization disciplines following the System Development Template. Each of these sections has three parts. The three parts present a portrait of current evolutionary status, a dynamic portrayal of the evolutionary path, and a projection of where the process is heading.

The first section, Research–The Systemic Nature of Educational Reform, discusses the evolution of the personal mastery discipline (Senge, 1990). If education
desires to become a learning organization, it will become important that educators first research and recognize their systemic evolutionary role.

The second section, Reflection-The Evolution of Governing Paradigms, discusses the development of the mental model discipline (Senge, 1990). If education desires to become a learning organization, it will become important that educators next reflect on the influence that their paradigm allegiance has over the systemic process of evolution.

The first two sections outline the theoretical and abstract contributions of the systems science perspective. The systems science perspective is metaphorical and therefore figurative. The figurative disciplines, personal mastery and mental models, prepare the foundation for the evolution of the remaining disciplines. These two sections use the coarse focus spiral of the System Development Template to delineate the evolution of the figurative disciplines.

The third section, Revolution-The Historical Evolution of Educational Reform, discusses the arrival of the discipline of shared vision. This section uses the fine focus spiral of the System Development Template to document and classify pivotal events in the evolution of systemic educational reform. The historical perspective supplies concrete evidence that the educational system struggles to create a coherent shared vision (Senge, 1990) for the organization.

Research-The Systemic Nature of Educational Reform

This section provides scientific background information on the systemic nature of education and documents the repercussions this has for the educational reform movement. This section focuses attention on the elements that contribute to the evolution of personal mastery. If education has the desire to become a learning organization, it must first practice the discipline of personal mastery. Educators
urgently need to research and recognize the importance of their systemic participation in organizational evolution. Personal mastery, in this thesis, refers to the development of an accurate systemic perspective. This systemic perspective serves as the foundation for the evolution of systemic educational reform.

This section outlines the growth of a systemic perspective. A systemic perspective develops through the practice of the discipline of personal mastery. The first step in the development of a systemic perspective works to understand systems theory. The next step investigates organizational change theories and apply them to the problems facing the educational system. The third step recognizes that education faces systemic problems and requires systemic solutions.

Much of the work necessary to ensure the success of large-scale change, like educational reform, occurs before the innovations are in place. Senge (1990) said that the discipline of personal mastery continually clarifies and deepens personal vision. The practice of personal mastery leads to a focusing of energy, the development of patience and the ability to see reality objectively. It becomes imperative that individual educators recognize the systemic significance of their actions.

The development and practice of personal mastery, in an organizational sense, require an understanding of the organizational culture. Organizational personal mastery serves as a developmental self-discovery process that creates an evolving awareness, artfully blends the vision of individuals, and builds cohesion for the whole community.

Personal mastery nurtures the community cognition of systemic behavior that serves as a vital precursor in change readiness. Awareness is the first stage in a plan that facilitates the implementation of innovation. Fullan (1992) stressed the importance of this kind of readiness as a key dimension ensuring the success of educational reform initiatives. In summary, the resolution of the crisis of perception
begins as education acknowledge and appreciate its' systemic nature.

A Portrait of Systems Theory

Systems theory contributes an accurate picture of reality. Systems theory promotes the development and practice of the discipline of personal mastery. The construction of an accurate picture of reality requires an understanding of the types and classification of systems. The process of system evolution and the relationships of systemic feedback also provide important background to the following discussion of developmental system dynamics.

The Systems Continuum

Systems theory provides two important insights that further the understanding of system behavior. It is important that educators recognize that there are different types of systems and that each system is unique. "General systems theory is useful in understanding school district reform because it blends technical considerations with planning and behavioral support needed to change behavior" (Prince, 1992, p. 9).

"An understanding of the notion of differences in system types and its implications for educational inquiry is not yet appreciated by the educational community" (Banathy, 1991, p. 35). Banathy (1991) presented a series of dichotomous descriptions to illustrate the diversity of system behavior. His pairs of polar opposites typify and serve as models of generally accepted system behavior.

Figure 6 builds on Banathy's (1991) description of the boundaries, relationships, purposes, and number of variables that serve as general system characteristics. He presents four dichotomous characteristics that describe five classes of systems. Construction of a continuum for each dichotomy establishes a rank order of typical system behavior (see Figure 6). The system type with rigid
control predominates at one end of the spectrum. This numb, closed system behaves similarly to a machine and likewise restricts available environmental stimuli. Closed systems, like factories, are capable of simple, one-dimensional activity. The purpose seeking system, described by Vaill (1989), commands the other end of the continuum. The open, diverse and communicative nature of the learning organization provides an exemplar of this system type.

Figure 6. A Continuum for System Classification.

Figure 6 also illustrates a parallel application of the continuum that provides organizational exemplars for each system type. Educator John Goodlad (1987) pointed out that "schools differ markedly from factories; there is no useful place for the factory model when seeking to understand schools" (p. 9). The deterministic
system we have is not the purpose seeking system we desire.

**The Evolution of a System**

Organizations exhibit systems behavior. A review of the systems science literature documents that all systems share three fundamental properties: cyclical information exchange, stabilizing architecture, and operational boundaries (Katz & Kahn, 1966; Senge, 1990; Wheatley, 1992). Table 5 summarizes the properties that typify stable system behavior. Stable systems, like education, thrive in stable environments. Unstable environments cause problems for stable systems.

**Table 5**

Properties of Stable Systems

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iterative Events</td>
<td>Events tend to occur in natural iterative cycles. Information exchanges with the internal and external environment.</td>
<td>The waves of educational reform</td>
</tr>
<tr>
<td>Homeostatic Balance</td>
<td>Components of the system maintain a stable internal environment despite variation in the external environment. Homeostasis maintains a steady state.</td>
<td>Maintenance of the status quo for educational practice persists, despite strong, efforts to change the educational system.</td>
</tr>
<tr>
<td>System Integrity</td>
<td>Variance in system architecture leads to similar ends.</td>
<td>The variety of reform initiatives (centralization/ decentralization, equity/ excellence) that fail to sufficiently perturb the system.</td>
</tr>
</tbody>
</table>

System adaptation, a process similar to biological evolution, allows systems to maintain stability and achieve effective transactions with an unstable environment.
The success of a system in a given environment depends on the accuracy of incoming information, the degree of response flexibility, and the breadth of systemic inter-relationships. Misinformation, rigid control and isolation severely limit system adaptation. A system incapable of adaptation exhibits status quo behavior despite changes in the environment. Stable systems evolve toward equilibrium and stability under the old paradigm.

Systems behave differently under the new paradigm. The general system characteristics remain the same but the periods of equilibrium shorten. Disequilibrium brought on by rapid environmental change catalyzes evolution in responsive organizations. The increasing rate of environmental change selects for new more effective organizational behavior. The organizations that thrive under the new paradigm are more capable of change.

Nadler and Tushman (1991) defined effective organizational behavior as leading to higher levels of goal attainment, utilization of resources and adaptation. This definition defies stability and demands organizational growth and development. Organizational adaptation results in organizational evolution. How well an organization functions during periods of disequilibrium depends on its' evolutionary capacity. Evolutionary capacity and adaptation reflect organizational ability to change. Evolution accomplishes change.

A survey of classical thermodynamics provides insight into systems behavior that applies to organizational evolution under the new paradigm. Equilibrium, disequilibrium and entropy are powerful forces that influence system and therefore organizational evolution.

In classical thermodynamics, equilibrium is the end state in the evolution of isolated systems, the point at which the system has exhausted all of its capacity for change, done its work, and dissipated its productive capacity into useless entropy. At equilibrium there is nothing left for the system to do; it can produce nothing. (Wheatley, 1992, p. 76)
A system not actively engaging in adaptive evolution can only deteriorate. Prigogine and Stengers (1984) found that systems have an inherent tendency to "run down" or dissipate their energy. Entropy influences all systems, where entropy describes, "the process by which energy becomes distributed evenly throughout the system" (Betts, 1992, p. 39). The decaying influence of entropy facilitates system evolution. The process of evolution feeds off entropic energy exchanges. Entropy serves an important purpose maintaining a difference in energy levels between equilibrium and disequilibrium. A system breaks apart and dies, "when there is no longer a difference in energy levels among the subsystems or elements" (Betts, 1992, p. 39).

Information provides the unit of energy exchange for organizational adaptation. In thermodynamics, a system must be able to import energy across its boundaries or have the capacity to generate new sources of energy to continue to thrive. Likewise, an organization must be able to import information across its' boundaries to continue to prosper. Open systems can import and export information; therefore, they are capable of sustaining change. A closed system can not exchange information with the environment; therefore, it can not change and will not thrive during turbulent conditions.

The Second Law of Thermodynamics (Giancoli, 1991), which governs entropy and decay, influences system behavior. Entropy moves all systems toward the chaos state of increasing disorder. Systems evolving toward the open state are more capable of adaptation. Adaptation increases productivity during periods of disequilibrium and avoids decay.

To stay viable, open systems maintain a state of non-equilibrium, keeping the system off balance so that it can change and grow. They participate in an active exchange with their world, using what is there for their own renewal. Every organism in nature, including us, behaves this way. (Wheatley, 1992, p. 78)
The disorder that characterizes disequilibrium can be a source of growth. Successful systems use disequilibrium to avoid deterioration though growth and adaptation. Such dissipative structures actively evolve, leading to reintegration at higher levels of complexity. Evolving systems are flexible rather than stable during periods of disequilibrium. A system in equilibrium resists change.

Resistance to change comes because of self-regulation, which is the natural way any organized system maintains its very existence. Resistance to change is neither bad nor good; it is a fact. Resistance to change can be overcome by learning other characteristics and principles of systems that overcome self-regulation in a natural way. (Prince, 1992, p. 9)

Disequilibrium allows an organizational system to evolve toward a new equilibrium and continue to be productive. The disruption of equilibrium must precede growth. Disequilibrium creates the need for adaptation. An evolving organization achieves dynamic information balance through adaptation (Cleveland, 1994; Wheatley, 1992).

Information concerning changing conditions serves as the key ally for an evolving system. Isolation from access to external information locks a system in equilibrium.

Open systems depend on and are responsible to its habitat. Inputs are stimuli (provocation, motivation, positive feedback, incentives, prods, fears) which activate the system. Outputs are stimuli (reactions, products and services) that the system produces as a consequence of its nature. The system's responses are regulated by the system's norms. (Prince, 1992, p. 17)

According to the Living Systems Theory (Miller, 1978) all living systems maintain their effectiveness by processing information, matter and energy. The new paradigm places great importance on information processing. The following three information processing elements contribute to an organizations' ability to survive lengthening periods of disequilibrium: (1) the sensitivity to environmental information, (2) the ability to use information and (3) the response to information.

The viability of a system, or organization, depends on its' capacity to
command and use available resources. The ability of a system to maximize its resources determines the development of potential and evolutionary success. Access to information drives system evolution. The processing of information, the integration and dissemination of information and the regulation of evolution occurs through a systemic process Wheatley (1992) calls self-reference. Apparently, the process of self-reference assists systematic change in tumultuous environments. "In human organizations, a clear sense of identity-the values, traditions, aspirations, competencies, and culture- guides the operation" of self-reference (Wheatley, 1992, p. 94).

A system, or organization, simultaneously obtains information and articulates a response through the mechanisms of negative and positive feedback (see Figure 7). A simple feedback circuit models the relationship that exists between an organization and the surrounding environment. Organizations have the capacity to receive information (input) about the environment through strategically placed sensors. These organizational sensors function throughout the internal and external environment to filter information and relay it to the administrative control center of the organization.

This filtration process presents an analogy to the process of organizational adaptation described earlier. Information received by the control center, from the periphery, arrives highly processed and often distorted. The control center then integrates and coordinates the input to form the basis for administrative decision making. The outgoing information, or output, relays back through the organization to effector sites for an action response. Effector sites, like sensor sites, are distributed throughout the organizational periphery. Local effector sites are capable of responding to changes in environmental conditions. This feedback process models organizational communication.
Figure 7. Simple Feedback Loop.

Figure 8 distinguishes between two types of systemic organizational response. Positive and negative feedback describes organizational responses to changes in the internal or external environment. The negative feedback response acts to maintain equilibrium by defeating change; negative feedback always returns the system to the original state. The positive feedback response acts to create disequilibrium by sustaining change; positive feedback always pushes the system away from the original state.

The design limitations of the homeostatic control mechanism, restrain organizational growth and development. Negative feedback always defeats any innovation that initiates the response amplification characteristic of positive feedback. Homeostasis assures smooth, machine-like, system functioning at the expense of
organizational growth and development.

Figure 8. System Dynamics in Equilibrium.

Organizations locked in homeostatic feedback loops are incapable of the dramatic, explosive change required by the quantum paradigm. Change becomes a reality when systems accept positive feedback and begin to approach the state of disequilibrium (see Figure 9). The organizational transformation proposed by systemic educational reform, becomes a possibility only outside the limits of system equilibrium. Systemic educational reform serves a disruptive force that catapults system dynamics into the flux of disequilibrium. Unopposed positive feedback mechanisms present an amplification of change efforts, a synergy that makes
significant educational reform a distinct possibility.

An administrative mandate for educational reform, or innovation, often fails to surface in the periphery in the form that was originally transmitted. This occurs because of the process of adaptation. Once adaptation occurs the cycle begins again. The design of a system presents limitations to organizational growth beyond its predetermined boundaries. Feedback loops function to maintain system stability over time. The response, negative feedback, that emanates from the local organizational effector sites, serves to return system function to its original pre-stimulus state.
Negative feedback defeats change through its actions to maintain equilibrium. Equilibrium defines the relatively stable state that exists when a system operates within preset boundaries. In summary, systems in equilibrium defeat change and it follows that systems in disequilibrium invite change.

**Negative Feedback Stabilizes Systems**

Negative feedback aims at reducing deviation from stated norms and expectations. But when the norms and expectations change- as they do today in response to massive environmental changes and transformations, efforts to improve the existing outdated system become counterproductive. (Banathy, 1992, p. 48)

Negative feedback in social systems, like in biological systems, occurs in response to information that indicates the system heads in a direction that is away from homeostatic tolerances. Negative feedback presents the response that brings the system back to equilibrium. Negative feedback establishes a stable internal environment despite change in the external environment. Negative feedback signals violation of the wholeness of the system. Negative feedback hinders evolution.

Eric Jantsch (1980) in his book, *The Self-Organizing Universe*, established that negative feedback correction is a confirmation of the stability of the system. His description of negative feedback is enlightening for educators. Negative feedback indicates that outcomes deviate from original outcome expectations. It maintains the status quo to within specific boundaries. A system produces what it does by design. A mechanistic system, designed to create a certain outcome will expend tremendous energy to maintain the stable, efficient production of that outcome.

This is much like the current situation in educational reform. Reform is trying hard to perturb a rigid, stable mechanistic system into generating new outcomes. Although education continues to encourage new models for system outcomes, the current system design maintains the sanctity of equilibrium. The negative feedback
response diminishes and negates any significant deviation beyond the homeostatic limitations of the system (see Figure 8). Not surprisingly, conflict exists because the current system can not produce the outcomes we desire. The system model that is the theory-in-practice for most educators is mechanistic. It is a model of a closed, disconnected system, that commits to a unitary outcome. Machines are numb and exist in isolation from their surroundings. They are incapable of responding to changes in the external environment they can not sense. The problem is that educational systems are highly pluralistic with many conflicting goals that precipitate continual change in search of equilibrium. This paradox obstructs the evolution of educational reform.

Negative feedback guides small changes and piecemeal adjustments that will not suffice to transform education. Beer (1976) in the book, Platform for Change, stated that celebrating the stability of mechanistic structure leads to "tinkering with the parts" reform efforts. The hope is to mitigate the bankruptcy of the entire system by increasing the excellence and efficiency of the problem laden parts; however, independent improvement of the isolated components does not insure the quality of the whole.

Positive Feedback Changes Systems

Feedback that encourages the subsystem to continue what it is doing is positive, and discouragement is negative....Feedback is not to be confused with the gathering or examination of data. Feedback is the response that activates the self-regulation thermostat. (Schmuck & Runkel, 1987, p. 14)

"Positive feedback loops amplify messages- disturbance grows- asking to change, this moves a system forward" (Wheatley, 1992, p. 78). Positive feedback amplifies deviation and increases disequilibrium. Positive feedback calls for novelty and change. Positive feedback responds to environmental change by pushing the
system away from homeostatic balance (see Figure 9). Explosive cascades in nature usually indicate a disease process. Disease signals that system outcomes are traveling away from the stable condition and that the system is in disequilibrium.

This dysfunctional imbalance is essential to break a system out of equilibrium. This defines systemic change. Open systems capable of evolution, thrive on chaos and grow to achieve a new state. "Faced with amplifying levels of disturbance, these systems possess innate properties to reconfigure themselves so that they can deal with the new information" (Wheatley, 1992, p. 88). Closed systems facing positive feedback decay and malfunction, descending overwhelmed into chaos. Human organizations fall short of their goals when internal deterioration overwhelms the system. Prince (1992) compared this stiffening process to arthritis. Rigidification, not faulty dogma or ignorance, precipitates organizational descent and decay.

The two main sources of positive feedback in social systems, like education, are the environment and the people within the system. The steady decline of educational achievement, despite reform efforts, diagnoses dysfunction in the existing system. Positive feedback allows a system to achieve the disequilibrium necessary for evolution. If the system is sensitive to changes in the environment, the system will reconfigure itself to adapt to the changes in the environment. Positive feedback is a systemic attempt to jump out of stability to achieve a new level of functionality for the entire system. Positive feedback "leads to rethinking education, redefining its societal functions, re-visioning its image, and recreating it by design" (Banathy, 1992, p. 52).
Every time we measure something we interfere. A quantum wave function builds and builds in possibilities until the moment of measurement, when its future collapses into only one aspect. Which aspect of that wave function comes forth is largely determined by what we decide to measure. (Wheatley, 1992, p. 62)

The Heisenberg Uncertainty Principle (Giancoli, 1992) applies to the analysis of the developmental behavior of systems. It states that the more an observer knows about the energy of a particle, the less able they are to delineate its position. The organizational corollary infers that the investigation of the structure of a system negates the role of performance, and that the evaluation of performance tends to neutralize the role of structure. This quantum physics parallel highlights the measurement and evaluation dilemma of system dynamics. It also clarifies the image of evolution from a scientific perspective.

Staying within the frame of reference of the existing system and focusing on its problems hinders the re-imaging of education. It presents a barrier to going beyond the boundaries of the system, exploring what is desired, creating a new image, and realizing that image by design. (Banathy, 1991, p. 47)

Energy is necessary to jump a particle from a simple stable state to a more complex stable state. The states described by quantum mechanics are unpredictable. They are discretely separate rather than predictable and linear. This quantum mechanics description of particle behavior holds true for the dynamics of system evolution. The perspective of the quantum paradigm indicates that nature reflects itself at all levels.

Similarly, to achieve a higher state, an evolving system must jump to the next level of complexity. According to the quantum paradigm evolution is not a gradual climb. Change must be drastic and complete. Multiple processes and events occur simultaneously creating a fabric of social interactions. Discrete regions seem to undergo transformation at once. The intertwining of mutually beneficial events
further the cause of development and the unraveling of opposing events obstructs evolution. The System Development Template models this staircase effect (see Figure 10).

![Figure 10. A Comparison of Quantum vs. Linear Models for Evolution.](image)

Steven Jay Gould (1977) asserted that the Darwinian argument for gradual evolution stems more from a standpoint of scientific tradition than from observation. Charles Lyell's (1865) theory of a gradual reformulation of geological history heavily influenced Darwin. Gould's (1977) support of catastrophic transformation, as the mechanism for evolution, aligns with contemporary physics.

The quantum paradigm explains system behavior differently than the industrial paradigm. Educational reform envisions that the industrial paradigm dictates system dynamics. This world view models how education orders the universe. It constrains evaluation and measurement. It blunts the effectiveness of reform initiatives. The following example illustrates the fundamental reform dilemma.

The industrial paradigm dictates the mechanistic, closed system behavior of an
automotive tool and die shop. The factory system functions under a design that detects malfunction. Excision and replacement of defective parts maintain a smooth manufacturing process. The replacement of factory system parts neither alters the process nor changes the product. However, if the tool and die workers decide they want to make custom Persian rugs they will need to do more than just change the fender machine. Why is the resilience of a closed system so intuitive and obvious in this example?

Piecemeal efforts ineffectively transform a machine shop into an art studio. Yet we are unable to see the folly in repeating attempts to gradually reform education using replacement parts. Systemic change means change the system, change the whole frame of reference. Brandt (1993) defined systemic change as "changing the system of rules, roles, and relationships that govern the way time, people, space, knowledge and technology are used and deployed" (p.8).

Change in one component of a system affects everything else in that system. All the various pieces in a system must align toward the achievement of common goals. O'Neil (1993) quotes Michael Fullan, Dean of Education at the University of Toronto:

Systems thinking is not the mere articulation of one element of a big system to another element. It's the recognition that the elements dynamically interact. Systems thinking leads a school to be capable of really dealing with change on a continuous basis. (O'Neil, 1993, p. 11)

Current educational reform initiatives leave some system components constant. The pieces that reform does not affect will generate enough negative feedback to drag the school back to the old system. O'Neil (1993) called this the "American Twist" (p. 10). Organizational recoil, at the local, state and national level, follows the wrenching struggle to change. America's unique political structure and traditions force the drive for systemic change to ironically continue unsystemically.
The United States currently has no centralized education program. The orchestration of educational policy making is not yet cohesive. Policy layers regulation on top of existing laws after deliberation and compromise. Educational policy provides short-term solutions to each problem, one at a time. Solutions just in time for elections are not conducive to long-range systemic strategies for changing schools.

The industrial paradigm confounds current systemic reform. The current model for education frustrates reformers. Reform will not alter outcome without a change in the machine model. Negative feedback eventually will negate any effort at reform. It is the outcome model that fails to meet expectations. In this situation, Jantsch (1980) said that an increase in deviation is necessary to achieve a new system state.

Information is the fuel that fires deviation. Information provides the energy for the Information Age. Personal mastery proclaims the importance of "learning how to see current reality more clearly" (Senge, 1990, p. 141). The practice of personal mastery leads educators to research and appreciate the quantum nature of systems behavior. The practice of personal mastery is the first step toward becoming a learning organization.

A Portrayal of the Systemic Problems Facing Education

The portrayal element of the System Development Template presents pertinent historical background illuminating the evolution of personal mastery. This section delineates how the historical interpretation of organizational change leads to the identification of systemic problems facing education. The development of an accurate systemic perspective depends on seeing problems as opportunities. The practice of personal mastery requires holding the creative tension between what we have and what we want.
The Institute for Future Studies at Macomb Community College presents five predictable shifts in strategic context that provide a platform for organizational change. Banach and Lorenzo, in their 1993 monograph, *The Emerging Context for Life in America: Toward a New Model of Thinking and Planning*, present the following characteristics of the Information Age:

(a) factors external to the organization are becoming the dominant drivers of fundamental change, (b) public opinion is having an increasing impact on organizational success, (c) quality and effectiveness are replacing quantity and efficiency as the primary measures of organizational performance, (d) employee attitudes will become more critical to organizational potential, and (e) organizational constituencies are becoming larger in number and more heterogeneous in composition. (Banach & Lorenzo, 1993, pp. 29-30)

Management consultants state that the uncertainty that characterizes the transition to the Information Age creates organizational uneasiness. Banach and Lorenzo (1993) described the importance of this discomfort: "while this appears to be an undesirable state, it has the positive effect of forcing organizations to rethink their purpose" (p. 30). Organizations are beginning to abandon the product orientation of the Industrial Age. They are evolving toward the process orientation of the Information Age. It will no longer be possible for an organization to cling to the rules and policies of the past. The rules and policies of the past no longer serve as timeless guideposts.

Even a cursory analysis of American enterprise indicates that a majority of organizations are either at the cusp of or solidity within the maturity stage of their life cycle. As a result, these organizations face two imperatives: they must determine how to assure continuous improvement in quality, climate, and overall performance; and, they must continuously adapt to changes in the external environment. The continuous nature of these foundation strategies can only be achieved with a process model. (Banach & Lorenzo, 1993, p. 32)

Futurists like William J. Banach and Albert L. Lorenzo (1993) recommended that mature organizations accommodate the coming trends. They proposed that organizations enhance and adapt their classical, industrial approach to strategic planning in the following ways:
(a) the planning model needs to emphasize process over product, (b) organizations must develop a clear sense of purpose by understanding their relationship to the larger social system, (c) organizations must devote greater effort to measuring their effectiveness and improving quality, (d) employee attitudes must be monitored systematically and objectively, (e) to accurately determine the external forces triggering the need for change, organizations must strengthen their ability to scan both the local and global environments, (f) the environmental scan must be designed so as to reflect the expectations of multiple and diverse constituencies, (g) the strategic planning process must include a means to monitor and influence public opinion, and (h) for mature organizations, the planning process must provide a basis for continuous improvement and continuous adaptation. (pp. 32-34)

Organizations discover that they must be proficient at adaptation and innovation to survive in this unstable and mercuric environment. Peter Drucker (1989) in his book, The New Realities, was among the first to champion the approaching monumental paradigm shift. He distilled this complex evolution down to two major issues that the United States must face as it unfolds: (1) the change in the global economy and (2) the effect this has on education.

Historically, education sets a precedent of service to society. The developmental role of education in contemporary society serves as the opening discussion and preamble for this section.

There are few, if any, social problems for which explanations and solutions do not in some way involve the school- involvement that may be direct or indirect, relevant or irrelevant, small or large. After all, the argument usually runs, the school is a reflection of our society, as well as the principle vehicle by which it's young are socialized or prepared for life in adult society. (Sarason, 1971, p. 7)

The educational reform process cycles between experimentation and adaptation. Schools struggle adjusting to the increasingly diverse demands of an evolving industrial society. Education rises to the challenge and attempts to equip citizens to support our burgeoning technological society. Educational reform, in America, parallels wave after wave of social reform. Educational reform has an extensive record of reactive but transient change.
The explosion of social change during the early 1900's originates in the economic and technological transformations of the Industrial Revolution. The compelling societal need for masses of urban workers transformed the structure and function of American education. This reactive pattern persists today. Tumultuous political, social and cultural struggles, beginning during the middle of this century, such as the Cold War and the Civil Rights and Feminist movements, continue to be central to the dynamics of current educational reform. Education responds to societal pressure by attempting to improve excellence and equity. The educational reform process oscillates through repetitive cycles of innovation and legislation.

Change Is the Developmental Stimulus

An ever changing, continuous identity is often called growth. Growth involves a paradoxical relationship between identity and change, the organism and its' environment.... Not only individuals grow but communities and organizations also grow and such growth is called history. The essential trait of growth is the combination of change and continuity. The essence of history may be what is called significant change. (Wheeler, 1980, p. 100)

Change creates the history of our nation. Change provides the existing educational institution ample opportunity for positive growth toward emerging societal goals. Yet there is no historical evidence of enduring change in American education beyond the innovations made at the turn of this century. The developing paradox between persistence and change perplexes educational reformers.

Aristotle defined change as the passage from potentiality to actuality. The recent history of educational reform lacks progress toward improvement. The potential of educational reform exceeds its' actualization.

To confuse change with progress is to confuse means with ends. Keeping those ends in mind, informing as they should the means in the most pervasive ways, is a responsibility that too often fades into the background in the turmoil of change. The means become ends in themselves and therefore, the more things change the more they stay the same, or worse. (Sarason, 1990, p. 8)
Change in American education during the last half of this post-Industrial era consists of a litany of quick fixes. Reform by continual replacement generates stagnant complaisance.

Too many changes for the sake of change tend to leave the members within a system confused. Change happens around them in circular patterns rather than across the systems members. Too often, educators ignore input and feedback from the system's members. Limited progress toward respect of human capability seems to keep organizations resistant toward change. (Wheeler, 1980, p. 99)

Certain abandonment initiates a decay spiral that restores the status quo. Once an ameliorating piecemeal effort reduces community pressure to change, the system reverts to its original condition. Society observes patterns of change that do not reflect the complexity of the schools. Reform by replacement does not account for the systemic operation of the school. Reform by replacement neglects to include an integrated strategy. Most new programs layer on top of existing programs rather than develop the shared vision for their redesign. New stresses pervade and destabilize the educational environment prompting the old familiar culture to envelop and smother the new.

Educational reformers have trouble understanding that change by legislative fiat or policy pronouncements from on high is only the first and the easiest step in the change process, a step that sets in motion the dynamics of problem creation through problem solution. Content to remain on that first step, ... they confuse a change in policy with a change in practice. (Sarason, 1990, p. 101)

Evidently the institution of education has the desire and resources to change but neither the motivation nor the effective means. The predominance of event mentality in American education, "tells people that the name of the game is reacting to change, not generating change" (Senge, 1990, p. 231).

Education faces problems with systemic proportions. Examination of recent ineffective cyclical reform efforts begins the development of personal mastery. If education needs to change, then educators with the desire to promote change will
need to work toward a more systemic reform perspective.

The Impasse in Educational Reform

Two problems maintain the current intractable impasse in educational reform. Reform is blind and impulsive. Educational blindness exists because of the lack of a systems perspective. Education fails to recognize the broadening gap between the current state of education and the rapidly changing society. Education exhibits impulsive behavior. Education endeavors to change and improve a complex system without first understanding the fundamental truths that govern the behavior of social systems.

Robert Frost (1978) said, "Two roads diverged in a wood- and I- I took the one less traveled by, and that has made all the difference" (p. 341). Education approaches a critical crossroads. Systemic reform provides the road that makes the difference.

The design road is the road less traveled by the educational community, but once taken and followed, it will become a journey to create the future and not just retrace the past. The educational reform movement is not out of the woods yet. It stands at a juncture where it can either continue on the well-traveled road of improvement or select the less-traveled road of systems design. (Banathy, 1991, p. 173)

A vital turning point exists that requires transformation of both the form and function of American education. Our current model of the educational system creates distortion that impedes the change process in educational reform. This precipitates an identity crisis in education. A crisis of perception misdirects educational reform. Reigeluth and Garfinkle (1994) insisted that, in order to assure that changes occur, educators must transform the way they think about the educational change process.

A true systemic model of education needs to evolve to facilitate the evolution of such wholesale change.
Advocates of "systemic change" or "systemic reform" believe that no amount of fine-tuning will result in large numbers of schools capable of reaching future demands. Instead, they assert, the education system itself must be rebuilt to support, encourage- and demand- that schools meet new, higher standards of performance. And that, experts say, will entail turning a fundamentally conservative public institution into one able to continually transform and renew. (O'Neil, 1993, p. 10)

Practice of the discipline of personal mastery (Senge, 1990) leads educators to conclude that the scientific perspective behind educational reform must evolve. Observation of educational reform over time uncovers a perspective that fails to explain and address the lack of coherent vision. Practice of personal mastery accumulates evidence that current scientific models encourage misinterpretation of the educational system. Personal mastery provides the source of a new vocabulary and understanding that place new mental models within our reach. Personal mastery leads to the acceptance of new paradigms to fuel the evolutionary process. Successful educational reform will be comprehensive and will be capable of generating purposeful change. Inside and out, education needs drastic reform to effectively adapt to the rapidly changing societal environment. Historical patterns demonstrate that systemic reform is necessary for education to sustain and support the evolution and maturation of society.

A Projection for a Systemic Solution

Both the level of external and internal turbulence and the absolute growth have become significantly greater than in the previous era. ...Organizational flexibility is at a premium, the ability to learn as an organization, call to engage in continuous organizational design/redesign. (Banathy, 1992, p. 128)

Examination of the development of scientific thought draws parallels that establish the learning organization as the evolutionary beacon for educational reform. We embark heading in the direction of systemic reform. Educators must first practice personal mastery and examine the science behind their mental models. An accurate
scientific perspective alters the perception of what is means to be a system.

The improvement of quality is the fundamental purpose of educational reform. Systemic improvement occurs when the system design optimizes systemic relationships. Systemic reform honors the relationships between participating system elements and between the whole system and environment. The current restrictions of a closed, mechanistic educational system preclude significant improvement. "In general, this means designing a system that is more open, organic, pluralistic and complex" (Betts, 1992, p. 40).

Banathy (1991) prepared a list of the ideal contingent qualities for an educational system to actively engage in systemic reform. Systemic reform happens when educators learn from experience. The practice of personal mastery encourages educators to act on experience and reframes the design of future educational systems. Systemic reform results from organizational learning. The ideal educational systems of the future will be learning organizations with the following attributes:

(a) it interacts with constantly changing, multiple environments and coordinates with many other systems in the environment, (b) it copes with constant change, uncertainty and ambiguity while maintaining the ability to co-evolve with the environment through transformation, (c) it lives and deals creatively with change and welcomes- not just tolerates- complex and ambiguous situations, (d) it becomes an organizational learning system, capable of differentiating among situations where maintaining the organization by adjustments and corrections is appropriate(single loop learning) and those where changing and redesigning are called for (double loop learning), (e) it seeks and finds new purposes, carves out new niches in the environment and develops increased capacity for self-reference, self-correction, self-direction, self-organization and self-renewal, (f) it recognizes that continuing knowledge explosion requires two prolonged increases in specialization and diversification and integration and generalization, and (g) it increases the amount of information it can process, processes it rapidly, distributes it to a larger number of groups and people, and transforms the information into organizational knowledge. (Banathy, 1991, p. 80)

Systemic educational reform flows logically from the diligent practice of personal mastery. Personal mastery establishes an awareness of the systemic problems facing education. Educators that accurately identify the systemic nature of
their organization also recognize the need to concomitantly alter their mental models. Systemic reform happens upon reflection. The accumulation of scientific evidence identifies the decline and the demise of the industrial paradigm. Reflection on the scientific evidence indicates the rising influence of the quantum paradigm. The practice of the discipline of mental models focuses attention on the evolution of paradigms. The resolution of the current crisis of perception will stem from the practice of this next discipline.

The educational system is not an abstract machine. It is people. To change a system is to change what those people value, where they think they are headed, what they talk about, how they talk to one another and what they do day to day. It is to change the policies that give the system direction, and the rules and regulations that specify how individuals work and what they work on. It is to change how the system is managed and how it inspires or crushes initiative and creativity. It is to create new incentives and disincentives, new norms, new cultures, new forms of leadership. In short it is to change every aspect of the system. (Education Commission on the States [ECS], 1992, p. 4)

Reflection—The Evolution of the Governing Paradigms

Senge (1990) described mental models as the entrenched assumptions and generalizations that influence how we understand the world and how we take action. He stated that the transformation of mental models begins with self-study. A reflective environment, where conversations balancing inquiry and advocacy commonly occur, nurtures self-study. This balance encourages people to expose their own thinking effectively and makes thinking open to others. This environment fosters the practice of the discipline of mental models.

The leaders have already adjusted their world view and accommodated themselves to the change they are proposing. More, importantly, they can see how they will succeed, or at the least survive, after the change has taken place. They can put what they are suggesting into a broader context and are comfortable that they understand most of the predictable ramifications of the decision to change. They have been able to adjust their mental model of the world to accommodate what they are proposing. ...Readiness activities are those that allow participants in fundamental change to have the opportunity to reshape their mental model, their world view, to accommodate the proposed
changes, and, most importantly, to understand how they will be able to survive and succeed in the new environment. (Conley, 1993a, p. 12)

The evolution of the practice of mental models controls the future of educational reform. Analysis of the scientific assumptions and generalizations guiding educational reform provides an explanation of its' cyclical and ineffective behavior. Individual beliefs powerfully influence organizational behavior. If education desires to design reform initiatives that will sustain change, it will be necessary that educators engage in reflection on the mental models guiding their behavior.

This section provides the framework of scientific information necessary to examine evolution of paradigms. The System Development Template serves as the model guiding discussion of two conflicting organizational paradigms. These two paradigms, or world views, influence the direction of educational reform. The industrial and the quantum paradigms form the foundation for the mental models guiding educational reform. Reflection on the evolution of mental models governing educational reform results in the realization that there is a paradigm revolution underway. Description of the evolution of the mental models discipline unfolds in three steps.

The first step paints a portrait of the two organizational world views by describing the scientific perspective at their roots. This step compares and contrasts the Newtonian mechanics of the industrial paradigm with the quantum mechanics of the quantum paradigm (Giancoli, 1991). The second step establishes the historical framework for these influential paradigms by outlining development of organizational behavior. This step compares and contrasts the mechanistic, industrial behavior of the Taylor factory model with the holistic, organismal behavior of the Senge learning organization model. The third step projects the effects these two paradigms have on
organizational change. This step compares and contrasts the environmental relationships and the loci for change for each paradigm.

Practice of the mental models discipline leads to an understanding of the science behind our organizational behavior. A declining industrial paradigm currently guides educational reform. New science and the quantum paradigm hold a brighter future for educational reform.

A Portrait of Organizational World View

We as social scientists are trying hard to be conscientious, using the methodologies and thought patterns of 17th Century science, while the scientists, traveling away from us at the speed of light, are moving into a universe that suggests entirely new ways of understanding. (Wheatley, 1992, p. 141)

Reform in education appears transitory and ineffective due to short term, mechanistic thinking. Educational reform activity seems prodigious yet indecisive. The reform movement stumbles, making minimal progress in 50 years. Educators employ research and evaluation methods with logic that no longer seem appropriate for the times. The logarithmic rate at which current systems experience change looks alarming in contrast to the linear pace that characterized change at the turn of the century. We enter a paradigm shift.

The industrial paradigm originates from the physics of Newtonian mechanics. This machine-like view of the universe guided organizational behavior since the Industrial Revolution. This industrial paradigm evolves as the scientific perspective behind it evolves. New science, the physics of quantum mechanics, emerges to take the helm. The rising quantum paradigm rewrites many of the scientific laws that govern organizational behavior. The new holistic paradigm ushers in the Information age.

Those who look through the lens of the previous era see their own reality very
differently from those who use the lens that the new era has crafted. This change between two world views is often called a "paradigm" shift. (Banathy, 1992, p. 3)

The expanding scientific information base presents a different view of the way things work. The quantum paradigm explains an unstable external environment where analytical methodology and mechanistic piecemeal solutions become obsolete. Comprehension of the rapidly vacillating, unpredictable nature of the universe, science now informs us, requires the new philosophy of chaos theory.

Chaos influences organizations. It becomes critical that an organization retain clarity about its purpose to continue to travel toward a distant point. It is axiomatic in chaos theory that you can never tell where a system is heading unless observation persists over time, so purpose and vision become the guiding principles for the new Industrial Revolution. It is through the steadfastness of purpose, not hands-on-control and manipulation, that we create the responsiveness and flexibility organizations require to thrive on the brink of chaos.

This foreshadows the importance of shared vision under the new paradigm. Effective organizational dynamics under the influence of the rising quantum paradigm require a cohesive vision. This vision emerges after the realignment of organizational mental models. This section next describes the characteristics of the competing paradigms that influence organizational mental models.

As long as we keep purpose in focus in both our organizational and private lives, we are able to wander through the realms of chaos, make decisions about what action will be consistent with our purpose, and emerge with a discernible pattern or shape to our lives. (Wheatley, 1992, p. 135)

Examination of the evolution of contemporary scientific thought becomes increasingly important during turbulent times. Science indirectly determines the rules that all organizations within society must play by. Paradigms evolve according to the laws of science, as we interpret them. Industrial organizations listen carefully to the
scientists of the quantum era and begin to change their behavior. Science dominates this technological culture. For society to flourish, educational practice must continue to evolve in parallel with the needs of industry. To accomplish this, educational reform must persist in looking to industry as a template for new behavior. It will be easier to convince our failing educational institutions that fundamental changes are necessary if we can give our position a sound scientific basis.

**Newtonian Mechanics and the Industrial Paradigm**

The dominant world view of the universe began with the events responsible for the Industrial Revolution. This industrial paradigm explains the universe as a vast, cosmic machine. The French mathematician, Descartes, was the first to assert a machine analogy for the material universe (Capra, 1982). This paradigm, dominant since the 17th Century, explains all observable phenomena using the isolation, arrangement and movement of component parts. The broad acceptance of this mechanistic model of the universe is due largely to the work of the English physicist, Sir Isaac Newton (Capra, 1982). A machine model paradigm is an ideal match for an emerging industrial society. The Newtonian paradigm aptly explained the system behaviors observed at the time. The Newtonian paradigm was appropriate for the Industrial Age, given the linear rate of external change.

Reductionism, a derivative of Descartes' original mathematical logic, directly follows to support and explain the mechanistic nature of the universe (Capra, 1982). Reductionism is hallmark to the linear logic still operational in most contemporary scientific thought. This analytical method constructs truth, what Descartes designates as absolute and scientific, from a sequential arrangement of often disparate ideas. It also assumes that cause and effects are observable at the same time.

Reliance on the Cartesian absolute nature of scientific truth and the
mechanistic Newtonian universe is still widespread in the scientific community and spills over to influence society (Capra, 1982). Adherence to Cartesian logic and Newtonian physics fragments the fundamental thought processes recognizable in many academic disciplines, including education (Bohm, 1979, 1981).

Ascribing to the clockworks philosophy of Newtonian physics has several ramifications that powerfully influence and limit the ability of its followers to respond and adapt to rapid change (Wheatley, 1992). Three fundamental Newtonian tenets weave through the history of scientific investigation; self-assertion, that man has dominion over the machine; the idea of interchangeable parts, and the supremacy of equilibrium.

Self-assertion falsely elevates the power and the control the human race has over the universe. The idea of interchangeable parts simultaneously conflicts with self-assertion. It diminishes the potency of each human. The individual cogs and wheels of a machine are replaceable. When the machine malfunctions, the parts are to blame and become refuse. Accordingly this philosophy contributes to the waste of personnel. It leads to an isolationist style of operation that rewards competition over cooperation (Wheatley, 1992). Bellah, Madsen, Sullivan, Swidler, and Tipton. (1985) commented on the pervasive isolationism in the American culture. They presented a picture of the American culture where the preservation of our individual and organizational boundaries expresses individualism to the extreme.

When man is in control of the machine, the machine has no need for feedback or communication with its environment to improve performance. Man strives for optimum productivity in isolation while maintaining an equilibrium that assumes external stability to thrive. The Newtonian paradigm abhors chaos and is ineffective at adapting to change.

Excessive self-assertion manifests itself as power, control and domination of
others by force. Our science and technology are based on the 17th Century belief that an understanding of nature implies domination of nature by man. Combined with the mechanistic model of the universe and excessive emphasis on linear thinking, this attitude has produced a technology that is unhealthy and inhuman; a technology in which the natural, organic habitat of complex human beings is replaced by a simplified, synthetic and prefabricated environment. (Capra, 1982, p. 44)

Together these inflexible, dogmatic beliefs create a philosophical dilemma that severely impedes the ability of a society to respond to a rapidly changing external environment. Albert Einstein (Einstein & Infeld, 1938) said that our theories and beliefs determine what we measure. For decades, scientists ran experiments that would defy classical physics, yet no one saw the truth in these experiments. This contradictory data eventually provided the information leading to the revolutionary theories proposed by 20th Century physics (Kuhn, 1970).

Early in this century, Einstein initiated the innovative developments in modern physics that undermined the disassociation principles characteristic of the Newtonian world view. Throughout his life it was Einstein's deepest belief that a mysterious connection exists between art and science that creates inherent harmony and interconnection in nature. This holistic philosophy influenced his theory of relativity and formed the common framework unifying what has become known as quantum physics.

**Quantum Mechanics and the Organismal Paradigm**

The conceptual revolution in 20th Century physics reveals the flaws in the mechanistic view of the universe. The quantum universe is not a machine, "but appears as a harmonious, indivisible whole; a network of dynamic relationships that include the human observer and his consciousness in an essential way" (Capra, 1982, p. 47). Advances in quantum physics prepare the way for the evolution of a more organismal paradigm. The organismal paradigm emerges to eclipse the industrial
paradigm. The quantum science that exists behind the new organismal paradigm reflects the polar opposite of Newtonian science. New science and the new paradigm celebrate relationships and systems thinking. Quantum mechanics defies Newtonian laws illustrating that there is no absolute truth in science, only uncertainty.

A quantum universe is enacted only in an environment rich in relationships. Nothing happens in the quantum world without something encountering something else. Nothing is independent of the relationships that occur. I am constantly creating the world-evoking it, not discovering it-as I participate in all of its many interactions. This is a world of process, not a world of things. (Wheatley, 1992, p. 68)

The major themes in contemporary physics demonstrate the complementarity and wholeness in nature. This new science, as Margaret Wheatley (1992) called it, is similar to the organismal, ecologically sensitive viewpoint of the ancient mystics before the Industrial Revolution. The organismal paradigm provides the scientific background indispensable to the holistic cultural changes in attitudes and values imperative for modern society.

To live in a quantum world, to weave here and there with ease and grace, we will need to change what we do. We will need to stop describing tasks and instead facilitate process. We will need to become savvy about how to build relationships, how to nurture growing, evolving things. All of us will need better skills in listening, communicating, and facilitating groups, because these are the talents that build relationships. (Wheatley, 1992, p. 38)

The universe is participative, rich in the processes that nurture growth, coherence, individuality and community. Diverse interconnections and a myriad of interrelationships characterize a multilevel network of systems. This network functions much like a biological organism. Under the organismal paradigm organizations function in a holistic fashion analogous to biological systems. This leads to the organizational development of systems thinking (Senge, 1990).

Quantum mechanics also questions the desirability of the state of equilibrium. In classical physics, the second law of thermodynamics states that equilibrium is the end state in the evolution of isolated systems. Equilibrium is an exhaustion point, the
point at which a systems capacity for evolution and change dissipates.

Prigogine and Stengers (1984) stated that equilibrium is not the goal of living systems. Living systems are open systems and function as partners with the external environment using disequilibrium to avoid the deterioration and decay characteristic of entropy. Under the organismal paradigm systems are unstable in contrast to the stable systems of the mechanistic paradigm.

To stay viable, open systems maintain a state of non-equilibrium, keeping the system off balance so that it can change and grow. They participate in an active exchange with their world, using what is there for their own renewal. Every organism in nature, including us, behaves this way. (Wheatley, 1992, p. 78)

Self-reference and self-renewal are information feedback mechanisms characteristic of biological, self-organizing systems (Wheatley, 1992). They facilitate orderly change in a turbulent environment. However, a system can only exist in such a fluid fashion if it has constant access to information. Information, concerning the status of the internal and external environment and availability of internal and external resources, drives adaptive evolution. Positive feed-back loops amplify signals, as the disturbance grows the demand for adaptation increases and the system evolves, progressing forward.

It must constantly process this data with high levels of self-awareness, plentiful sensing devices, and a strong capacity for reflection. Combing through this constantly changing information the organization can determine what choices are available and what resources to rally in response. (Wheatley, 1992, p. 91)

Feedback and self-reference are the best reasons of all for leaving behind the clock-like world of Newton and the industrial paradigm. Organizations that become adept at self-reference can identify and claim their birthright as living, open systems. Living, open systems thrive on autonomous iterations and chaos. Organizations that ignore the supremacy of the emerging organismal paradigm will remain lifeless. Closed, mechanistic organizations can do no better than stagnate at equilibrium. If
education desires to survive the paradigm shift, it must trust the workings of chaos. The mental models governing educational reform are due for a change. The guidance of the flexible, fluid tenets of the organismal paradigm sustain the evolving purpose of educational reform.

This seemingly risky and radical proposition may be the last chance for education. There do not seem to be many other alternatives left. The time for a transformational change may be right. After all, Winston Churchill is thought to have said that America always does the right thing, but only after it has exhausted all the other alternatives.

A Portrayal of Organizational Behavior

Unfortunately, the "mind set" of the fragmented and classical scientific orientation- is the dominant conceptual framework that has guided educational improvement movement for the last decade. It manifested itself in a piecemeal and incremental, disjointed, "tinkering with parts" approach to educational improvement. It has failed to connect and integrate the various so-called solution ideas that have emerged into an internally consistent system of solutions. It has focused on the existing system and stayed within its boundaries. At best, it stipulated changes at the margin. It has failed to recognize the complexities of the current issues surrounding education as a social system. (Banathy, 1992, p. 8)

Educational reform attempts to prod a decaying mechanistic system to rise to a higher level of quality and productivity. The past fifty years of reform initiatives indicates that the best the current educational system can manage, in spite of tremendous effort, is the maintenance of equilibrium. Historically, things stay the same in education because things can not change. The culture of education continues to operate under the detrimental and limiting influence of the industrial paradigm.

American corporate culture is beginning to accept and embrace the organismal paradigm. History illustrates that where industry goes education will soon follow; educational reform is lagging behind corporate transformation only for the moment.
Discussion describing the influence the Newtonian and Quantum scientific paradigms have on organizational behavior follows below. This section compares and contrasts two examples of organizational behavior that clearly reflect the influence of scientific paradigms. The industrial organizational behavior Frederick Taylor (1911) presented serves as the foundation for the first example, which I shall refer to as the Taylor model. The Taylor model reflects the mechanistic influence of the Newtonian paradigm. The systemic organizational behavior presented by Peter Senge (1990) serves as the foundation for the second example, which I shall refer to as the Senge model. The Senge model reflects the holistic, organismal influence of the Quantum paradigm. This section compares and contrasts the effectiveness of these two models as designs for the organizational behavior of contemporary education.

The old design worked relatively well for the society it served; it brought schooling to millions of immigrants whose skills and conformity were needed to stoke the engines of the industrial society. Today's society no longer requires such a work force. We need people who can think creatively and solve problems using information and technology. (Banathy, 1991, p. 15)

Foster (1992) described the machine as the most popular metaphor for school organization and established that the most widely used technologies of management are still mechanistic in nature. The Taylor (1911) model describes the development of the current dysfunctional state of organizational behavior in education. The Senge (1990) model describes the current style of organizational behavior that most innovative corporations are striving to develop toward. They struggle for evolutionary supremacy in contemporary education reform.

Industrialistic/Mechanistic Taylor Model

Tyack (1974) described the dramatic shift in the American educational ideal that occurred during the early part of this century. The shift in educational ideal
paralleled the rise of the industrial paradigm. During this volatile era, the agrarian paradigm was in decline. Concomitantly educational needs shifted from private schools to public schools. The purpose of private schools was to secure for elite students intellectual mastery of core academic subjects. The purpose of the emerging public schools was to produce workers adjusted to vocational roles (Marshall & Tucker, 1992). Under, what was then, the new industrial paradigm, clearly defined vocational roles became vital to the developing industrial economy. In a space of less than 20 years, American educators undertook a monumental task and built a school system based on the Taylor model of industrial mass production (Tyack, 1974).

The roots of the Taylor (1911) model are deep within Newtonian science. The fundamental fruit of this model is that isolation improves understanding. The purpose of Taylor's scientific management was to determine how to accomplish tasks at the highest level of quality for the lowest cost (1911). The organization focuses on task accomplishment (Marshall & Tucker, 1992). Bill O'Brien, CEO of Hanover Insurance, described this traditional, authoritarian industrial dogma as dysfunctional. Managing, organizing and controlling are symptoms of diseases of the hierarchy that thwart organizational learning. They also lead to organizations that fail to be responsive under shifting conditions (Senge, 1990).

This educational development model, however, conforms ideally to match the needs of the emerging smokestack economy. Application of the Taylorian (1911) principles of mass-production to education generated the high-quantity education necessary to create a low-skilled, compliant work force for industrial mass-production. Education and business form a tight, highly effective supply and demand system.

Franklin Bobbitt (1916), an instructor in educational administration at the University of Chicago, initiated the adaptation and application of Frederick Winslow
Taylor's work to the American educational system. Scientific management created two serious problems that persist today (Callahan, 1962). Teacher competency and student performance continue to serve as the major issues driving educational reform in these last decades of the 20th Century.

Bobbitt (1916) and Taylor (1911) believed efficiency is dependent upon centralization. Scientific management elevates the authority of supervisors and reduces the control that low quality workers have over production. High ratios of managers, support staff and technical personnel must bear the primary responsibility for quality control. The fundamental assumption in Taylor's work was that the front-line worker was incapable of thinking for himself. Financial resources are not available for the training of expendable, interchangeable parts, in effect-coolie labor. Coolie labor is unskilled and therefore incapable of innovation. Persistence of these principles in educational systems limits the freedom and competency of teachers, reducing them to the status of blue collar workers. Professional treatment of teachers requires a fundamental culture change.

"The dictates of Taylor's scientific management not only produced the bureaucracy, it prescribed its function" (Marshall & Tucker, 1992, p. 16). Scientific management prescribed that the success of the system would depend on long runs of standard products. This led to large investments in equipment rather than personnel. This decision set the process in motion that created the pending dilemmas in education over student performance.

Ideas and conceptual skills were banished in favor of the facts and operational skills demanded by the practical requirements of the industrial age. In the second industrial revolution, employers would find that authoritarian management and approaches to the organization of work leaves them at a severe disadvantage in the industrial race for flexibility and productivity. All of the earlier reforms in curriculum, teaching method, and school organization have ultimately disappointed their advocates. All have been rejected or watered down in the course of time by the larger system, which seems to be impervious to any real changes at all. It is the system that is the problem, and...
only basic changes in the structure of the system will change it. (Marshall & Tucker, 1992, p. 101)

School officials have neither the incentives to devote resources to research that would determine how to teach most effectively, nor the motivation to run effective organizations. Schools retain the bureaucracy and mechanistic philosophy of scientific management, but none of the effective operation that was the justification and core of the Taylor system. It is no surprise that for decades cost spirals upward with but modest increases in performance.

Organismal/Holistic Senge Model

Our concept of organizations is moving away from the mechanistic creation that flourished in the age of bureaucracy. We have begun to speak in earnest of more fluid, organic structures, even of boundaryless organizations. We are beginning to recognize organizations as systems, construing them as 'learning organizations' and crediting them with some type of self-renewing capacity. These are our first, tentative forays into a new appreciation for organizations....We can forgo the despair created by such common organizational events as change, chaos, information overload, and cyclical behaviors if we recognize that organizations are conscious entities, possessing many of the properties of living systems. (Wheatley, 1992, p. 13)

The physicist, Frijtof Capra (1982), in his book, The Turning Point: Science, Society and the Rising Culture, explained that systems theory looks at the world from a platform where all phenomena interrelate and are interdependent. Systems theory operates in a universe with a holistic foundation, where isolation masks understanding.

A system describes our view of a whole. A whole whose properties cannot reduce to the mere sum of its parts. Each part of a biological or a social system, under the organismal paradigm, must exude individuality and cooperation. Individuality maintains stratification of form throughout the system and cooperation submits to the function of the whole, keeping the system viable.

While traditional organizations require management systems that control
peoples' behavior, learning organizations invest in improving the qualities of thinking, the capacity for reflection and team learning, and the ability to develop shared visions and shared understandings. (Senge, 1990, p. 289)

The Quantum paradigm revolutionizes the chronically non-systemic Western culture. The simple, snapshot answers to complex questions that characterize reductionism undergo transformation through process thinking. Peter Senge (1990) pioneered the analysis of developing learning organizations. Learning organizations champion what Morgan (1986) referred to as the organismal paradigm. Learning organizations thrive, evolving an organizational focus on process, the process of learning.

Learning eventually results in changes in action, not just taking in new information and forming new 'ideas'. That is why recognizing the gap between our espoused theories (what we say) and our theories-in-use (the theories that lay behind our actions) is vital. Otherwise, we may believe we've 'learned' something just because we've got new language or concepts to use, even though our behavior is completely unchanged. (Senge, 1990, p. 202)

The translation of mental models into action allows the learning organization to be more coherent and adaptive than its hierarchical predecessors. The learning organization thrives on uncertainty yet, maintains focus through the empowerment of local control. The systemic structure of the learning organization succeeds at ultimately changing behavior because it orchestrates and directs how change occurs. Senge (1990) proposed that the five transforming disciplines—mental models, personal mastery, team learning, building shared vision and systems thinking—form a pyramidal base for the new scientific management.

The dominant scientific paradigm determines the most effective organizational operational model. The organizational model, in turn, determines the predominant theories of organizational change. The influence of the scientific perspective guides a vast cascade of events pertinent to the study of educational reform. Educational reform attempts to initiate and institutionalize change. The
scientific paradigm governing educational reform activity determines the effectiveness of the initiative. The industrial and the organismal paradigms approach change from different directions.

A Projection for Organizational Change

Herman and Herman (1994) in their recent book, *Making Change Happen*, stressed the importance of a dynamic organizational awareness of the change process. They insisted that organizations must know how to facilitate the change process to effectively implement any plan of reform. Organizational perception, or the mental model, behind the change process, influences organizational behavior. The mental model for change dictates whether an organization reacts, restoring equilibrium, or adapts, maintaining disequilibrium.

The structural organization and system definition reflect the authority of these underlying mental models (Lippett, 1973). This section draws three parallels that establish a relationship between organizational change paradigms, organizational behavior and organizational architecture. The first parallel compares and contrasts the endogenous and exogenous paradigms governing the process of change. The second parallel compares and contrasts the relationship between the environment and the organization under each paradigm. The third parallel compares and contrasts the system architecture each paradigm dictates. Projection of the latent effects of scientific paradigms on organizational change reinforces the importance of the discipline of mental models. The design of successful educational reform initiatives requires mental models that align with the emerging organismal, or quantum paradigm.
Organizational Change Paradigms

Smith and Keith (1971) identified two main change philosophies influencing Western thought. These philosophies include an endogenous and an exogenous paradigm. An understanding of change paradigms becomes increasingly important as the science behind them evolves. The faster science changes the quality and quantity of available information, the faster change occurs. Change paradigms govern organizational interpretation of events, establish the relationships organizations maintain with the environment and dictate the organizational architecture that best expresses the dominant scientific paradigm. The change paradigm becomes most influential during times of organizational crisis and upheaval.

Change is analyzed in terms of the intrusion of major events, the influence of the environment, and crises. Crisis is the ubiquitous symbol of change. Symptoms of disturbance, upheaval, social movements, and the overthrow of institutions are subsumed under the term crisis. (Pine, 1980, p. 110)

Kytie (1977) presented two conceptual models for social change that mirror their parent scientific paradigms. Kytie (1977) described consensus and conflict driven models that represent how the dominant change paradigm guides organizational handling of social inequality. Social inequality drives much of the educational reform movement; therefore, Kytie’s (1977) theory contributes pertinent information to the discussion.

The Endogenous Paradigm. Endogenous change is analogous to the growth of in nature (Pine, 1980). Uniform change occurs slowly and continuously spirals irreversibly upward in complexity. The endogenous paradigm views change as a paradox: internal response to change is continuous, yet the external force imposing change is intermittent. These statements fuel the classic debate between the Darwinian (1859) and Gouldite (1977) scenarios for evolutionary processes.
This paradigm translates Darwinian crisis (Ghiselin, 1969; Ruse, 1979). The Darwinian approach interprets crisis as a major intrusion, an intermittent punctuation of the relatively smooth and changeless homeostatic equilibrium (Tushman & Romanelli, 1985). This change paradigm reflects the essence of Newtonian science.

Kytle's (1977) consensus model follows the tenets of the endogenous paradigm. Organizations ascribing to the consensus model see inequality as a structural component. The endogenous paradigm compartmentalizes crises that require negotiation. Consensus assumes that the balance and stability of equilibrium are the norm. Equilibrium rules over the gradual evolution of educational reform theory and practice.

The dominance of the endogenous paradigm of change is reflected in the ideology of gradualism which permeates education theory and practice. The intellectual roots and tacit values of systematic, planned organizational development approaches support the gradualistic, evolutionary, cooperative approach to change that characterizes contemporary educational innovation. (Pine, 1980, p. 110)

The Exogenous Paradigm. Exogenous change interprets crisis as a frequent and normal part of the change process (Pine, 1980). This paradigm portrays change fraught with tension and conflict. It projects that neo-evolutionary change is seldom smooth or regular.

This paradigm translates Gouldite (1977) crisis. The Gouldite (1977) approach interprets crisis as an integral component of the evolution process. Crises create the disequilibrium that drives the Gouldite version of evolution. Evolution progresses discontinuously with intermittent punctuation by brief periods of equilibrium (Gersick, 1991). This change paradigm mirrors the influence of quantum science.

Kytle's (1977) conflict model approaches inequality from the realm of the exogenous paradigm. The conflict model interprets crisis as a central contradiction
and causal agent of competition between the classes. Conflict creates necessary and
desirable disequilibrium in the system. Disequilibrium rules over the explosive

The Organizational Relationships with the Environment

The relationships that organizations establish with the environment stem
directly from their predominant change paradigm. These systemic relationships
influence the effectiveness of change initiatives. The endogenous paradigm and the
consensus model for change dictate that the system abhor conflict and dampen the
drives promoting change. In this situation, the organization reacts to the environment,
constantly opposing change. The exogenous paradigm and the conflict model for
change dictate a system that embraces change and amplifies the drives promoting
change. In this situation, the organization responds to the environment, constantly
accommodating change.

Environmental Enmity. Kytle (1977) established the consensual basis for
most organizational development. Kytle described the reduction of conflict as driving
the primary goals for organizational development. This results in long range changes
that are cosmetic. Conflict reduction leaves the political and economic forces
molding the system intact. "The avoidance of conflict and the promotion of
equilibrium or a state of collaboration constitute the main programmatic orientation"
for most organizations (Pine, 1980, p. 113). The consensus model also influences
systems behavior in that most view order as positive and view disorder as negative.

Education tends to eliminate conflict, redefine it and search for consensus.
Newtonian supporters of systems management take this position as well, claiming
that they apply scientific principles. Their scientific perspective reflects archaic
inaccuracies.

The historical evolution of science and the development of its disciplines follow an incongruous path. Gradual consensus does not characterize the evolution of scientific paradigms (Kuhn, 1970). Extreme conflict, on intellectual and interpersonal levels, characterizes the major conceptual scientific advances Kuhn (1970) identified as scientific revolutions.

American educators have been imbued with the cultural illusion that all progress in education evolves inevitably and properly from a consensual integration of confluent tending social circumstances and values ordering the universe as a whole, the social system, and particularly formal education. (Pine, 1980, p. 114)

This is incomplete and only partially correct. Adopting a systems view but preserving the existing consensual patterns is still dysfunctional. The persuasiveness of this ethos of compromise explains why many promising educational innovations and efforts at reform have failed to develop.

The failure of practically every important educational reform proposal made in the past 75 years...can, in the final analysis, be traced to the inability of large numbers of actual or potential reform-minded educators and their allies to appreciate the necessity and the legitimacy of truly original thought and attendantly, individual and collective dissent at times on behalf of needed changes in the structure and function of the institution. (Reitman, 1974, p. 342)

The consensus model (Kytle, 1977) presents a problem for change interventionists in that it promotes consideration of the balance between the continuity of compromise and the discord of change in the life of the school. The consensus model points to crisis and discord, the natural characteristics of instability and fuel for the change process, as detrimental to operational equilibrium. Accordingly, the consensual basis of most organizational vision maintains equilibrium. Equilibrium generates stagnation and compliance. Organizations that ascribe to the consensus model envision crisis in the external environment as the impetus for change. Change in the external environment disrupts equilibrium and
therefore represents the enemy.

Change threatens the stability of the system and the system reacts to resolve the crisis. Goals are passive, in that organizations usually are in the state of deficiency, striving for what they do not have. Goals are reactionary and lack focus. Organizations respond to things, stimuli, beyond the control of the organization.

Crisis driven change forces the system to acquire a negative culture of prevention and avoidance. Organizations ask, "What do we want to avoid?" For example, anti-bussing and anti-drug campaigns express this pervasive attitude. Senge (1990) proposed that negative vision severely limits the evolutionary potential of a system. The diversion of energy and resources, powerful raw materials for progress, prevents construction and growth. Negative vision directs the gradual destruction of new growth to maintain the status quo. Demolition carries the subtle message of powerlessness, and is short-term. Fear provides the fundamental source of motivation driving reactive organizational development. Overreaction initiates actions that fail to consider systemic repercussions.

The consensus model (Kytle, 1977), through the minimization of conflict, insures that incremental changes will maintain homeostatic balance of the system. Conventional change theories and practice barely makes a dent in the surface of enduring fundamental educational change. The vocabulary of consensus prevents sensitivity to the positive and integrative function of conflict as an agent of change.

Environmental Partnership. Pine (1980) proposed the ethical use of conflict to initiate social change. Conflict stimulates the creation of new rules and cultural norms. Conflict leads to a re-evaluation of power structures and functions to balance and consolidate organizations. Conflict brings coalitions of diversity together. Shifting relationships produce powerful agents of change through the stimulation of
greater organizational variation and participation. Crisis and discord are necessary to initiate change and sustain the evolutionary process. Prigogine and Stengers (1984) discussed the symbiosis between conflict and evolution as a partnership with the environment.

The pursuit of change in American schools must take place in the context of a pluralistic society. A plural democracy ultimately grounds its values in the differences among individual members. The clash of values which is so clearly present in the resistance to change is the clash of legitimately differing interests. (Pine, 1980, p. 117)

The conflict model (Kytle, 1977) enables movement and growth toward goals. The tolerance of organizational discord and diversity leads to strong organizational commitment. Organizations driven by the conflict model of change unify to meet the challenge. Aspiration serves as the fundamental source of energy for the organizational culture. The message of these organizations speaks of empowerment and choice. The harnessing of conflict disequilibrium catapults change efforts toward long-term success. The positive vision behind organizational goals promotes an atmosphere of construction and adaptation.

Morgan (1986) in the book, Images of an Organization, presented biological organisms as system archetypes. Biological organisms represent the organic local control that results from conflict driven adaptation. Rigid, authoritarian hierarchies thwart adaptive learning and fail to respond to rapidly shifting conditions.

Senge (1990), in his discussion of the example of the Beer Game, presented a valuable lesson for educational reform: organizational structure influences behavior. This central theme supports the theory that the organizational action creates organizational reality. Systems precipitate their own crises.

The conflict model (Kytle, 1977) explains that crises result not from external forces, but from internal reaction to change. Systemic structure generates patterns of behavior that occur in response to events. This model illustrates that basic internal
and external interrelationships mold organizational behavior. Internal forces that constrain the formation of relationships limit system evolution. Internal growth drives evolution.

The belief that we can't influence our circumstances undermines the incentive to learn, likewise the belief that someone out there dictates our actions....However, if we know our fate is in our own hands, our learning matters. (Senge, 1990, p. 288)

Importantly, education still ascribes to the consensual model (Kytle, 1977); therefore, the impetus for change is external. The educational reform movement reacts to an external call for change. The impetus for change is outside the organization. This perspective maintains equilibrium and defeats change. Much of the available organizational analysis of the educational reform movement loses sight of this fact.

Organizational analysis focuses primarily on the structural architecture behind the organizational response. Structure does influence organizational response but fails to alter the relationships between the organization and the environment. Organizational structure defines the internal relationships. Certain structures are more flexible and capable of gradual adaptation than others. Structure cannot sustain drastic transformation with consensus. It becomes increasingly important to recognize that architecture, as a consensual tool, serves only to ameliorate external crisis and dampen internal change initiatives.

The structure of reform initiatives alternates between external and internal direction. The dissemination of innovation and the mandate of policy exemplify the external, top-down, or centralization approach. School improvement initiatives and bottom-up restructuring exemplify the internal, bottom-up, or decentralization approach. Centralization and decentralization fail to include systemic interconnections with the external environment. True to Senge's (1990) predictions,
structural initiatives fail to observe their contribution to a major internal crisis.

A major internal crisis brews within the educational reform movement as the organization struggles to develop new mental models. Lack of coherent organizational direction presents the greatest problem in educational reform. The structural debate polarizes a secondary structural issue to such magnitude that the primary issues, locus for change and the contributions of the scientific perspective, get lost in the shuffle.

Conflicting demands trap Superintendents. Localization and centralization are the two main periodic waves that dominate the last fifty years of education reform. Educational reform oscillates between localization and centralization. This oscillation implies a deep lack of confidence in local decision makers and points to the consensual model for organization change. Senge (1990) called this situation a shifting the burden archetype. At any hint of crisis, control goes straight back to the top.

Systems thinking is the corrective lens for the short-term myopia of local control and the astigmatic resistance of hierarchical policy to maintain consistent focus. Systems thinking will not evolve quickly if education fails to reflect and take action on the mental models it holds for the process of change.

A discussion of system architecture follows. System architecture, that supports the consensual change model, explains the cyclical and ineffective organizational behavior behind educational reform. The internal crisis mounts as the organizational ability to maintain the dynamic tension between the two approaches diminishes. The imminent explosion/implosion makes way for a new perspective. Systems evolve with or without our help.
The Dynamics of System Architecture

The dynamics of system architecture project the organizational practice of the discipline of mental models. The system architecture mirrors the organizational development philosophy of the leadership. System architecture responds to external calls for change. Changes in system architecture represent attempts to accomplish the dictates from an external force. System architecture defines the how, rather than the why, behind organizational accomplishments.

Foster (1992) defined structure as, "organizationally established roles; interlocking rules; usually bureaucratic hierarchy; school and school district policies and an operating system of values, norms and beliefs" (p. 1109). The current fixation on structural reform initiatives points clearly to a mental model with roots still in the Newtonian paradigm.

Centralization Generates Vertical Change. State and local policies exert predominant control over education today. State policy makers control the operation of public schools through regulatory constraints. Local boards of education direct the implementation of state policy. Superintendents translate state policy into district policy. Centralization limits the degree of teacher freedom, burdens the administrative function and impedes innovation.

This architectural approach, with roots early in this century, is the structure that results from an impasse between administrative centralism and educational scientism. This structure, driven by the industrial paradigm, attempts to find a subjective, scientific basis for both administration and instruction. This approach looks to improve schools through the standardization and dissemination of a single solution. It describes vertical change.

Under the old paradigm, the role of the central office was perceived as that of
keeper of the gate, maintaining quality control - most typically slowing down the creative process or by directly intervening in the site-level program decisions. (Murphy & Schiller, 1992, p. 31)

Today this structure is at issue for improving education. Centralization asserts that external forces cause crisis and expend a great deal of energy maintaining system equilibrium. This highly reactive structure requires a large stimulus to provoke a static response. The Second Law of Thermodynamics (Giancoli, 1991) guides the design and operation of this structure. This structure avoids disequilibrium and crisis. It works toward organizational preservation. The primacy of homeostasis declares that organizational behavior will not influence structure and that change will oscillate within the limits of the original design.

Centralization provided an appropriate solution for the inefficiency that was plaguing the agrarian paradigm. Now its' bureaucratic and technical structures make it difficult to focus on the emerging importance of systemic relationships. Betts (1992) pointed out that, as organizational hierarchy increases, the amount of energy required by the system to maintain existing relationships also increases. Larger systems require more energy to maintain dynamic balance.

Systemic reform ideas seem to require unprecedented efforts to integrate separate policies, new strategies of policy sequencing, novel processes to involve the public and professionals in setting standards, challenges to traditional politics, complex efforts to balance state leadership with flexibility at the school site, extraordinary investment in professional development, and creative approaches to serving the varied needs of students. (Fuhrman & Massell, 1992, p. 24)

The old system architecture and old mental models prove inadequate to the task. This structure stresses accountability over innovation. If education desires to achieve change, a fundamental transformation of organizational philosophy needs to occur. Change requires that education move from a reliance on deterministic system philosophy toward a purpose seeking system philosophy. Organizational focus shifts from how to why. Reflection on mental models catalyzes this movement away from
architecture and towards purpose and vision. This centripetal architecture works compatibly with a closed system. Centralization limits the response of the system to changes in the internal philosophy or external environment.

Decentralization Generates Horizontal Change. Decentralization typically restructures the bureaucratic hierarchy. Decentralization emphasizes teacher leadership and places the burden of school improvement at the local level. Decentralization leads to organizations more organic and organismal, and therefore, sensitive to small stimuli. Decentralization facilitates long range solutions and systemic effort. This architecture, in theory, proactively responds to changes in the internal and external environment. "Dynamic systems-whether ecology-biology-or schools ... survive because of balanced relationships among the parts and concern for the environment" (Prince, 1992, p. 9). Decentralization results when a system commits to organizational renewal, acknowledging change as a constant.

Decentralization suits the change process better than centralization. This architecture empowers teachers and prepares the way for the evolution of systemic educational reform. The focus of this architecture however, still remains on how to accomplish externally driven tasks, efficiently and with a minimum of conflict. The improvement of structure falls short of generating enduring change. Decentralization serves as a start. Currently the imperatives and vision behind change initiatives trickle down from invisible sources external to the organization. In this consensual situation internal forces will maintain equilibrium.

Internal conflict and disequilibrium are necessary to promote rapid organizational evolution. Evolution, beyond the present stagnation, requires that education employ reflection and mental models to combat the internal cultural forces bent on the defeat of change. Evolution thrives on conflict. Conflict provides a
source of energy for the system and facilitates the exportation of entropy.

Systemic reform, with its explosive, change everything approach, is on the right track. Systemic reform requires the discipline of personal mastery to recognize systemic structure. Systemic reform requires the discipline of mental models to begin to change organizational behavior and structure. Systemic reform, without the philosophical foundation of the learning organization, remains just another good idea.

Educators have always been squeezed by pressures to conform to social norms on the one hand and to take risks to shape a new social order on the other. How they shape the schools depends on the response to those contradictory pressures. School culture is defined by the attitudes and behaviors of all who teach and learn there. The call for reform comes when expectations change about the outcomes of learning and teaching, and there is dissatisfaction with the way things are. (Prince, 1992, p. v)

The learning organization approaches both structural and philosophical changes. Without a systemic solution for reform that involves structural and philosophical influences, the fabric of change will unravel at one end even as it is being woven at the other (Holtzman, 1993). According to Issacson and Bamburg (1992), "systems thinking is the cornerstone of change" (p. 42). Senge (1990) suggested that if a system does not change, it will continue to produce the same results.

If a school district or an individual school is to be transformationally and systemically changed; and if the change is to create a culture which promotes dramatic changes in the structures, processes and attitudes which exist, it has a much better opportunity to do these things if it unifies and blends the separate approaches into one coordinated and complementary approach to transformational change and to a new systemic organizational culture. (Herman & Herman, 1994, p. 129)

The learning organization promotes the structural and philosophical transformations that evolution, under the organismal paradigm, requires. The synthesis of vision, the purpose behind purpose-seeking organizations, relies on the practice of personal mastery and mental models to prepare the organization to shift change strategies. Transformation of structure and philosophy allow internal
resources to invite disequilibrium, process conflict, and promote change from within the organization.

The development of a cohesive organizational purpose, or shared vision, is the next evolutionary milestone. The following section presents educational reform as illustrative of the process of building shared vision. The conflict, struggle and discontinuity that characterize the evolution of educational reform indicate the rise of the new paradigm.

Renovation—The Historical Evolution of Reform

Senge (1990) described shared vision as the answer to the question, "What do we want to create?" (p. 206). Educational reform also attempts to answer this question. This section documents the historical evolution of educational reform. The evolution of educational reform represents an analogy. Educational reform is analogous to the development of the discipline of shared vision. Educational reform reflects an evolutionary conflict as educators struggle to practice the discipline of shared vision.

Shared vision is vital for the learning organization because it provides the focus and energy for learning. While adaptive learning is possible without vision, generative learning occurs only when people are striving to accomplish something that matters deeply to them. (Senge, 1990, p. 206)

You cannot have a learning organization without shared vision. Without a pull toward some goal which people truly want to achieve, the forces in support of the status quo can be overwhelming. Vision establishes an overarching goal. The loftiness of the target compels new ways of thinking and acting. A shared vision also provides a rudder to keep the learning process on course when stresses develop. Learning can be difficult, even painful. With a shared vision, we are more likely to expose our ways of thinking, give up deeply held views, and recognize personal and organizational shortcomings. (Senge, 1990, p. 209)

Education strives, through reform, to become a learning organization. This process does not paint a cohesive picture. The various regions of the educational
system evolve and develop the learning organization disciplines discontinuously and at different rates. Education approaches shared vision from many different angles. This is a time of great conflict and disequilibrium.

This section provides a close examination of the cyclical struggles of educational reform. Description of the evolution of educational reform, using the coarse focus spiral of the System Development Template, unfolds in three steps.

The first step paints a portrait for the evolution of shared vision. It describes the wave metaphor that pervades the educational reform literature. It traces the development of a vision dilemma that indicates the paradigmatic influence of the next scientific revolution. This step presents generative vision as the distant point toward which shared vision evolves.

The second step establishes the historical framework for the paradigmatic evolution that drives educational reform. This step explains the process of paradigm evolution. It also portrays the influence the cycle of paradigm evolution exerts on the development of shared vision in education.

The third step projects the influence of paradigm evolution onto the waves of educational reform. This step uses the fine focus spiral of the System Development Template to carefully analyze and interpret the complex web of events contributing to the evolution of educational reform. It projects an emerging organizational commitment to systemic renovation and illuminates evidence that confirms an emerging paradigm crisis.

This section documents education's internal struggle with change. The reform endeavor is complex and widespread throughout the educational system. The diverse regions of the educational system are practicing the disciplines of personal mastery, mental models and shared vision with varying degrees of fervor and success. This section sifts through a daunting array of reform initiatives to distill a cohesive pattern
from the vast selection of variation. The cyclical pattern that emerges documents a paradigm revolution that shifts the evolutionary scales toward the learning organization.

A Portrait of Shared Vision

Senge (1990) believed that the discipline of building shared vision lacks foundation if not constructed from the disciplines of personal mastery and mental models. The discipline of shared vision without a fundamental understanding of systems theory will abort.

In recent years, many leaders have jumped on to the vision bandwagon. They've developed corporate vision and mission statements. They've worked to enroll everyone in the vision. Yet, the expected surges in productivity and competitiveness often fail to arrive. This has lead many to become disaffected with vision and visioning. ... The problem lies not in the shared visions themselves, so long as they are developed carefully. The problem lies in our reactive orientation toward current reality. Vision becomes a living force only when people truly believe they can shape their future. (Senge, 1990, p. 231)

Shared vision shapes the future. The practice of personal mastery and mental models build the shape of shared vision. The practices of personal mastery and mental models evolve by quantum jumps and emerge in different places at different times. The accumulation of mastery of these two disciplines, over the entire educational organization during a specific period, resembles a series of waves. The wave metaphor models the cyclical learning process behind the evolution of shared vision.

This first step begins with a description of a wave metaphor that expresses the quest for shared vision in education. A distinction between predictive, old paradigm vision and generative, new paradigm vision follows. Generative vision is characteristic of the learning organization. This step concludes with a discussion of the evolution of generative vision.
The Wave Metaphor

There are several recent analytic approaches in the educational reform literature documenting the historical evolution of the theory and practice of educational reform (Futrell, 1989; Jacobson & Conway, 1990; Massell, 1994; McLaughlin, 1992; Sashkin & Egermeier, 1993). Table 6 illustrates the distinctly dissimilar hypotheses behind the models that these authors present. Yet, they do share a common origin and contribute to a collective portrait of the educational reform movement. The progression of observable events traces a trail of the shifts and struggles that alternate between crest and abyss (Ravitch & Vinovskis, 1993; Reigeluth & Garfinkle, 1994). Many researchers employ a wave metaphor to describe the recurrent, undulating sequence of problem dilation and solution contraction that characterize the evolution of educational reform (Murphy, 1990; Verstegen, 1993; Verstegen & McGuire, 1991).

The wave analogy originates from the seminal work of Chin and Benne (1969). They defined strategies for the planning of change in which "attempts to bring about change are conscious, deliberate, and intended, at least on the part of one or more agents related to the change attempt" (p. 33). Each consecutive wave shares a common element with all those that precede. "One element in all approaches to planned change is the conscious utilization and application of knowledge as an instrument or tool for modifying patterns and institutions of practice" (p. 33). Each wave describes strategies of increasing complexity as education struggles to develop a greater institutional capacity to sustain innovation.

It takes several cycles of trial and error, of collective reflection on the process, of honing the component parts of the process, of accumulated skill in the managing of the technical and socio-emotional aspects of change, etc., for such a capacity to take root. (Fullan, 1992, p. 7)

Strategies for the planning of change identify divergent problems and propose
local solutions. Linear initiatives still rely on the erroneous assumption that it is possible to have the vision and foresight to predict future outcomes.

Table 6
A Comparison of Selected Classification Schemes for the Waves of Educational Reform

<table>
<thead>
<tr>
<th>Classification Schemes for the Waves of Educational Reform</th>
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<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>First Wave</td>
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<tr>
<td>Second Wave</td>
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<tr>
<td>Third Wave</td>
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<td>Next Wave</td>
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Fullan (1992) proposed a departure from the tight planned change models of the 1970s. He proposed a more fluid, evolutionary, "rolling" model of change.

We have now learned that the resources, the training, the strategies, the timelines are all forms of liquidity, which we would be better to spend as we go, leaving as much slack as we can for monitoring where we have come from and anticipating what is around the next corner. (Fullan, 1992, p. 9)
The majority of current reform efforts ascribe to a declining Industrial Age paradigm and cannot expect success. The wave metaphor documents the dilemma as educational reform labors continuously to contain problems and expand solutions. Each wave illustrates an abortive organizational attempt to develop a shared vision for the future of education.

Armstrong's (1992) discerning work on analogy provided an insightful analysis of the complementary and companion evolution of the four contemporary organizational metaphors that fuel educational reform. It is particularly appropriate to apply this metaphoric progression to the evolution of educational reform. She classified the mechanistic, social-political and organic metaphors that describe the fragmentary nature of Industrial paradigm. The integral perspective of the Information Age paradigm enlightens her final holonomic metaphor.

Intermittent cycles of new solutions to old problems and old solutions to new problems switch back and forth as education assays new metaphors. The metaphors that guide reform focus attention on evolutionary achievement. The dominant organizational metaphors reflect the current level of organizational progression.

Each metaphor exhibits cycles of practice and analysis that establish reliability and demonstrate validity, as education jockeys to stay in focus for the future. The waves of reform are the result of organizational experimentation with vision building. The organizational metaphors direct the waves of educational reform. Table 7 compares and contrasts the mental models behind the waves of educational reform. They describe the evolutionary journey as education strives to resolve conflicts over the form and function of the reform necessary to transform education for the Information Age.
Table 7
A Comparison of the Methods and Mental Models for the Waves of Educational Reform

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Biases</th>
<th>Perspectives</th>
<th>Metaphors</th>
<th>Paradigm Cycle</th>
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<table>
<thead>
<tr>
<th>First Wave</th>
<th>Empirical-Rational</th>
<th>Rationalistic</th>
<th>Research and Development</th>
<th>Mechanistic</th>
<th>Anomalies</th>
</tr>
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<tbody>
<tr>
<td>Second Wave</td>
<td>Power-Coercive</td>
<td>Technocratic</td>
<td>Political</td>
<td>Socio-political</td>
<td>Crisis</td>
</tr>
<tr>
<td>Third Wave</td>
<td>Normative-Re-educative</td>
<td>Individualistic</td>
<td>Cultural</td>
<td>Organic</td>
<td>Revolution</td>
</tr>
<tr>
<td>Next Wave</td>
<td></td>
<td></td>
<td></td>
<td>Holonomic</td>
<td>Transition</td>
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</table>

**The Vision Dilemma**

Vision effectively tools the reshaping of organizational culture. Vision holds the system together, acting like glue, in times of rapid change. Vision directs effective organizational adaptation to changing societal values and expectations. Vision creates meaning and purpose for an organization. The process of developing vision legitimizes decisions through a mutually reinforcing circle that generates vertical and horizontal trust. Vision contributes an important component of the mutual covenant that generates organizational support for change.

Schmidt and Finnegan (1992) described the conditions that nurture the development of a mutual covenant promoting organizational change: (a) convincing
evidence that the present situation is not desirable, (b) a proposal for a future that is clear, sensible and desirable, (c) a path toward the future that is definite and realistic, and (d) an implementation cost that is not prohibitive.

Senge (1990) referred to this mutual covenant, or organizational vision, as shared vision. Shared vision develops when members of an organization practice the prerequisite disciplines of personal mastery and mental models. Shared vision "involves the skill of discerning shared pictures of the future that foster genuine commitment and engagement rather than compliance" (p. 11).

Conley and associates, in the 1992 Oregon School Study Council Report, outlined the role of shared vision in a manner that is much less mystical and more directional than that put forth by new paradigm business reform. The definition of shared vision that follows represents its' use in much of the educational reform literature:

...a shared agreement, explicitly stated in some form, by a significant number of participants in an organizational unit, on a mixture of values, beliefs, purposes and goals that serves to provide a clear reference point for members of the organizational unit to use when making decisions about their behavior in the organizational context, and that is clear enough to enable them to choose behaviors that help move the organization toward the general values, beliefs, purposes, or goals contained in the vision statement (p. 2).

Traditional, authoritarian organizations such as education, characteristically develop a top-down vision statement. Typically, this degrades to a one shot, strategic vision. Strategic vision neglects the individual contributions of personal vision from deep within the organization. Senge (1990) predicted that static vision leaves little opportunity for the inquiry and evaluation critical to the generative learning process. Static vision also fails to cultivate dynamism and commitment.

The knotted tangle of the reform movement indicates the complexity of reform. Clearly, reform intimates change. Although the transition point may be quite unclear, reform implies an ending of what is and a beginning of what will be.
Attention to the development of vision seems to provide an "internal compass for people in complex organizations that help[s] them understand more clearly how their actions relate to, or contribute to, broader organizational goals" (Conley, Dunlap, and Goldman, 1992, p. 2).

If there is disagreement as to whether *something is wrong*, there will probably be disagreement over the need for reform. If there is disagreement over *what it is that is wrong*, there will probably be disagreement over what it is that needs to be re-formed. (Jacobson & Conway, 1990, p. 182)

Internal differences, evident in the characteristic elements of dissent and discord, promote the evolutionary process. Internal diversity provides a beneficial developmental push throughout the history of educational reform. Internal variation inspires growth. Disagreement widens the spectrum of organizational options as new points of view emerge and promote disequilibrium and adaptation.

The image of vision, currently in practice, provides an example of the influence of the old linear, cause and effect paradigm. Reliance on linear vision drives changes to perpetuate organizational cultures that depend on conformity. Linear vision obstructs complex learning because it assumes that prediction is possible.

Predictive vision reduces internal variation and limits the ability of an organization to cope with external variation. Pascal (1990), expressing of the law of requisite variety, discussed similar consequences for cybernetic systems. The internal control elements of a system must celebrate variety to maximize potential adaptation to the external environment.

The emergent quantum paradigm demands a dynamic systems perspective where vision develops continuously. Vision, under the new paradigm, becomes the "intention to be creative and deal with what comes, not intention to achieve some particular future state" (Stacey, 1992, p. 146). The calendar of issues and challenges
at hand drive the learning organization to develop generative vision.

The evolutionary perspective rests on the assumption that the environment both inside and outside organizations is often chaotic. No specific plan can last for long, because it will either become outmoded due to changing external pressure, or because disagreement over priorities arises within the organization....Strategy is viewed as a flexible tool, rather than a semi-permanent expansion of the mission. (Louis & Miles, 1990, p. 193)

The Evolution of Generative Vision

An evolutionary perspective, where the expression of vision dynamically displays organizational intent, speaks to this dilemma.

In the new paradigm of change organizations will have to reverse traditionally held assumptions about vision and planning. By doing so they will 'arrive at' deeper and more powerful shared visions which inspire committed action on a day-to-day basis throughout the organization. (Fullan, 1993, p. 33)

The powerful visions of the new paradigm are transient and contain the foundation for prompting further generative learning. Generative vision leads to a cascade of productive change. Through the process of mobilization this new possibility sharply contrasts the prior litany of impotence in the face of change. Unproductive change unfolds and continues to reverberate through the manipulative process of predictive vision. The effectiveness of old paradigm change models declines as evolution progresses.

New paradigm models pivot on an understanding of the iterative nature of the change process. Evolution advances, commanding continuous attention, not a one time change. The pace of change and the diversity of educational settings requires that vision building also be an iterative process. Development of shared vision cannot be static. Shared vision must be dynamic and adaptable to address the unique challenges of each school.

"The school is not now a learning organization. Irregular waves of change, episodic projects, fragmentation of effort, and grinding overload is the lot of most
The one dimensional solutions, of the old paradigm, lead to confusion and misdirection under the new paradigm. A search for the one best solution characterizes the development of shared vision in education. The complexity of change endures this shotgun approach. The diversity of initiatives and the resulting resilience of the current educational system stymie educational reformers. The frustration, that reaches epic proportions, contributes to the disequilibrium necessary for evolution under the new paradigm. It is not surprising that there is a dearth of exemplars currently resonating successful reform.

The educational organization exhibits an iterative, evolutionary struggle to develop and practice the discipline of shared vision. Without the critical foundation of systems thinking and the learning organization disciplines, vision merely projects snapshots of what we want to create. It is possible, however, to learn from history. Learning organizations accomplish this through the constant derivation of lessons that review and connect precedent instances of incomplete success. "As people in an organization begin to learn how existing policies and actions are creating their current reality, a new more fertile soil for vision develops" (Senge, 1990, p. 231). The perspective of the new paradigm reveals the significance of interconnecting elements. Internal relationships contribute to the dynamic evolution of our current situation.

The wave of metaphors running through the educational reform literature creates lenses that focus on the iterative, developmental struggle to author a shared, paradigmatically consistent, vision for education. Disagreement in the literature, over the correct classification and time frames for various reform efforts, confounds analysis under the old paradigm. This confusion disappears when the observer shifts toward a non-linear paradigm.

Consideration of the evolution of a non-linear paradigm, as the dominant mental model for education, establishes a quantum order for the evolution of
educational reform. The time frames for specific events project and span multiple waves partially because of the chaotic nature of the system under examination and partially because of the current state of paradigmatic revolution. The evolution of the organismal or quantum paradigm evokes the evolution of educational reform.

The Portrayal of a New Paradigm

The second step, depicting the historical evolution of educational reform, begins with an explanation of the new quantum paradigm. An unfolding of the historical and scientific roots of the new paradigm follows. This step concludes with a discussion of the direction proposed by the emerging paradigm. The evolution of the quantum paradigm parallels the evolution of educational reform.

The New Paradigm

In Kuhnian (1970) terms, a paradigm defines the cognitive map that serves to guide our interaction with reality. A paradigm establishes the reference frame that collates internal and external interactions into coherent, purposeful relationships. According to Brown (1978), a paradigm is both practical and cognitive. Paradigms nurture the quiescent covenants among members that facilitate the systematic portrayal of organizational roles.

A paradigm, as a model, serves also a metaphor (Hawkes, 1972). Paradigms, as metaphors, are succinct descriptions of a particular doctrine expressed as an image, or mental model. Mohrman and Lawler (1985) detailed the three essential characteristics of a paradigm: (1) it constitutes a way of looking at the world, (2) it describes a way of doing things, and (3) it assumes that there is a network of individuals to adopt and practice the paradigm.

At a particular time and place, a dominant world view organizes and directs
the activities of the organization(s). This world view, frame of reference, or paradigm is defined by a dominant myth, a knowledge-based belief system and a set of exemplars which are concrete and observable. (Simsek & Heydinger, 1992, p. 11)

Levy (1986) also described the dual composition of an organizational paradigm. The first, or abstract, domain details the tacit and implicit background assumptions. The second, or concrete, domain designates the action guidelines that result from practice of the assumptions.

The first domain operates analogously to the lens through which we view the world. From an abstract position, with covert background assumptions, we formulate particular perspectives and develop theories of action. The theory of action and knowledge base creates the background for behavior.

The second, behavioral and normative, domain contributes the pattern for doing things. Complementing the ethereal viewpoint, the observable portion of the paradigm describes typical organizational strategies. The second domain exists in the foreground, to actualize organizational objectives. The disciplines and doctrines that mold organizational behavior conform uniformly (Brown, 1978; Hedberg, 1981; Imershein, 1977).

Simsek and Heydinger (1992) adapted the four steps of Kuhn's (1970) paradigm shift model to trace the evolution of higher educational organizations and their paradigms. The Simsek and Heydinger hypothesis proposes a six step model for the paradigm evolution: (1) normalcy period, (2) anomalies, (3) crisis, (4) selection (revolution), (5) transition, and finally (6) another normalcy period emerges. This modification forms the foundation for further discussion of the parallel evolution of educational reform and the quantum paradigm.
The Historical and Scientific Roots of the New Paradigm

The individuals within an organization, in concert, solidify and perpetuate the position of their dominant paradigm. Gradual change characterizes, what Simsek and Heydinger (1992) called, the normalcy period. The normalcy period follows the completion of an evolutionary cycle. Each iteration of the paradigm evolution establishes the dominant paradigm for that period. It describes the developmentally tranquil period when organizational adaptation matches the rate of environmental change. Organizations aligning with the dominant paradigm continue to flourish. During this stable period the guiding metaphors are subliminal. Research during this phase, according to Kuhn (1970), solves puzzles. Leaders and practitioners within the organization make incremental, linear adjustments to unexpected changes conforming to an accepted dominant management style (Tushman & Romanelli, 1985). Mohrman and Lawler (1985) used the term, social matrix, to describe these agents responsible for the degree of paradigm diffusion and allegiance.

Even in the face of continuous negative information, organizational members—especially the managerial elite—still take for granted the dominant world view, rules, principles, models and exemplars conveyed by the current paradigm. (Simsek & Heydinger, 1992, p. 22)

Gersick (1991) suggested, in agreement with the work of Kuhn (1970), a punctuated equilibrium model to describe the form and function of change over time. In this model, overt, abrupt revolution punctuates long periods of relative equilibrium. From a union of the systems science and historical perspective we the view the change process as a succession of tradition-bound, evolutionary periods punctuated by non-cumulative, revolutionary breaks. The rate of environmental change determines the length of the equilibrium period. Faster rates of external change precipitate shorter equilibrium periods.

Simsek and Heydinger (1992) referred to these non-linear, revolutionary
breaks as paradigm shifts. What we currently deduce, from the historical evolution of educational reform, is that a paradigm shift is underway.

When the interaction between reality and our frames of reference become dysfunctional, they cause "anomalies." At certain times anomalies are only single inconsistencies, much like a tremor which causes some shaking but no damage. At other times anomalies are a part of a larger "earthquake" or paradigm shift underway. Anomalies are most useful for they can bring to the fore both the fundamental assumptions of the old paradigm as well as a glimpse of the emerging paradigm. (Simsek & Heydinger, 1992, p. 192)

When a new paradigm looms on the horizon, inconsistencies or anomalies begin to occur between organizational prescriptions, expectations and outcomes. Clark and Astuto (1992) made predictions about the effects a major paradigm shift would have on an organization. They asserted that, "change should be visible in the fields theoretical, conceptual and empirical dimensions" (p. 959). Inconsistencies in the accuracy of a proven model indicate the tension of a paradigm shift.

Hedberg (1981) theorized that, under anomalous conditions, the social matrix would work to guarantee that "strategies are reformulated when actions fail to produce desired results" (p. 12). The anomalies period arises from indeterminate issues, lag between cause and effect, and abrupt changes in the internal or external environment. Organizations that rely heavily on a single strategic perspective are most prone to anomalous activity.

The chaos and the self-organization perspectives on systems theory maintain that triggering events and random shocks occur throughout the life of an organization and paradigm. During periods of normalcy...the dominant paradigm "provides" the answers to the puzzles and issues presented from within or outside the organization. (Simsek & Heydinger, 1992, p. 23)

Simsek and Heydinger (1992) provided two examples of problem solving anomalies that indicate an impending paradigm shift: (1) the frequent misinterpretation of the core belief system that leads to an implementation of aberrant correction strategies and (2) the discovery of a deficiency in the belief system when attempting to decipher problem solving efforts that result in failure. During this
period of paradigm instability, shocks that might have resulted in minimal change, during the equilibrium of a normalcy period, often trigger a cascade of events. This pushes the system away from equilibrium toward disequilibrium and moves the paradigm from anomaly to the crisis period (Griffiths, Hart & Blair, 1991; Prigogine & Stengers, 1984).

Tushman and Romanelli (1985) theorized that technology plays a major initiating role in the molding and evolution of paradigms. New technology induces a fundamental slip in the knowledge base that influences a number of organizations. This shifting of information across multiple industries sparks a crisis as members try to adapt and convert their organizations over to the new knowledge base. As the numbers of anomalies mount, organizations begin to look to the knowledge base for exemplars and for models of success in other organizations.

**The Direction of the New Paradigm**

Intense revolutionary periods with widespread confusion and contradiction are the turning points in the selection of a new paradigm. Organizational members frantically search for alternative strategies during the turbulent crisis period. They look for more effective, ways of thinking about and accomplishing their work. Often, as a result, governance of the organization becomes chaotic triggering a political upheaval. This initiates a renegotiation of the established political hierarchy (Jonsson & Lundin, 1977; Tushman & Romanelli, 1985).

One possible outcome of the political process might be the emergence of competing new myths. That is, a dominant coalition may not form around one alternative; individuals might gather in antagonistic groups and discuss ends and means of the present situation. The temporary result is paralysis of action. (Jonsson & Lundin, 1977, p. 165)

A growing organizational consensus that something is wrong characterizes the crisis period. Organizational theorists agree that a paradigm crisis exists when a
number of the following conditions occur:

1. Extensive argumentation, over the interpretation and practice of basic operational principles, occurs internal and external to the organization. (Jonsson & Lundin, 1977; Simsek, 1992)

2. Extensive reports, that chronicle data on failures of the system, are accumulating at an increasing rate. (Jonsson & Lundin, 1977; Simsek, 1992)

3. Emotional antipathy and agitation are increasing among practitioners using elements of the paradigm in their daily practice. (Simsek, 1992; Sterman, 1985)

4. Erosion of organizational performance, that abrades the established political order, is causing unrest among the interest groups in the system. (Jonsson & Lundin, 1977; Tushman & Romanelli, 1985)

5. Escalation of the search for alternative approaches fails to prevent the domino effect anomalies trigger. (Simsek, 1992; Sterman, 1985)

The selection, or revolution, period follows the period of crisis and ushers in the development of alternative paradigm candidates. Sterman (1985) asserted that, by definition, these candidates would be untested and have equal chance for selection. The arduous process of paradigm selection follows through the application of three organizational change strategies. Chin and Benne (1969) first proposed empirical-rational, power-coercive, and normative-re-educative strategies as organizational tools for the planning of change. Organizations employ these strategies to direct the selection of a new paradigm.

An enthusiastic transition period trails the arrival of a new paradigm. New power relationships and the initiation of distinct policy temporarily weaken the early phase of transition. Instability predominates until the organization accepts the fresh set of metaphors and exemplars. These new metaphors and exemplars guide the next iteration of the paradigm life cycle (Jonsson & Lundin, 1977). The gradual, linear
rate of change returns to stabilize organizational performance. The return of organizational stability indicates that the organization and its new dominant paradigm, re-enter the state of normalcy. There is no clear distinction between the periods of paradigm evolution in real time. Historical retrospection illuminates the progression of stages.

Application of the Simsek (1992) model of paradigmatic evolution to the evolution of American educational reform fosters discernment of the powerful systemic forces currently directing the change process. Figure 11 illustrates the parallels between the evolution of educational reform and the rise of a new dominant paradigm. Layering the Simsek model over the wave metaphor, popular in the reform literature, builds a holistic framework for understanding organizational change at the encompassing system level.

The last twenty-five turbulent years of education reform (Cuban, 1990) illustrate the organizational disequilibrium that ushers the emergence of a new paradigm. Each successive wave of similar reform initiatives documents the completion of a period in the paradigm life cycle. The process of paradigm evolution seeks to supplant the mechanistic, Industrial Age paradigm with a holistic, Information Age paradigm. The educational organization experiences the effects of this turbulent transition guiding the coming of the Information Age. The educational reform movement provides the means for transforming the educational organization and reflects the underlying influence of a dramatic paradigm shift.

The third documentary step, that follows, continues the discussion of the historical evolution of educational reform. This step describes the renovation of education projecting the Simsek (1992) model of paradigm evolution onto the evolution of educational reform.
Each of the three major waves of educational reform contributes evidence that corroborates the emergence of a new paradigm for the 21st century. This step uses the fine focus spiral, of the System Development Template, to facilitate an analysis and interpretation of the educational reform movement. The fine focus spiral traverses four elements: (1) description, (2) application, (3) analysis, and (4)
transformation. Three iterations of the fine focus spiral unfold the parallels between
the expression of paradigmatic metaphors and the occurrence of historical events (see
Table 7).

The narration that follows describes the paradigm life cycle and illustrates its' influence on the educational reform movement. Figure 11 portrays the relationships between the impending scientific paradigm shift and the evolution of educational reform. The decline of the mechanistic paradigm precipitates a similar deterioration in the effectiveness of the factory school model. This indicates the initial slip in match between the reform model and the paradigm. This slippage initiates the organizational disequilibrium that catalyzes growth and development. The first three major waves of educational reform represent the disequilibrium period.

Organizational disequilibrium compares to the search for shared vision. The search for shared vision in education continues in an iterative fashion, much like the learning process (Kolb, 1984). The emergence of shared vision results when an organization practices the learning organization disciplines. Shared vision evolves from the reverberations and repercussions of many individual visions condensing to focus and direct systemic organizational commitment.

The First Wave—Paradigm Anomalies

The first wave of educational reform initiates the anomalies phase of paradigm evolution. This wave directly follows the decline of the mechanistic paradigm and the factory school. It catalyzes the rise of the quantum paradigm as the normalcy period for the mechanistic paradigm comes to a close. The first wave of educational reform provides preliminary evidence of the power of personal mastery, mental models, and shared vision to influence organizational behavior. The misalignment of mechanistic mental models, at the dawn of the Information Age, unravels what ever
potential this wave may have had during the Industrial Age.

**Description.** The first wave of educational reform employs change strategies for improving school performance through the transfer of innovation. It posits that change occurs through the dissemination of innovative techniques because, "people accept and use information that has been scientifically shown to result in educational improvement" (Sashkin & Egermeier, 1993, p. 2). The central theme driving the evolution of this wave of reform initiatives originates in the Industrial paradigm. Chin and Benne (1969) first identified the "empirical-rational" strategy behind the dissemination of innovation as part of planned change efforts over twenty-five years ago.

A change is proposed by some person or group which knows of a situation that is desirable, effective and in line with the self-interest of the person, group, organization, or community which will be affected by the change....Because the person (or group) is assumed to be rational and moved by self-interest, it is assumed that he (or they) will adopt the proposed change if it can be rationally justified and if it can be shown by the proposer(s) that he (or they) will gain by the change. (Chin & Benne, 1969, p. 34)

House (1981) modified this tactic to better suit educational organizations, creating a rational-scientific or research and development perspective. Sashkin and Egermeier (1993) referred to the research driven, Newtonian, clockwork, school improvement strategy that dominates the first wave as "fix the parts" (p. 3). This wave represents the dawn of evolution for shared vision in education. It germinates the seed of the idea that schools need to change (improve) and establishes a foundation for the practice of innovation dissemination. Many school improvement initiatives arise and populate the first wave, but fail to achieve lasting universal betterment.

Why do schools, when viewed historically, seem both faddish and resistant to change? Many reforms seem to sweep across the pedagogical heavens, leaving a meteoric trail, but then burn up and disappear in the thick air of institutional reality. Whatever happened? It is not easy to tell. There is a rich
paper trail of such reforms in the advocacy stage, when people make grandiose claims for them, but when they fade, silence often ensues. Since success is often equated with survival, few people have bothered to chronicle transitory innovations. As the saying goes, success has many parents, but failure is an orphan. (Tyack, 1993, p. 340)

Clark and Guba (1965) identified a model that characterizes the specific processes that comprise this strategy. They theorized that development, diffusion, and adoption were necessary to evoke change in educational practice following research: the development phase includes invention and design; the diffusion phase includes dissemination and demonstration; and the adoption phase includes trial, installation and institutionalization. Most of the first wave initiatives stall before institutionalization.

Knowledge, diffusing from sources external to the organization, provides the power source for this strategy. The empirical-rational strategy establishes the have and have not duality reminiscent of classical liberalism. This strategy aligns with early mechanistic views on scientific management. Knowledge of the mechanics of change potential does not lead to acceptance and implementation of change, nor does a massive infusion of federal monetary incentives underwrite successful program outcome achievement. Drawing from the Lionberger (1962) schema for diffusion of innovation, the majority of the first wave initiatives focus on awareness and advocacy. These initiatives generate a great deal of publicity and interest but lose momentum early in the learning curve and fail to reach the final implementation stages.

This wave began to swell during the late 1950s peaking during the 1970s. Research and improvement projects under federal sponsorship were especially numerous. Linkage of research and development efforts with diffusion and innovation efforts through federal support of research and development centers and regional laboratories characterize the initial years. This articulation served to connect
state departments of education with federal initiatives. A common investigation of educational change prompted the coordination of innovation dissemination.

Large scale evaluation studies, during the mid-1970's to mid-1980s, published volumes of information on how to most effectively entice educators to adopt specific innovations. This reform era attempted to perfect the processes by which teachers and administrators learn of and adopt the new programs and practices that usher educational improvement. The reform movement during the first wave expended a great deal of effort to increase educator awareness. During its' reign, this movement progressed from the analysis of single innovation pilot studies to include full scale experimentation with comprehensive innovation packages.

This wave establishes a focus and identifies the need for change. Change acts as the catalyst that incites the development of a shared vision for education. The first wave initiatives focus primarily on the achievement of basic skills. This thrust accomplishes little improvement in the content of instruction and fails to alter the reigning notions of teaching and learning. The first wave supplies a start. A vision evolves for education during the first wave, but the entire organization fails to share it.

The first stage in reform was to convince people that the present system of schooling was inefficient, anachronistic, and irrational—if not rotten. This has long been the strategy of utopians who condemn existing arrangements in order to substitute an alternate vision of the future. (Tyack, 1993, p. 339)

The academic research and development perspective of the first wave excluded bureaucrats and teachers. The front-line educators did not play a significant role during the first wave and soon became the focus of blame. The first wave comes to a close with the tone and fervor of reform rhetoric escalating from critique and analysis to condemnation and approbation. By the end of first wave, many reformers proclaimed that mediocrity in the teaching profession and the lackadaisical nature of
governance were the root of the poor educational system.

Application. The first wave of educational reform originates during the early 1950s. It begins to peak in the 1960s with huge federal and private financial investment in national curricular reform, open plan schools, and individualized instruction. The 1960s was a utopian time of "optimism and urgency when comprehensive reform—reinventing education—seemed possible" (Tyack, 1993, p. 360). Table 8 and Table 9 summarize the major single and multiple innovation initiatives of the first wave of educational reform.

Federal education policy and companion initiatives to reform local practice began in 1965 with the Elementary and Secondary Education Act (ESEA) (Wilkerson, 1970). Early federal intervention policies were categorical efforts targeted for specific groups disregarded by the schools. Broad social purposes, values and equity concerned this era. The early reforms were redistributive to counter the perception of imbalance in the allocation of local resources for education. The fundamental assumption of the early first wave was that local practitioners knew what to do but lacked the motivation or resources to provide the federally mandated services (McLaughlin, 1992).

This was a shotgun approach that did not lead to stable changes in education. It did not reflect strategies planning for change nor did it address implementation procedures. Desperate hope predominates this first wave of reform efforts. Bullard and Taylor (1993) referred to this flood of activity as a "watershed period" for American educational philosophy. The foundation for the core belief during this era shows the Newtonian origin of this wave of reform. The first wave reformers acted on faith that something would change for the better as a result of a random barrage of innovative theories and ideas. First wave reformers held that the adoption of a new
idea completes a school improvement initiative. The sheer volume of first wave initiatives lacking evaluation demonstrates the reformers' belief that awareness and adoption equate with practice and performance. The term implementation is absent from most of the reform rhetoric of this period.

Table 8

The First Wave Reform Single Program Initiatives

<table>
<thead>
<tr>
<th>Program</th>
<th>Participation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot State Dissemination Project (PSDP)</td>
<td>Sieber et al. (1972)</td>
<td>3 states Based on the success of the Agricultural Extension Agent Service Programs and led to development of National Diffusion Network.</td>
</tr>
<tr>
<td>RAND Corporation; National study of Federally funded innovation</td>
<td>Berman &amp; McLaughlin (1978); McLaughlin (1990)</td>
<td>293 projects Neither money, effort nor content influenced the diffusion of innovation. Local capacity and will are key elements.</td>
</tr>
<tr>
<td>Dissemination Efforts Supporting School Improvement (DESSI)</td>
<td>Crandall &amp; Loucks (1983)</td>
<td>150 schools Consistent with the Rand study</td>
</tr>
</tbody>
</table>
Table 9
The First Wave Reform Multiple Program Initiatives

Multiple Program Innovation, Dissemination and Adoption
(Overlap with the Third Wave)

<table>
<thead>
<tr>
<th>Program</th>
<th>Citation</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive School Improvement Program</td>
<td>Ford Foundation (1972)</td>
<td>Staff development to change educational structures (allude to the second wave); looks to the systemic nature of problems but underestimated cost and complexity.</td>
</tr>
<tr>
<td>Federal sponsored 1960's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Schools Programs</td>
<td>Doyle (1978)</td>
<td>Underestimate of complexity and overestimation of capability of federal staff involvement in local efforts.</td>
</tr>
<tr>
<td>Federally supported 1970s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Schools</td>
<td>Edmonds (1979)</td>
<td>Not purely rational-scientific, mixed with normative-reeducative</td>
</tr>
</tbody>
</table>

It is only since the 1960s that we have been able to understand how educational change works in practice. We have come to call the decade of the 1960s the adoption era, because educators were preoccupied with how many innovations of the day were being taken on, or adopted. It was a period of new maths, new chemistry and physics, open education, individualized instruction, team teaching, and so on. Innovations, the more the better, became the mark of progress. (Fullan, 1992, p. 21)

The first large scale implementation evaluation studies surface during the early 1970s. These inflammatory studies identify a lack of forethought and follow through in the innovations of the 1960s. The insurgence of program evaluation precipitates a developing sense that something is wrong. Books appearing at the turn of the decade like Behind the Classroom Door (Goodlad et al., 1970), Implementing Organizational Innovations (Gross et al., 1971), The Culture of School and the Problem of Change (Sarason, 1971), and Anatomy of Educational Innovation (Smith

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& Keith, 1971) expose the errors of rampant adoption of innovation without accountability.

Evaluation, recovery and regrouping efforts define the narrow scope of reform initiatives during the bulk of the stagnant, refractory 1970s. A notable exception was the National Diffusion Network (NDN).

The US Department of Education adapted the successful Pilot State Dissemination Project (PSDP) program to field-test and disseminate local curriculum and program innovations (Havelock, 1969; Sieber, Louis, & Medzker, 1972). Emrick, Peterson and Agarwala-Rogers (1977) found that the NDN was one of the few successful federal efforts to make wide-scale use of important educational innovations.

Little confidence in the first wave initiatives persisted through the end of the 1970s. Minor triumphs generated insufficient success in isolation and failed to replicate on a larger scale. The massive Rand Corporation study (Berman, Greenwood, McLaughlin, & Pincus, 1975; Berman & McLaughlin, 1974, 1975, 1978; Berman & Pauly, 1975; Greenwood, Mann, & McLaughlin, 1975), and the Project Innovation Evaluation (Stanford Research Institute, 1975), both found a high degree of adaptation and modification necessary to suit innovations local use. Users rarely adopted innovations without modification. These studies concurred that there was little enduring difference in the schools studied. Despite the large infusion of federal dollars, the first wave of innovations failed to significantly alter prior practice. McLaughlin (1989), in a reexamination of the Rand study, stated that it was extremely difficult for policy to change practice because the mechanics and variability of implementation at the local level always dominated outcome. Both studies found that local capacity and will were the most critical factors for successful change.
The pioneering evaluation work of Hall and Loucks (1977) initiated a new emphasis on the implementation of change and the establishment of accountability. Accountability presents an outcome for measurable pupil impact. Although the 1970s produced scant innovation, it was a period of exponential evaluation research. At the end of the 1970s, evaluation initiatives began to link declining student performance with declining economic markets. Consensus and commitment began to brew out of conflict. Discord among business, political, and educational leaders developed over the accountability of dissemination initiatives. A startling vision evolved out of discord. Nearly everyone agreed that something was wrong with our educational system. The urgency calling for change was undeniable.

By the end of the 1970s, the effective schools' movement had accumulated information about the major elements facilitating the introduction of single innovations (Edmonds, 1979). Staff development strategies began to emerge (Joyce, 1987, 1990, 1991; Joyce, Hersh, & McKibben, 1983; Joyce & Showers, 1988; Joyce, Showers, & Rolheiser-Bennett, 1987) on the cusp of the second wave.

Nationally funded evaluation studies continue to predominate in this waning phase of the first wave. Louis, Rosenblum, and Molitor (1981), in a NIE sponsored study of the Research and Development Utilization Program (RDU), found that planning and extensive technical assistance in conjunction with a problem-solving approach was more effective than simple adoption of innovation. Similarly, the Dissemination Efforts Supporting School Improvement (DESSI) program, investigating federally supported adoption approaches, found that it was the federal funding that served as the primary stimulus for change (Crandall & Loucks, 1983). This confirms the findings of the Rand study a decade earlier.

Crandall (1989), in a retrospective of the 1983 DESSI study, observed that the transformation of complex social systems involves a mixture of persistence, politics,
people and knowledge. Knowledge acts as the weakest link in the process yet it is the one around which reformers of the first wave plied their trade.

The NDN continues into the 1990s promoting programs that transfer multiple innovations, such as complex school improvement strategies for science and mathematics education (Office for Educational Research and Improvement [OERI], 1990, 1991) and restructuring, from one school or district to another. Innovations like the Outcomes-Driven Developmental Model (ODDM) from the Johnson City, New York school district and the Program for School Improvement (PSI) from the University of Georgia, promote shared decision-making to improve the quality of classroom and school life for all students. The NDN proves the exception and serves as one of the few exemplars illustrative of the first wave of reform.

A general agreement, reverberates throughout the recent reform literature, that the bulk of the dissemination of innovation strategies have yet to produce significant change. This pronouncement heralds the denouement of the first wave of educational reform. The merit of a reasonable idea alone provides an ineffective strategy for creating change in our schools. This leaves most reform-minded educators wondering, what to try next?

Analysis. The "fix the parts" school improvement strategy works best in the grounding and diffusion of generally acceptable "thing" technologies (Sashkin & Egermeier, 1993). It establishes a tradition of relatively passive recipients of input in diffusion situations. Mort and Cornell (1941) identified the slow tempo of diffusion and utilization for research findings and inventions in public education. The passive stance of this strategy introduces a flaw that delays the development of a shared vision for education.

Bennis (1969) claimed that the empirical-rational perspective suffers from an
intrinsic, rationalistic bias. This rationalistic bias weakens the impact of the empirical-rational perspective as a change strategy. The symptom of insufficient program evaluation before implementation, during the first wave, indicates this bias. The problems of the first period of intense reform, reflect that "knowledge about something does not lead automatically to intelligent action" (Bennis, 1969, p. 68). Benne, Chin and Bennis (1969) prophetically presented the three problems plaguing this initial wave: (1) the pitfalls of reliance on etiology, (2) the issues of predictability and control, and (3) the working contexts of comprehension and verification.

The practitioners of planned change during this period expressed keen interest in causation. Frequently practitioners are, "booby-trapped into using a theory of origins of the problem as a basis for ... intervening in helping to solve the here-and-now problem" (Benne, Chin & Bennis, 1969, p. 122). Strategic intervention, that restores effective organizational function, requires different actions than interventions affecting the "basic causes" that precede a problem. This creates a relative state of functional autonomy for the present and leads to a corrective rather than preventive plan of action.

The reports of behavioral scientists often lure practitioners into believing that a "predictable specificity of consequences will follow if he but learns to act in the correct manner" (Benne, Chin & Bennis, 1969, p. 123). Low predictability and lack of control characterize the dynamics of complex social organizations. Spontaneous, unpredictable consequences are pandemic in the actions of a complex social system. In a society that held change commensurate with progress, it is no wonder that educational leaders applauded and pushed for the rapid institutionalization of every new gimmick during this period.

Educators want to appear responsive to criticisms and to public demands for change. This is one way to retain the credibility to tax-supported and publicly controlled schools as accountable institutions--to justify the faith that
Americans have vested in education as the engine of social betterment. Politicians, foundation officials, business leaders, social critics and others feel compelled to do something about schools when they are considered to be in crisis. (Tyack, 1993, p. 370)

The hasty, idiosyncratic rapprochement of this period suggests that educators "examine the issues surrounding our methods of diagnosing to assess the relative emphases to be placed on 'understanding' and on 'verification' " (Benne, Chin & Bennis, 1969, p. 123). These surprisingly prescient authors warned twenty five years ago that misdirection occurs when organizations sacrifice one for the other. Awareness and interest dominate this wave. Organizational concern focuses on the generation of understanding through the exploration, formulation and comprehension of phenomenon. First wave reform initiatives exhibit a high degree of codification and personalization that celebrates the potential of ideas. First wave reformers placed high value on simple understanding and quick adoption, neglecting the skepticism and rigorous evaluation procedures that explicitly investigate and verify actions.

While utilization is a hope for some and even a firm expectation for others, it remains, for most of us, a poorly defined and poorly articulated concept. One the one hand, we are aware of an enormous and ever-increasing body of specialized scientific knowledge and, on the other hand, we have a vague vision of this knowledge being used by people to make ... better schools, more healthful and productive organizations or happier community relations. Yet there is no clear picture of how we get from one end of the utilization chain to the other. We know, or at least we feel, that science has been and will be useful, but we do not know much about the transition from science to improved action and practice. (Havelock & Benne, 1969, p. 125)

Havelock and Benne (1969) were among the first to express the vague, lack of focus and common purpose of the first wave. They pointed out communication difficulties and role conflicts that occur at the points of systemic interchange. They identified the lack of vision, cohesion and commitment that accompany the first wave. These implementation problems of the first wave herald and illuminate normative issues. This initial claim, although part of the literature of the first wave, serves as the vanguard for emerging allegiance to political and cultural perspectives.
Unremarkably, resistance to change creates the main problems plaguing the first wave of reform. The lack of shared vision erects an organizational obstacle that limits the first wave of school improvement. The blind, condescending attempts to coerce educators to adopt and implement numerous innovations did not serve as levers for dramatic school wide improvement as originally planned.

Successful adoption of innovations is far more complex and costly a process than had been imagined. When coupled with the great complexity of whole-school change, such efforts falter. And, when true costs are figured in, the relative advantage of these school improvement approaches over the status quo becomes less impressive. (Sashkin & Egermeier, 1993, p. 9)

The first wave of reform generated a substantial amount of knowledge about change, in theory, and identified a myriad of symptoms contributing to the state of dysfunction in education. The first wave, in practice, merely advocated the imitation of change. The superficial tinkering of the empirical-rational strategy sought to correct isolated parts of the system. This tactic resulted in little more than manipulation and misdirection.

When those who have the power to manipulate changes act as if they have only to explain, and when their explanations are not at once accepted, shrug off opposition as ignorance or prejudice, they express a profound contempt for the meaning of lives other than their own. For the reformers have already assimilated these changes to their purposes, and worked out a reformulation which makes sense to them, perhaps through months or years of analysis and debate. If they deny others the chance to do the same, they treat them as puppets dangling by the threads of their own conceptions. (Marris, 1975, p. 166)

Transformation. The scathing reports of the early 1970s resulted in predictable reflexive reactions calling for greater efficiency and better performance through harder exertion. Significantly, the first wave of reform forges allies from the top echelon of the educational hierarchy. They agreed that something was wrong education and they recognized the need for change. They failed to agree on the specific nature of the problems confronting education. This nebulous consensus
furnishes the most significant contribution of the first wave of educational reform.

The garnering of a strong hierarchical consensus without a clear focus, expedited the most significant problem met by the first wave of educational reform. The swift, defensive reaction of the controlling organizational hierarchy triggered re-implementation of old solutions. Homeostatic mechanisms overwhelmed the demands of first wave challenges because, "significant change does not occur on the basis of 'brute sanity' " (Sashkin & Egermeier, 1993, p. 16). A rational-empirical strategy alone ineffectively directed change, because educators failed to correctly diagnose the systemic problems plaguing education.

Armstrong's (1992) mechanistic metaphor provides the framework for organizational action during this first wave. The vision, shared by the top echelon of the organization, interpreted the educational system as analogous to a machine. The mechanistic metaphor, "suggests a straightforward path toward a predetermined goal unhampered by contextual constraints" (Armstrong, 1992, p. 1). Closed systems, like machines, are relatively insensitive to changes in contextual information. Closed systems appear unreactive because homeostatic mechanisms effectively maintain the status quo. The design of the educational system, responding to first wave initiatives, deflects change.

First wave reformers sought to fix and replace the broken pieces in the educational machine. They agreed on the sub-optimal operation of the machine and began wildly searching for the source of the malfunction. They thought a tune up would improve lagging performance. Reliance on the replacement of parts severely limits organizational learning. The "limitation of this metaphor is its actual disempowerment of the individual" (Armstrong, 1992, p. 1).

The relative insensitivity of a closed system, to environmental information, obscured paradigmatic influence. The decline of the mechanistic paradigm and
emergence of the quantum paradigm went undetected. Opposition between system
design and the rising influence of a new paradigm results in anomalous system
behavior.

Observation of organizational changes, through the metaphoric lens of the first
wave, illustrates the form of evolution as an erratic rebellion. Change appears to act
external to education rather than to emerge from within. This consensual based
metaphor does not account for variance in contextual conditions. This perspective
leaves education armed with ideas but powerless against the chaotic external forces
that mold the environment. The escalation of conflicting organizational behavior at
the end of this wave signals the beginning of the crisis phase of paradigm evolution.

The Second Wave—Paradigm Crisis

The second wave of educational reform launches the crisis phase of paradigm
evolution. This rise of the second wave closely follows the demise of first wave
initiatives. It contributes a sharp rise in organizational conflict as the levels of
disequilibrium mount. The ascendancy of the quantum paradigm forces the
anomalous behavior, indicative of the first wave, to propagate to crisis proportions.

The second wave of educational reform polarizes the emphasis of change
strategies, against architectural solutions, further fanning the fires of conflict.
Importantly, under the direction of the quantum paradigm, conflict and disequilibrium
are crucial to the evolutionary process. The effectiveness of reform initiatives
populating this wave indicates that educational reformers are beginning to practice the
disciplines of the learning organization.

The crisis that ensues, as educators examine and explore the mental models
guiding their behavior, brings the evolution of a shared vision for education that much
closer. The second wave of educational reform establishes a glimmer of the vision
education desires to create. The misalignment of mechanistic mental models thwarts change throughout the second wave. At the same time the discord fuels the paradigmatic evolution. Education approaches shared vision, not by consensual effort as originally thought, but through experimentation with conflict.

**Description.** The first wave focused on fixing the parts and did not significantly alter pupil outcomes. As a result, another wave of major reform rose to redress the definition and division of the problems facing schooling. The second wave of educational reform perplexed public education during the decade of the 1980s. This second wave of educational reform replaces federally sponsored research and development initiatives with the economic drive of state mandate for change.

During the 1980s, education became a major tool employed by state and local governments to promote economic development. Governors who had run on platforms of 'jobs, jobs, and jobs' at the beginning of the decade campaigned for re-election on the promise of educational excellence. In Washington, Congress has linked education to international competitiveness and both presidential candidates in 1988 promised to be 'education presidents.' (Vaughn, 1989, p. 1)

The reforms of this turbulent period targeted the continuing decline in student achievement. Voluminous reports heightened public awareness of the multitude of problems in education and incited a chaotic reaction. Several conflicts, which began brewing as anomalies during the first wave, burst on to the scene contributing to a full blown paradigm crisis during this phase of the reform movement.

The National Commission on Excellence in Education's (NCEE) 1983 report, *A Nation at Risk*, served as one of American education's most effective battle cries, in an increasingly vigorous era of education reform. McLaughlin (1992) noted that this influential report continues to serve, in this capacity, 10 years later. *A Nation at Risk* focused the eyes of the nation on two enduring, fundamental problems: (1) equity—the social conflict of fallen, inappropriate national education standards (student
performance); and (2) excellence—the political consensus that the school professionals are responsible for the decline (teacher competency). Differences in opinion abound in the educational research literature concerning the exact status of our schools; however, agreement exists that our schools continue to be ineffective for many of our nation's students. Discussion of this debate in detail exceeds the scope and purpose of this thesis.

Declining student achievement, with its highly vocal prognostication of drastic economic repercussions, and the assertions that identify teacher quality as the causal agent, rival as the tandem problems of equity and excellence. During the second wave educational reformers sought limited structural solutions to these problems with systemic proportions. State control, through top-down legislation, and local controls, through bottom-up restructuring efforts, focus attention on power and culture as possible strategies to achieve change.

The second wave of reform emerges during the Johnson administration. It peaks and gains momentum from the changed political culture and economic conditions during Regan's New Federalism. A change in the socio-political environment pushed responsibility and authority for policy making down to the states. Two phases are evident: (1) the early to mid-1980s, with strife primarily over the issue of equity and standards to improve student performance and (2) the mid- to late 1980s, with struggles to resolve the issue of excellence through identification of the factors that enrich teacher quality. Limiting the movement toward economic recovery through equitable education was that new standards would have little effect unless teacher quality improved. Table 10 summarizes the pivotal judicial, legislative and commission mandates from the second wave of educational reform.
Table 10
The Evolution of Equity and Equal Opportunity Education as It Relates to the Second Wave of Educational Reform

<table>
<thead>
<tr>
<th>Date</th>
<th>Stimulus</th>
<th>Educational Opportunity Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900s</td>
<td>City Schools Systems in the United States (1885)</td>
<td>Free access to minimum common curriculum and standard compulsory public education as crucial entry point into the labor market (Katz, 1971; Philbrick, 1885; Rossmiller, 1987)</td>
</tr>
<tr>
<td>1920s</td>
<td>The Cardinal Principles Report (1918)</td>
<td>Recognition of different educational futures and differentiation of vocational and college preparation (National Education Association, 1918; Tyack, 1974)</td>
</tr>
<tr>
<td>1950s</td>
<td>Brown v. the Board of Education (1954)</td>
<td>Inequality defined as the consequences of schooling for individuals of unequal backgrounds and abilities, segregation unconstitutional (Coleman, 1968; Schorr, 1993; Schorr &amp; Schorr, 1989)</td>
</tr>
<tr>
<td>1960s</td>
<td>Equality of Educational Opportunity (1966)</td>
<td>Student outcomes and achievement depend on factors external to the school, focused research away from equality and onto issues of outcome and productivity (Coleman et al., 1966).</td>
</tr>
<tr>
<td>1970s</td>
<td>Serrano v. Priest (1971)</td>
<td>Equality of expenditure among districts within a state, education not a function of wealth leads to many states entering into school finance litigation (Verstegen, 1991)</td>
</tr>
</tbody>
</table>
Academic excellence and teacher accountability became the top priorities. State legislation reached into the technical core of schooling challenging a domain previous held by the local school boards. The central theme distinguishing this wave is that of state level mandates for reform. This contrasts the federal encouragement of the first wave.

The avalanche of legislation, spurring the rise of this wave, originates in the mechanistic, correction and replacement mode of the Industrial paradigm. Sashkin and Egermeier (1993) referred to dual nature of the politically and socially motivated school improvement strategy, that dominates the second wave, as "fix the people" (p. 3). The people perspective described the focusing of organizational vision on a philosophical and legislative mandate to improve the quality of individuals and increase the effectiveness of the relationships involved in the education endeavor.

The second wave of educational reform employed two competing change strategies to tackle the problem of deteriorating student performance. One strategy installs top-down architecture and mandates changes in standards of performance for individuals. Shifts in organizational governance characterize this approach. This coercive strategy "seek[s] to mass political and economic power behind the change goals which strategists of change have decided are desirable" (Chin & Benne, 1969, p. 53). This strategy lacks the spirit of collaboration. The technocratic bias of this governance strategy delays the development of genuinely shared vision in education.

Technocratic bias ignores the importance of the human element. Change typically involves risk and fear. Yet, change driven by bureaucracy makes no allowance to work through and discuss these elements. Argyris (1962) found that bureaucratic purpose stresses the rational task aspect of work and disregards the essential human elements that, if neglected, reduce organizational performance.

Chin and Benne (1969) first recognized the power-coercive strategy behind
the dissemination of innovation as part of planned change efforts. The influence of external laws and administrative policy generates power and prods the process of effecting change through organizational compliance. House (1981) modified this strategy to better suit educational organizations, calling it a political perspective.

The political perspective was especially prominent in major top-down, state-level reforms that followed the shift in initiative from federal to state levels in the early 1980s. This perspective was demonstrated, for example, by strong external policy controls derived through processes of bargaining and political compromise among power groups. The most simplistic version of this perspective was to mandate certain changes and outcomes, often by law. It was then assumed that the changes would be made. A more sophisticated version of the same political perspective involves those in top-level power positions formally waiving various controls and requirements if lower-level agents (schools or districts) can demonstrate that they are achieving certain desired conditions or outcomes. (Sashkin & Egermeier, 1993, p. 2)

The other strategy, with bottom-up architecture, directs the training and development of professionals capable of declaring and achieving desirable outcomes. This strategy works to increase the effectiveness of the relationships between individuals. It poses that, "improved educational outcomes are best achieved by first improving the knowledge and skills of teachers and administrators, making them better able to perform their assigned roles" (Sashkin & Egermeier, 1993, p. 9). This professional development contribution to the second wave is more complex. It employs educational research, reflecting distinctive remnants of the empirical-rational focus of the first wave, and elements of organizational development that contribute, what Chin and Benne (1969) would call a normative-reeducative influence.

Chin and Benne (1969) stated that people technology is as necessary, to an organization undergoing change, as part technology. People technology supplies elucidation and revision of values through experiential learning. This aspect achieves an optimum adaptation to the changing internal and external environment. An organization must develop and institutionalize its own problem-solving structures and processes to sustain evolution. People technology fosters the development of the
learning organization disciplines.

Change in a pattern of practice or action, according to this view, will occur only as the persons involved are brought to change their normative orientation to old patterns and develop commitments to new ones. (Chin & Benne, 1969, p. 33)

This inherently collaborative, cultural strategy directly conflicts with the intrinsically bureaucratic, political strategy. The normative-reeducative perspective promotes changes in attitudes, values, and relationships. Creative adaptations to changing conditions arise from within human systems. This perspective asserts that innovation does not have to import knowledge, information or intellectual rationale from the outside. The individualistic bias of this strategy creates its' boon and its' bane. Bennis (1969) found that this strategy has a very local orientation and denies the systemic organizational forces that surround each pocket of practice.

This second wave of reform represents the continuation of a search for shared vision in education. The second wave falls disappointingly short of expectation. "It then seemed almost as though those in powerful positions, seeing this failure, said, 'We gave you social scientists all this money to no effect. By gosh, we'll just make them do it' " (Sashkin & Egermeier, 1993, p. 17). The second wave is no more effective, at creating enduring changes, than the first wave. The second wave does establish links between policy instruments, organizational development and the technical requirements for improvement of school performance. Many school improvement initiatives arise during this governance/organizational development phase but fail to achieve lasting universal betterment due the conflicts inherent in a traditional piecemeal approach.

**Application.** School improvement efforts of the Sputnik era, provide the foundation and initiation point for the second wave of reform. The habitually touted rubric of educational excellence bundles the reforms of this era bundle together to
create a comprehensive fabric for reform. The thread of educational excellence weaves through the history of educational reform in the United States. Educational excellence cycles with a periodicity of about ten to twenty years. The educational excellence movement undergoes transformation to surface during each cycle with a definition modified by contextual conditions. Table 10 catalogues the evolution of the educational excellence movement.

The first rounds of the excellence reforms, during the 1950s, focused attention on academically talented boys and were primarily applications of thing, or material technologies. The cold war proposals of James B. Conant (1959) were mute on the point of girls, the academically deficient, and the urban poor. The second round of the excellence movement, during the Vietnam era, represented a significant departure from the excellence agendas two decades earlier. The orientation of the next cycle slanted toward a focus on people, or social technologies.

There was growing concern, during the Vietnam era, about the access of poor and minority students to high-quality schooling. Society's obligation to overcome the social and educational deficiencies caused by poverty and discrimination formed the premise for early second wave initiatives (Rawls, 1971). This premise serves as the foundation for education reforms, ESEA Title I and Head Start, initiated during the Johnson administration (Wilkerson, 1970). Excellence in education evolved to mean compensatory services to promote equality in the outcomes of schooling. Equal opportunity would soon evolve to mean opportunity for all students to meet their own needs for education regardless of race, ethnicity, cultural preference or ambition (Farrar, 1990).

Early during the second iteration of the excellence movement, reformers made claims that the quality of education was poor due to inadequate teaching, low curriculum standards, large class size, and inadequate instructional materials. They...
believed many students to be victims of intergenerational poverty and unable to benefit from the environment in current schools. Accordingly, schools were resistant to the first wave federally mandated dissemination of innovation. Schools were reluctant to modify traditional delivery systems, which work for middle class students, to suit the needs of the disadvantaged, while maintaining standards for all.

The emergent second wave overlaps the peaking first wave. The overlap occurs as federally mandated dissemination of people technology combines with federally funded diffusion of thing technology during the second wave.

These piecemeal efforts led to a dysfunctional cul-de-sac. The eager socio-political reformers badly misunderstood the systemic nature of the problem. The colloquial definition of insanity, common to 12 step self-help groups coping with dysfunctional behavior, illuminates this deplorable situation. It is insane to keep using the same techniques in a recurring situation and expect that the outcomes will miraculously change.

Contrasting two previous generations, the excellence movement of the 1980s, made the choice to mandate reform in local schools. Political entities enact this third generation of the excellence movement. This represents an expansion in the deployment of power-coercive strategies. Previous efforts relied solely on the rational-empirical power of intellectual persuasion. In this round, the buzzword becomes equity, calling for improved performance for all students.

In 1983 the report, A Nation at Risk, initiated a dramatic intensification of second wave reform. The rise of the second wave of reform gained momentum from an avalanche of national commission reports and privately funded studies released early in the decade. The report of the National Commission on Excellence in Education (1983), A Nation at Risk, was clearly the most influential. It was the most widely disseminated and read. It aroused public opinion to the need for reform
During the same period, the Education Commission for the States [ECS] distributed *Action for Excellence* (1983), the National Science Board [NSB] released *Educating America for the 21st Century* (1983), and the Twentieth Century Fund issued *Making the Grade* (1983). These reports made essentially the same recommendations as *A Nation at Risk*. In addition, several scholarly critiques of secondary education released shortly after the NCEE report, served as the catalyst for earnest public debate about the status of American schools (Boyer, 1983; Goodlad, 1984; Sizer, 1984).

The stakes spread to large scale tinkering as state governments rushed in to fill the vacuum created by decreased federal intervention. Ignoring the lessons of history, state legislatures mimicked the federal initiatives of previous era, and began experimentation with structural solutions to local problems through top-down mandates. In response to national commissions, virtually every state put the reports to use. States sought to improve student performance, by increasing their requirements for high school graduation, calling for more courses and increasing the distribution requirement for mathematics and science (Green, 1987; Pipho, 1986).

The extent of state education reform after 1983 is startling even when one acknowledges that the states have been on the move since 1965. By July 1984 the Education Commission of the States reported that 250 state task forces had sprung up to study every aspect of local education and to recommend changes in local control....What is striking about the 1983-1987 state reform era was (1) the rapidity of the spread of similar policies among the states and (2) the tendency for the reforms to impact similarly states with highly dissimilar political cultures. (Kirst, 1993, p. 93-94)

The first round of commission reports also championed the belief that teachers must improve. This led to increased teacher certification requirements, and incentives to improve the pay and working environments. Two-thirds of the states initiated upgraded teacher certification and required standardized testing by the late 1980s (Goertz, 1986). Other reforms included teacher career ladders and new training
programs for administrators (Fuhrman, 1986).


The timbre of later reports contrasts that of the spate of earlier reports. The second generation of reports called for close articulation between schools and schools of education and more local involvement. "They address more complex issues, including some important aspects of schooling that were overlooked earlier, such as the need for students to be creative as well as competent in the basic skills" (Green, 1987, p. 3).

State policy, during the waning phase of the second wave, focused on the central context and substance of instructional policy. During the second half of the decade, as social and political pressure mounted to improve student performance, the importance of accountability from within the various stakeholder groups began to rise. As state governments tackled the compound issues of school structure and governance, the rising tide of organizational development research supported the pivotal role of teachers as solutions.
Table 11
A Comparison of Selected National Reports, 1983–1986

<table>
<thead>
<tr>
<th>Force</th>
<th>Centralization</th>
<th>Centripetal Influence of State Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report</td>
<td>A Nation at Risk</td>
<td>Tomorrow's Teachers</td>
</tr>
<tr>
<td>Problem</td>
<td>Declining standards, linkage of education and economics</td>
<td>Lack of technical expertise with the teaching profession to improve quality of teaching</td>
</tr>
<tr>
<td>Solution</td>
<td>Restoration of high standards at the school level, get tougher.</td>
<td>Professionalization of teaching through the creation of entry standards that enhance the quality of schooling.</td>
</tr>
<tr>
<td>Role of Local School Professionals</td>
<td>Viewed as the fundamental problem, needing more regulation and standardization to improve performance</td>
<td>Viewed as recipients of authoritative top-down solutions from the research community with a narrow scope</td>
</tr>
<tr>
<td>Issue</td>
<td>Focus on educational inputs with excellence more important than equity</td>
<td>Professionalization of teaching champions excellence and teaching as input</td>
</tr>
<tr>
<td>System Structure</td>
<td>Acceptable as is</td>
<td>Acceptable but, calls for restructuring of teacher education</td>
</tr>
</tbody>
</table>
### Table 12
A Comparison of Selected National Reports, 1990

<table>
<thead>
<tr>
<th>Force</th>
<th>Decentralization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Centrifugal Influence of Local Control</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Report</strong></td>
<td><strong>Tomorrow's Schools</strong></td>
</tr>
<tr>
<td>Author</td>
<td>(Holmes Group, 1990)</td>
</tr>
<tr>
<td>Problem</td>
<td>Lack of equitable political involvement in the improvement of education</td>
</tr>
<tr>
<td>Solution</td>
<td>Democratization of education to include diverse social and economic groups in the improvement process</td>
</tr>
<tr>
<td>Role of Local School Professionals</td>
<td>Viewed as collaborators with higher education to initiate bottom-up, egalitarian solutions with a broader scope</td>
</tr>
<tr>
<td>Issue</td>
<td>Democratization of education champions equity with a focus on learning outcomes</td>
</tr>
<tr>
<td>System Structure</td>
<td>Acceptable but, calls for implementation of Professional Development Schools</td>
</tr>
</tbody>
</table>

The conflict between structure and governance expanded as reformers attempted to force the development of shared vision though the coercive use of power and culture. This classic conflict grew to exemplify the crisis period of a major paradigm shift during the decade of the 1980s. The proposal of multiple, antagonistic solutions to many diverse but connected, problems characterize this period.
There is a serious lack of consensus as to what direction educational policy should take. The failure to identify the lack of prepared capable workers for the new industrial revolution is a broad and deep problem much like the metaphor of the boiling frog. We fail to recognize the crisis enveloping us and are unprepared to take effective action. (Marshall & Tucker, 1992, p. 70)

The states continued to seek consensus for change during the opening years of this decade. The states sought consensus through the creation of bold education goals for the nation. The National Governors' Association Task Force on Education (1990) submitted a report, *Educating America: State Strategies for Achieving the National Goals* that made assurances ensuring that "our children have the skills they need to compete in the world marketplace" (p. 5).

Building a consensus for change is not just a catch phrase for the nineties. It is a critical strategy for bringing about the changes required. States will continue to bear the principle responsibility for leading the effort to achieve these goals, but they cannot be achieved by the state government alone. Our success will depend upon the support and active involvement of teachers, parents, administrators, school board members and the business community. (National Governors' Association Task Force on Education, 1990, p. 5)

In the seven years that separate the two most influential reports of the second wave, *A Nation at Risk* (1983) and *Educating America* (1990), the nature of the problem as well as the framework for the solution has changed. The current, fourth iteration of the excellence movement proposed to "upgrade educational quality for all [italics added]students" (Farrar, 1990, p. 5). The current version of the excellence movement is more ambitious and comprehensive in scope. It begins to move beyond establishment of high standards from within the current system. The focus shifts the role of teachers. Teachers shift from being problem to providing the solution.

Staff development initiatives stem from the cultural perspective. The influence of the cultural perspective began to rise during the last years of the second wave. Fullan (1990) linked staff development with institutional development. "Staff development can be an effective tool for change, both in terms of change in teaching and improvements in learning" (Sashkin & Egermeier, 1993, p. 10). Fullan (1990)
concluded that staff development provides an important tool for educational reform. Staff development leads to improved teacher performance. This critical link places teachers in the role of learner. In conjunction with appropriate policies and organizational arrangements, staff development became an integral part of the strategies dominating the decline of the second wave.

The insurgence of staff development strategies points to the professional teacher movement. This affects the century-long dominance of the bureaucratic structure of schools. School professionals require more autonomy and a reversal of the stiff state centralization that dominated the 1980s. The end of the second wave of reform approaches as education examines the need to restructure the current system.

Analysis. Efforts to define and achieve excellence in education characterize the second wave of educational reform. The second wave expresses a struggle to identify and work toward the achievement of a vision for education. Economic development provides the impetus behind this convoluted journey.

Education might not fare as bad as might be expected because the momentum is with reform. After all, few expected the interest in reform to last this long, and it has shown few signs of ebbing. As long as education reform is tied closely to economic development—and the second wave of reports has continued this trend—the pressure to make substantive changes will not go away. The nation is too committed at this point to regaining its place a leader in the world economy, and education has a major role in making that a reality. (Green, 1987, p. 28)

Concern for the decline in America's position in the world market was the motivating factor for the first iteration of the quest for excellence in education during the Sputnik era. This concern continued under the guise of equity through a second iteration during era of the Great Society. The definition of equity developed further during the third iteration of the Regan era. By 1986, a survey by the National Governors Association found at least 20 states with major education initiatives targeted to improve their economies (Clarke, 1986).
By embracing education as an economic development tool, policymakers were doing more than simply responding to a new fad. They were adopting a new economic metaphor—a new way of understanding how the economy works and identifying determinants of development. Development policy has shifted focus, from providing incentives for the accumulation of physical capital to emphasizing investments in human capital. (Vaughn, 1989, p. 1)

Reform initiatives during the post-Sputnik phase of the excellence movement interpreted deterioration of student performance standards as the primary problem confronting education. The commission reports blamed the steady erosion of student performance on a parallel decay of teacher performance; however, the thrust for economic development that spawned over a decade of teacher bashing has come full circle.

Three important changes in the national education environment, during the Regan years, prolonged the twenty year supremacy of the second wave of educational reform: (1) abdication of the federal role, (2) increases in state involvement, and (3) numerous national and private commission reports (Farrar, 1990).

Clark and Astuto (1986) described "the five D's" of the Regan plan to diminish every aspect of the federal role in education: (1) disestablishment of the US. Department of Education, (2) deregulation of federal education programs, (3) decentralization of control and liability to the states and school districts, (4) de-emphasis of education as a federal priority, and (5) diminution of federal expenditure. The Regan plan reversed over fifteen years of strong federal influence. It provided the opportunity for state and private enterprise participation in educational reform to increase.

State subsidy of local education had been building for nearly decade before the Regan administration, reaching an equal fiscal share to the federal government by 1983 (McDonnell & Fuhrman, 1983). This drain on state budgets created tremendous incentive for the state governors and legislatures to begin to pay closer attention to
education. They were ripe to fill the void with cost effective measures.

This vacuum fostered the development of what Senge (1990) called creative tension. Creative tension describes the elastic relationship between current reality and future possibilities. In the evolution of educational reform, creative tension drives disequilibrium. Creative tension precipitates organizational changes through conflict rather than consensus. The reform literature fails to stress this extremely important developmental relationship. Figure 12 illustrates the tension between the opposing forces that characterize the second wave of educational reform.

Figure 12. The Paradigm Crisis of the Second Wave.

The creative tension between centripetal and centrifugal forces builds throughout the second wave and spills over into the third. The second and third waves of educational reform exhibit considerable overlap. The reform initiatives of the second and third waves share a common period and experience the same influential factors. The perspective of creative tension illuminates these two waves in
such a way that their differences, highly touted in the reform literature, seem to melt away. The tension between centralizing and decentralizing forces provides the common element.

The contrast between the two waves centers on the breadth and inclusiveness of initiative participation, policy and promulgation. Second wave initiatives, that dominate positions lower on the evolutionary ladder, tend to limit stakeholder involvement, occur in isolation and display no coherent thematic pattern. Third wave initiatives, occupying positions higher on the evolutionary ladder, tend to involve a wider variety of stakeholder groups, target very specific goals, and build relationships that create networks.

The overall pattern of second wave initiatives, from the vantage point of participation and policy, looks random. Many different, but separate, stakeholder groups initiate reform affecting reform participation. Table 13 describes the key stakeholders making contributions to the second wave of educational reform. Contradictory, independent, policy decisions affect reform direction and emphasis. Table 14 describes the key policy instruments and initiatives of the second wave of educational reform. Individual states down through individual districts and schools sample from the reform smorgasbord. This indiscriminate behavior characterizes the crisis phase of paradigm evolution. No single approach occurs most frequently. This crisis phase grants all possibilities equal weight and equal opportunity. Table 15 summarizes the reform activity during the second wave for a selection of states actively pursuing second wave reform. A discussion of the opposing centripetal and centrifugal forces follows.

Centralization imposes pressure on the educational system from the outside in. Centralizing pressures exert centripetal, condensing forces on the educational system. The expression of power in centralization is convergent. Top-down mandates for
### Table 13

**Key Stakeholders and Policy Components in Representative States, 1983–1993**

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Policy Components</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legislatures</td>
<td>Staff Development</td>
<td>Arizona ✓</td>
</tr>
<tr>
<td>State Agencies</td>
<td>Site-Based Management</td>
<td>California ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>New State Structures</td>
<td>Courts</td>
<td>Georgia ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Courts</td>
<td>Business</td>
<td>Minnesota ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>Business</td>
<td>Community</td>
<td>Florida ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Community</td>
<td>Local Educators</td>
<td>Pennsylvania ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Local Educators</td>
<td>Curriculum Frameworks</td>
<td>South Carolina ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Curriculum Frameworks</td>
<td>Alternative Assessment</td>
<td>New Jersey ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>Alternative Assessment</td>
<td>Teacher Incentives</td>
<td>Kentucky ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>Teacher Incentives</td>
<td>Teacher Education &amp; Certification</td>
<td>Texas ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Teacher Education &amp; Certification</td>
<td>Site-Based Management</td>
<td>Ohio ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Site-Based Management</td>
<td>References</td>
<td>Wisconsin ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>References</td>
<td>Oregon ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>Goldman &amp; Conley, 1994; Thompson, 1993</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>1980s--The Second Wave</td>
<td>1990s--The Third Wave</td>
</tr>
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</tr>
<tr>
<td>Legislatures</td>
<td>Increase in number of education bills and omnibus legislation, indiscriminant action with a narrow focus to establish and mandate standards</td>
<td>Decrease in number of education bills and omnibus legislation, increase in a more selective advisory role and development of broad goal statements</td>
</tr>
<tr>
<td>State Agencies</td>
<td>Implement evaluation of top-down regulation of mandated accountability</td>
<td>Significant downsizing due to recession leads to reorganization and increase in services to build local capacity</td>
</tr>
<tr>
<td>New State Structures</td>
<td>Creation of ad hoc committees that continue the previous pattern of incoherent policy</td>
<td>Creation of bridge constituencies that bypass traditional governance structures to establish standing reform coalitions</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>1980s–The Second Wave</td>
<td>1990s–The Third Wave</td>
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</tr>
<tr>
<td>Courts</td>
<td>Courts: Finance serves as the primary conduit for judicial involvement as states seek to resolve disparity of funding distribution, based on funding for input services (at-risk populations, special education and bilingual education)</td>
<td>Courts: Litigation serves to focus attention on unequal educational opportunity as measured by outputs (student outcomes)</td>
</tr>
<tr>
<td>Business</td>
<td>Business: Organization of advocacy role, characterized by impatience for change and volunteer burnout</td>
<td>Business: Continuation of advocacy role, with long term commitment to systemic reform and the implementation of site based management</td>
</tr>
<tr>
<td>Community</td>
<td>Community: Public opinion polls concerned with justification of increased taxation</td>
<td>Community: Direct enlistment of local citizenry to support and advocate standards based reform</td>
</tr>
<tr>
<td>Local Educators</td>
<td>Local Educators: Recipients of top-down state initiated standards, teaching and assessment policies. When successful, modification of policy served as local catalyst</td>
<td>Local Educators: Participants in bottom-up restructuring, SBM with a shift of academic and financial responsibility to the local school</td>
</tr>
<tr>
<td>Policy Component</td>
<td>1980s–Second Wave</td>
<td>1990s–Third Wave</td>
</tr>
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</tr>
<tr>
<td><strong>Curriculum Frameworks</strong></td>
<td>Construction of fragmented curriculum in response to pressure groups. Efforts isolated from other policies were not salient to local district personnel. Policymakers focused on regulation of narrow educational inputs and practice</td>
<td>Linkage of curriculum policy to broad educational output goals through assessment, staff development, accountability, and teacher certification by teams of teachers, academics and other educators</td>
</tr>
<tr>
<td><strong>Alternative Assessment</strong></td>
<td>Standardized testing utilized by state policy as a mechanism for change, focus on minimal requirements and basic skills in reading and mathematics</td>
<td>Movement from minimum competency to performance evaluation and graduation requirements, broader scope to include criterion referenced assessments in more subject areas, including a focus on outputs &amp; higher order thinking</td>
</tr>
<tr>
<td><strong>Teacher Incentives</strong></td>
<td>Prior to the middle 1980s, most states had district control over teacher salaries, movement began to raise the minimum range</td>
<td>Salaries that peaked early in the decade, have begun to be threatened by fiscal instability. Also career ladder incentives for improved performance</td>
</tr>
<tr>
<td>Policy Component</td>
<td>1980s–Second Wave</td>
<td>1990s–Third Wave</td>
</tr>
<tr>
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</tr>
<tr>
<td>Teacher Education</td>
<td>Increased regulatory standards that focus on the inputs of teaching practice and pedagogy</td>
<td>Increased emphasis on clinical experience, reorganization of programs focuses on learning and outcomes; movement to increase post-graduate study requirements</td>
</tr>
<tr>
<td>Staff Development</td>
<td>Most states lack a staff development office and lack funding base for district inservice. Programs focus on teachers as passive recipients of fragmented information</td>
<td>Staff development programs continue to be limited by political and fiscal instability and are routinely short term workshops. Movement toward long-term collaboratives with external funding</td>
</tr>
<tr>
<td>Teacher Certification and Evaluation</td>
<td>Certification of prospective teachers required by only a limited number of Southern states; few states evaluated teacher performance. Life-time licensure was standard practice</td>
<td>Majority of states mandated assessments of basic skills. Increase in mandates specifying regular evaluation programs and recertification</td>
</tr>
<tr>
<td>Site-Based Management</td>
<td>Not in existance</td>
<td>Decentralization of authority to the local level to optimize school effectiveness. At best implementation is partial and change slow to develop</td>
</tr>
</tbody>
</table>
greater professional and fiscal efficiency and accountability blend to create a tight amalgam. This "cult of effectiveness" (Hills, 1983) is often unable to respond to the escalating problems of the diverse at risk population.

Bullard and Taylor (1993) identified the evolution of equity and excellence as criteria for the evaluation of effectiveness. Criticism of the public schools emerging from the Regan administration served to bolster and enflame a political confrontation between the reform camps espousing educational excellence and equity. This conflict contributes a strong social undercurrent to the second wave of reform.

The primary problems of the early second wave reforms relate to their conjecture that the educational system is valid. The antecedent reports urged school improvement by fine tuning and diligence rather than advocating system redesign.

The commission's formula for pushing back the tide of mediocrity was to shore up the system with salary increases, more academic courses, higher standards, and more time in school—to wit, incentives and regulation. None of the commissions provided much hard or soft evidence as to why they thought that will work. (Farrar, 1990, p. 10)

The peak of the second wave of reform, provoked by A Nation at Risk (1983), imposed top-down legislation demanding that educators do more of the same only better. The tail of the second wave, exemplified by the Holmes Group report, Tomorrow's Teachers (1986) and the Carnegie Forum report, A Nation Prepared (1986), began to acknowledge the systemic nature of the educational enterprise and the pivotal importance of the teacher in the implementation of educational reform.

But what does it mean to put the teacher at the center of educational reform? There are signs that it simply means we recognize that we have a long history of top-down, mandated reforms that have often been frustrated by the unwillingness of the teacher, once the classroom door is closed, to do what curriculum developers and policymakers say ought to be done. Some reformers also feel that teachers are somehow not up to the mark in terms of quality and performance and that we must somehow select them better, prepare them longer, test them better, and get rid of the incompetents more cheaply. (Petrie, 1990, p. 14)

Reform efforts that focus on narrowly defined issues imposing "curriculum
and teacher competencies repel good people from entering and/or staying. Bureaucratic reforms may be able to guarantee minimal performance, but not excellence in teaching" (Fullan, 1992, p. 121). Attempts to standardize curriculum and performance of teachers and students are neither apt nor significant except for achievement of the narrowest goals (Corbett & Wilson, 1990; Wise, 1988).

Timar and Kirp (1988) found that, "educational excellence is not amenable to implementation by regulation or by scattering fiscal incentives" (p. 78). Policymakers can only successfully manage what they can mandate--funding, curriculum frameworks, teacher certification, textbook selection and the like. They have limited control over daily events in the schools. The states neglected to apply the single most significant contribution of the first wave research--successful improvement initiatives depend on the involvement and will of front line educators.

The central role being proposed for teachers in a restructured teaching profession derives from questioning some fundamental assumptions about teaching, learning, and the organization of schools. It is in questioning these assumptions that some reformers have begun to develop a new vision of teachers and teaching, one that at least suggests, if not demands, a new concept of the role of teachers in schools. (Petrie, 1990, p. 14-15)

Agreement persists, during the second wave of educational reform, that something is wrong in education. Disagreement mounts over what exactly needs reformation. Out of this intense conflict, a diverse coalition of educators, citizens, elected officials and professionals from business and industry learned from the experience of the second wave, that educational reform requires more than centralized mandates and decentralized staff development and administrative reorganization.

Decentralization exerts pressure on a system from the inside out. The decentralizing pressures expand, imposing centrifugal forces on the educational system. The expression of power in decentralization is divergent. Site-based management increases teacher autonomy and empowerment; however, it becomes
more illusion than substance if the system continues to operate within centralized systems of governance that use traditional forms of accountability. Decentralization causes conflict when "individual schools lack the capacity to manage change or because assessment of attempted changes cannot be tracked" (Fullan, 1992, p. 117).

This second wave, viewed as a whole, escalates the struggle to develop the vision of what education wants to create. The tension between excellence and equity and between centralized and decentralized governance moves the platform of the reform debate to a different level of understanding. The tension between centrifugal and centripetal forces promotes organizational evolution. It is a wave of conflict, of competing ideas and policies but, even so, it reflects the paradigm crisis at hand.

The present is a combination of bifurcation and confusion. The former is represented on the one hand, by centralists who see greater top-down regulation, accountability and control of the educational establishment as the answer. This includes, by the way, strategies such as local management of schools which attempt to place more power in the hands of local interests outside the school. The other hand of bifurcation is represented by the restructionists who see greater control by school-based teachers and other educators as the basic solution. (Fullan, 1993, p. 2)

The perpetuation of conflict during the second wave of educational reform endorses the redefinition of our assumptions about teaching and learning in the context of the schools. The cultural perspective joins the political perspective as the reform movement begins to experiment with the power of people. The restructuring element of decentralization, during the declining phase of the second wave, heralds the coming of a new wave. Evolution of the educational organization continues in response to the concerns of teachers. A flat, decentralized organization focuses on the goals of education and the achievement of balance between means and ends.

This begins the transformation of traditional assumptions about the teaching-learning process away from the factory model. The normative-reeducative, or cultural, emphasis of this new development focuses on the making of shared meaning.
Vision contrasts the focus of the prior wave that centers on the bound platform of rote implementation.

The second wave of reform, examined in entirety, exhibits the characteristic symptoms of an organization ascribing to a paradigm in crisis:

In the midst of fairly general agreement on major points, some contradictions surface in recent reports on education. Ideas or attitudes within a single report jostle each other. Contradictions arise between one report and the next....The unsettled points do merit some consideration. They point to difficulties that could loom larger, eventually requiring strenuous new efforts to forge consensus. (Green, 1987, p. 11)

Green (1987) in an ECS review of second generation reform reports, The Next Wave: A Synopsis of Recent Education Reform Reports, indicated three conundrums that weave throughout the second wave of reform. Her analysis pinpoints the diffuse, confusing nature of the second wave. The indecisive reforms of the second wave characterize the crisis stage of paradigm evolution.

The major conundrum she identified involves the above mentioned debate between centralization and decentralization. Green (1987) established that the reports recommend state initiative in the creation of external leadership yet, desire increasing realignment and collaboration to include the local level. This conundrum highlights the contribution of stakeholder reform participation to the creative tension of the period.

The next two conflicts add to the strain, pushing the educational system farther into disequilibrium. The impasse between confidence and suspicion and the vacillation between implementation and evaluation follow as ramifications of the primary struggle over governance. These secondary issues reflect the tension between centripetal and centrifugal forces and illustrate the dominance of centripetal forces during the second wave of educational reform.

The vacillation between implementation and evaluation augments the creative
tension of the second wave. The reports on this issue, mirror the top-down stance characteristic of strong centripetal influence. The second wave reports insist that transformation takes time and yet, simultaneously demand immediate assessment. In addition, the reports call for confidence in local educators but insist that state government be armed to intervene if local initiatives falter. This authoritarian threat severely limits the promulgation of reform initiatives (Green, 1987). Conflict between policy elements and ephemeral empowerment acts to further destabilize the educational system.

The critics of second wave reform initiatives point to these conflicts as evidence of the ineffective nature of educational reform. These critics neglect the prime importance of disequilibrium to the process of evolution. Disequilibrium liberates a system, momentarily, from the limitations of homeostasis. An unstable system, outside the bounds of equilibrium, becomes more open to change.

Disequilibrium results when positive feedback overweighs the system. Once in the state of disequilibrium, a system responds to environmental stimuli differently. The volume and frequency of conflicting issues besieging the educational system, during the second wave of educational reform, generate sufficient distraction to catapult the system into disequilibrium. Creative tension pulls the educational system toward a vision for the future.

The paradigm crisis initiates changes in the dynamics of the educational system and precipitates major shifts in the environmental forces that influence the educational system. The second wave gets the system in a position that enables organizational action away from normal behavior. An organization outside the bounds of equilibrium can respond in innovative and unexpected ways to a changing environment.

The second wave lacks focus and direction, typical of any crisis, but the
energy and will the system of education dedicates to escalating tension demonstrates
glor and enthusiasm. Islands of stakeholders, in a hurry, tinker aimlessly with the
system. Analogous to the late commuter madly dashing about in search of their car
keys, the second wave reformers act everywhere and attempt to change everything,
from policy to governance. Soon the whole household joins the frantic, cacophonous
search. The keys do eventually get found.

This humorous perspective to the emerging discipline of shared vision
surprisingly fuels the process of organizational evolution; however, the
predominantly authoritarian perspective dominating this period, precludes the
attainment of true shared vision. Once personal mastery and mental models develop
further, the discipline of shared vision will evolve. Diligent practice of the discipline
of shared vision brings education that much closer to becoming a learning
organization.

During the crisis phase of paradigm evolution, an organization searches for
paradigmatic realignment through experimentation and by juggling the investigation
of multiple possibilities. The second wave illustrates this frantic vision quest, driven
by environmental forces to crisis proportion. The educational historian, Diane
Ravitch (1993) cogently summarized the paradigm crisis facing education during this
turbulent second wave period.

The challenge before us as a nation is to develop a thoughtful process to
decide what knowledge is of most worth and what knowledge is most valuable
to children who will live and work in the twenty-first century. History tells us
that it will not be easy to do this; in fact, we know already that the fractious
politics of curriculum making guarantees controversy at almost every step of
the journey. Partisans with a mission will seek centralized control, if they
think they can get it, to carry their message into every schoolroom; others,
fearful of centralization and loss of autonomy, will resist any coordinated
effort to develop content standards. But again, the message of history is that
autonomy is an illusion; standards are already in place, an accidental product
of decisions made for various reasons...Could we do better if society
consciously and thoughtfully decided what we want children to learn, and if
we purposefully redesigned the customary means of assessing whether and
how well students have learned what was taught? Would more children achieve higher levels if we were explicit about what was needed for success in school? Could we serve the ends of both excellence and equity by making expectations clearer to everyone involved in the educational process? (Ravitch, 1993, p. 334-335)

Technological eddies in the dominant paradigm shift from the Industrial to the Information Age cause economic repercussions. Economic undercurrents stimulate the educational system to begin searching for adaptive responses to the major issues that continue to plague the period. The first wave of reform struggled with the tension generated by the equity versus excellence debate, the second wave contends with the competing forces of centralization versus decentralization, and the third wave begins an examination of teaching versus learning. Education continues to evolve toward the learning organization. A third, more coherent, wave emerges on the reform horizon as the discipline of shared vision grows stronger.

**Transformation.** The tug of war between social and political forces, during the second wave of educational reform, promotes change. An explosive barrage of reform initiatives places the educational system in the state of disequilibrium. Disequilibrium produces the most significant contribution of the second wave of educational reform. Disequilibrium between opposing centripetal and centrifugal forces facilitates the evolution of education toward a more open system design.

The emergence of bottom-up reform initiatives, during this period, demonstrates the action of centrifugal forces on the educational system. The cultural perspective drives the nascent social aspect of the educational reform movement. The dominance of top-down reform initiatives reflects the influence of centripetal forces on the educational system. The political perspective drives the declining bureaucratic aspect of the educational reform movement. There are distinct cultural and political contributions to the second wave of reform.
The social movements of this period differ from those of the nineteenth century, exemplified by Horace Mann, which were interested in building institutions like the schools. Today social movements are interested in challenging public institutions and trying to make them more responsive to forces outside the local administrative structure. Some would assert that these movements help fragment school decision making so the schools cannot function effectively. (Kirst, 1993, p. 103)

Interestingly, conflict holds the key to organizational evolution and change. Failure to recognize the creative tension between social and political forces creates the most significant problem of the second wave of educational reform. If education is to have significant influence in the future "the [next] round of reforms must continue to prepare students for a changing society and address omissions in initial efforts" (Green, 1987, p. 5). The social aspects and cultural perspective achieve prominence as the second wave ends.

Armstrong's (1992) social-political metaphor, prompts organizational behavior during the second wave. This metaphor emphasizes the underlying dynamics of systems searching for, what Armstrong called, collective meaning. This metaphor alludes to a culture of ideologies that nest within the larger context of social, political and pedagogical conditions. From the larger view of changing research perspectives, there is a succession of ideologies that alternate between a political and cultural perspective. The social-political metaphor is either or. The dominant ideology, at any moment, appears either political or social and rarely serves both. According to Armstrong (1992), these competing ideologies often, but not always, have overt correspondences with the societal environment in which they embed.

Most of the recent reforms have not significantly altered the fundamentals of how students are taught. The way students learn in school bears virtually no resemblance to the way they will learn once they are in the workforce. Few of the reforms to date have made schools more flexible or better able to address the diversity of students they now serve, and none have overcome the disconnection between education and work. (National Governors' Association Task Force on Education, 1990, p. 7)

The major strength of the social-political metaphor lies in its' challenge of
societal values. The importance placed on the economic value of education within society has both challenged existing schooling practices and succeeded in keeping them under constant attack. This metaphor forces the evolution of educational reform toward deliberate coordination of policies and governance. The focus of second wave initiatives emphasizes the achievement of state-wide change. The evolution of state-wide, or emerging systemic change, movements occur as a response to critical societal needs. In thinking thus, the social-political metaphor may be initiating rather than documenting the important links between policy and governance (Hagans, Crohn, Walkush, & Nelson, 1992).

The belief that values emerge solely from the surrounding cultural context, limits the application of this metaphor. The myopia of this view engenders a distinct project mentality. This perspective leads to policy fragmentation with the competition, overlap, and conflict characteristic of the crisis period prior to a paradigm shift. Multiple short term goals, complex administrative requirements amended to programs and policies, fragment the authority structure and lead to mixed signals at the local level what to do and when.

We cannot continue to tinker with an educational machine whose fundamental design is defective. More resources may be necessary, but many alone will not stave off continuing failure if the system remains unchanged. Instead, fundamental and dramatic changes in the very design and structure of the education system must be made. (National Governors' Association Task Force on Education, 1990, p. 7)

Observation of organizational change through this metaphoric lens illustrates the initial decline of consensual, homeostatic, responses to external changes in the environment. It heralds the genesis of experimentation with internal conflict as a way to tip the evolutionary scales toward a new system configuration.

The 1980s saw a host of educational reforms. But those reforms largely addressed individual parts of the system, such as merit pay for teachers, smaller class sizes, and an increased number of credits for graduation. Many educators and policy makers now believe that to improve student learning the
education system as a whole must be changed. Attention is being focused on change designed to improve student outcomes by determining what students should know and be able to do, and ensuring that all the key components of the educational system are directed to achieving those outcomes. (Morra, 1993, p. 1)

Despite the limitations of top-down mandated improvement, the political and cultural perspectives did illuminate an important detail. Alternation between power-coercive and normative-reeducative strategies, throughout the crisis period, highlights the need for a comprehensive, systemic approach. The end of the crisis period clearly indicates the demise of the narrow, mechanistic mode of reform. The social-political metaphor gives way to an inclusive, organic metaphor that recognizes the importance of both mandated central standards and local control over implementation. This transformation characterizes the beginning of the revolution phase of paradigm evolution.

The Third Wave—Paradigm Revolution

The highly touted third wave of educational reform evolves from out of the random onslaught of second wave initiatives. The revolution phase of paradigm evolution prompts this third surge of reform activity. The new paradigm gains influence and acceptance during the revolution phase of a paradigm shift. The spread of new paradigm acceptance in an organization parallels a decline in the diversity of competing alternatives (Simsek & Heydinger, 1992). The focus of reform initiatives sharpens during the third wave.

Third wave initiatives embrace the idea of comprehensive reform and direct attention toward the establishment of national standards and the decentralization of governance. The third wave reforms indicate an increase in practice of personal mastery and reflect the evolution of a more accurate picture of organizational reality and dynamics. This wave casts the mechanistic model of the educational organization
aside and begins to explore the possibilities of a more organic, relationship orientation.

The third wave retains some of the conflict driven issues but demonstrates the stirrings of internal triggers for the adaptation response. The demand for wholesale, quantum evolution grows from within the organization. This departure from the piecemeal approach of earlier waves presents the most significant difference between this wave and the first two. Recognition of the importance of systemic connections heralds the evolution of the learning organization. The educational organization currently rides the crest of the third wave. The third wave heads toward the practice of the discipline of shared vision.

**Description.** The field of organizational development nurtures the evolution of the predominant strategy driving the third wave of educational reform. Sashkin and Egermeier (1993) refer to this third strategy, that centers on the school as an organization, as "fix the school" (p. 3).

Organizational development efforts aim to help people in organizations learn to solve their own problems more effectively. The focus is on organizational problems rather than the problems dealing with just a part of the organization or with certain technical skills of organizational members. (Sashkin & Egermeier, 1993, p. 11)

The influence of the normative-reeducative strategy (Chin & Benne, 1969) increased during the third wave of educational reform. The beginnings for this movement took root during the second wave. It predominates during this wave but is not the sole strategy. This strategy, referred to by House (1981) as having a cultural perspective, acts on the belief that value changes within the organization cause change. The third wave demonstrates a shift in organizational behavior toward centrifugal, conflict driven change. It reflects the influence of all three strategies proposed by Chin and Benne (1969) to facilitate the implementation of planned
change. The shared vision developing approaches the generative style of the learning organization but is however, still predictive at the moment.

This third wave serves as a foil to the reliance on reason and external innovation of the first wave. It complements the reliance on socio-political power and external mandates of the second wave. This strategy gathers and blends wisdom from centrifugal and centripetal approaches to compose a more comprehensive reform agenda. It sets the stage for systemic reform by facilitating the development of a unifying vision and encouraging the restructuring of the educational system. "The difference in new phases of reform is the quest for comprehensiveness and coherence" (Hagans et al., 1992, p. 1).

This extensive approach to school improvement has been evolving slowly since the late 1960s. Support increased, over the past three decades, through successful experimentation with the vision first proposed by the comprehensive correlates of Effective Schools. This has eventually led to the national Goals 2000 legislation and local advances in organizational development through implementation of site based management. The primary focus of the third wave initiatives falls under the rubric of restructuring. The quantum evolution, or transformation of the educational organization continues to transpire through radical redesign and redirection.

In themselves, the three pure strategies do not directly address the problems of context, environment, and the larger system of which the school is but a part. These are structural problems and issues, and that is why the third wave is based in good part on restructuring. (Sashkin & Egermeier, 1993, p. 19)

Restructuring evolves in an attempt to develop the means to produce significant system-wide changes in education. Massive organizational transformation "requires a working consensus on the need and direction for change" (Sashkin & Egermeier, 1993, p. 16). Passage through the conflicting initiatives of the second
wave allows wider-spread agreement on the need for change to develop. Agreement on the imperative for change comes from within the organization during the third wave. This brewing organizational agreement indicates the beginning of the revolution phase of paradigm development. True shared vision develops later during the transition and normalcy phases of the paradigm life cycle. The third wave still exhibits remnants of the old paradigm.

The two previous focal points of reform, technical innovation and professional development, are more likely to have positive influence when they serve cooperatively toward common accepted organizational aims. The opportunity to develop common aims nurtures commitment to technical innovation and professional development initiatives at the building level. Local autonomy, found to be an important factor during the second wave, resurfaces here as site-based management. Site-based management, when complete with real decision-making power, grants ownership and problem-solving autonomy at the building level.

"The new wave of education reform is promising because for the first time it brings together the technical knowledge needed for improvement with a locally sensitive yet systemic education strategy" (Sashkin & Egermeier, 1993, p. 21).

Application. The Comprehensive School Improvement Project (Ford Foundation, 1972) attempted to use the dissemination of innovation approach to effect comprehensive school level change. It worked toward the acceptance and institutionalization of multiple innovations. This initiative, thirty years ahead of its time, sought to use comprehensive staff development strategies to change the structure of education. The CSIP evaluation gleaned the importance of variables beyond the limit of the local school. Financing, parent expectations, and local socio-political pressures restrained the spread of outcomes beyond the CSIP project schools.
The CSIP report, in its insistence that comprehensive consideration of outside issues was vital to the success of school improvement, foreshadows the coming of systemic educational reform. This program failed to achieve widespread success because of underestimation of the cost and complexity of a system-wide change initiative.

The Experimental Schools Program (ESP) of the early 1970s was a federally sponsored attempt to introduce comprehensive and lasting change in the schools. Similar to the privately funded CSIP, ESP promoters believed that the simultaneous acceptance and adoption of multiple school innovations would be a catalyst for change of the school as an entity.

Evaluation of this initiative indicated that program designers underestimated the task complexity and underestimated the capabilities of the federal implementation staff to shape local change (Doyle, 1978). The evaluation reported that many of the factors limiting the success of ESP were predictable. ESP could have deflected resistance had local and federal facilitators not neglected knowledge of barriers to change. The major lesson of the ESP initiative was that change cannot be successfully launched at the same time it is being planned.

Organizations recognize resistance to change as a naturally occurring phenomenon. If education desires to implement comprehensive reform, it will be important to develop the capacity to deal with change. The Concerns Based Adoption Model (CBAM), a major change management tool, contributed significantly to research and improvement in the school environment (Hall, Loucks, Rutherford, & Newlove, 1975; Hall & Hord, 1987). This widely available program, developed in the early 1970s, at the University of Texas Research and Development Center for Teacher Education, provided a systematic approach for finding and fixing organizational barriers to adoption of innovation. It is an early but incomplete precursor to the learning organization.
CBAM has broad applicability that goes beyond the successful introduction of one or another technical innovations. It can help people understand and control many of the factors that stimulate or stifle effective change in schools. CBAM empowers people to make change while supporting their rational assessment of needs and means and, perhaps most important, bringing them together to deal with change as an organized group. It is, then, a tool for integrating the three perspectives on change... [reason, political power, culture] and making them work in concert to support effective school change (Sashkin & Egermeier, 1993, p. 19).

Effective schools' programs carry over from the first wave encouraging the implementation of multiple innovations (Brookover & Lezotte, 1979; Edmonds, 1982; Lezotte & Bancroft, 1985). ESPs exemplify early implementation of systemic reform. The volume of convincing literature evaluating the progress of the program contributes to the evolution of systemic reform. Evaluations of these programs affirm the importance of a the reliance on a broad base of comprehensive interventions. An emphasis on shared vision at the local level assures the success of the project.

The developing awareness of the importance of comprehensive initiatives and local autonomy furthers the evolution of systemic reform.

Two elements are key to the success of the model. First, the schools and district must develop and state school and district missions. Second, the schools and district must be willing to accept the Effective Schools Program as a comprehensive plan. Developing a school improvement plan on a piecemeal basis and focusing on only two or three of the characteristics (correlates) that define an Effective School destroys the cohesiveness of the program and decreases the chance for significant results and lasting improvement of the school. (Bullard & Taylor, 1993, p. 421)

The ESPs, as expansive programs of school improvement, acknowledge the need to bring to the system a common language. That language, shared vision, guides the school improvement discourse and endeavor.

They seem to recognize the utility that comes from the common language associated with effective teaching research as well as the language associated with effective schools research. One is a language of the classroom, of teaching, of interaction, the other is a language of organizations, of cultures, of schools as a whole. The next generation of both research and practice will see a further assimilation of these language systems. (Levine & Lezotte, 1990, p. 70)
Organizations often function poorly because their shared norms and beliefs are unproductive or dysfunctional (Firestone & Corbett, 1988; Kilmann, 1989; Levine & Lezotte, 1990). The Effective Schools research calls for a coupling of fundamental beliefs together with widespread local ownership. Importantly, both the mission and the strategies for change flow out of shared vision. These schools believe that successful teaching and successful learning depend on an alignment of human and organizational resources at the building level. This highly cultural approach sparked a great deal of interest in site based management.

The way to accomplish [change] is to address straight away the fundamental beliefs and values that define the culture of the school. When this coupling occurs, change will more likely follow and most importantly, will more likely be sustained. The goals of making schools substantially more effective cannot be accomplished by depending on the efforts of autocrats, bureaucrats and technocrats who think they can mandate change through technical rules and regulations that direct schools to improve. (Levine & Lezotte, 1990, p.71)

Confusion appears to be the most legitimate state of mind during the late 1980s, a period rife with experimentation. The second and third waves of educational reform evolve in tandem during this turbulent period. State mandated reform initiatives operate side-by-side with site-based management and comprehensive innovation. Educational reform fragmented into two pieces. The second wave, with its' social-political strategies, proselytized the top-down, standards and accountability driven piece. Most converts to the emerging cultural perspective championed professional development and site based management. The cultural perspective focuses on bottom-up initiatives. Each camp continued to evolve during this period and moved away from single innovation packages. They began to advocate comprehensive, system-wide change. Incoherent but comprehensive initiatives laid the parameters for the resolution or selection phase of the paradigm shift.

We are led to the organization, e.g., the school as the center of change. We are not lead naively to see the schools as isolated from its sociopolitical context, able to engage in miraculous self-renewing activities without district,
community, state and federal support. But we are led to where the day-to-day action is, to where with the proper motivation and support, the prevailing conditions and circumstances of schools can be challenged constructively within the context of competing values and human interest...In short, people who live and work in complex organizations like schools need to be thoroughly involved in their own improvement efforts, assuming significant and enduring organizational change is the purpose we have in mind. (Sirotnik, 1987, pp. 25-26)

The Consortium for Policy Research in Education (CPRE) presented a policy brief on the work of Marshall Smith and Jennifer O'Day (CPRE, 1991) that began to put the pieces of systemic reform together. They proposed a top-down, bottom-up approach that expressed concern for statewide change related to critical societal needs. This plan emphasizes the coordination of policies with a focused state level vision. These two elements, together, reinforce and support local schools reaching coherent goals. Their blueprint relies on creating the necessary infrastructure to support long-term, locally driven, comprehensive, statewide improvement. Centralized state coordination and increased professional discretion at the local school site simultaneously increased coherence in the system and encouraged the integration of a shared vision for the organization. California, Kentucky, West Virginia, Texas and South Carolina coordinate a broad number of programs and policies in this manner (Fuhrman & Massell, 1992, p. 2).

The educational research literature often refers to this effective combination strategy as systemic reform. The lessons of twenty-five years of unsuccessful educational reform show that none of the change strategies are effective when used alone. The Smith and O'Day (1991) report shoved the educational reform movement in the right direction. The 1990s brought an escalation of states mandating systematic and system-wide reform known ambiguously as restructuring (Conley, 1993b).

Restructuring collates many hard-earned lessons. The restructuring movement, of the third wave, emerges from the combined experience of the first two
waves. Restructuring attempts to implement structural reorganization use each of the
three Chin and Benne strategies for planned change (1969).

There is an underlying coherence to the concept of restructuring and to the
broader and more inclusive notion of systemic reform. We find various
researchers and practitioners repeating the same factors as basic elements in
defining and describing a systemic approach to school improvement. (Sashkin
& Egermeier, 1993, p. 13)

This movement demonstrates that educational reformers are beginning to look
back through history for information to guide future initiatives. It also demonstrates
that the educational reform movement, and perhaps the organization of education, is
ready to learn from its mistakes. Restructuring serves as a catch-all-phrase in the
reform literature. The movement coined the term to describe the characteristics of its'
many efforts. The empirical-rational, power-coercive and normative-reeducative
strategies collaborate creating this movement. Decentralization, site-based
management, innovative pedagogy and performance oriented assessments contribute
pieces of the restructuring puzzle.

It means a complete change in the culture, organizational assumptions,
leadership, curriculum, instructional approach, and accountability of the
school. Plus a market orientation in which the customers are the parents and
the students.... In short, restructuring means exactly what the name implies-a
complete change in the structure of the organization and the underlying beliefs
that have given rise to that organization. (Reavis & Griffith, 1992, p. 2)

Decentralization of authority grew in popularity. Near the end of the 1980s,
school site decision making was a major component of the restructuring rhetoric
(David, 1989). Reavis and Griffith (1992) warned of the limitations of this element.
Neither decentralization nor the site-based management it spawned requires change in
the behaviors of central administration personnel. Provisions for teacher participation
in curriculum decisions involve little or no challenge to organizational assumptions.
"The opportunity for organizational change is not great" without system-wide
involvement (Reavis & Griffith, 1992, p. 3).
Changes in instruction from the teacher centered focus, of the 1960s through the mid 1980s, to the current learner centered focus and the interest in new more authentic performance assessment spring from restructuring initiatives. The learner focus offers opportunity for systemic collaboration. The shift from teacher to learner parallels decentralization as a technique for flattening an organization. The evolution of horizontal management and service delivery indicates significant progress in the practice of the learning organization disciplines. This horizontal shift holds the most promise for the development of a shared vision for education.

Changes in federal and state accountability also characterize the restructuring movement. Kirst (1993) found that between 1961 and 1976, 35 states passed accountability statutes. Almost half claimed to have comprehensive, multi-component systems. None shared a common definition, purpose or concepts. Early restructuring focused on state control and school outcomes, besides state defined minimum inputs. There has been a tremendous increase in state involvement with over 4,000 pieces of accountability literature published.

Before 1990, federal influence relied on categorical grants and funding to motivate and mold educational research and development, through what William Bennett, Secretary of Education during the Regan administration, called the bully pulpit. The three C's content, character, and choice declined as factors in federal initiatives after 1991, as federal policy shifted to the creation of national goals and standards for the states to strive toward.

National goals do provide an intense focus for educational reform. State legislation in Kentucky, California, South Carolina, Oregon, and a myriad of others, mandates restructuring to achieve these goals (Firestone et al., 1991; Fuhrman & Massell, 1992; Massell et al., 1994). The tidal wave of restructuring literature indicates that this third reform movement is close to understanding and attaining the
systemic reform it professes. Restructuring evolves through the process of education learning about change. It looks and acts more systemic than any previous initiatives.

Norris and Reigeluth (1991), in a national study of 62 restructuring schools, found three fundamental differences between restructuring and past reforms: (1) systemic-like changes in the schools are interrelated, rather than piecemeal, and that change in one part of the school requires changes in other parts of the school; (2) changes in the schools are based on a connected, underlying theme or vision that facilitates planning and implementation of cohesive change; and (3) the changes are meaningful, based on the needs and values of the local community of which the school is a part.

With systemic, fundamental change that is meaningful and that the school community itself has worked to create, restructuring appears to hold great promise to more lasting change that can result in a quantum improvement in meeting the needs of students and society in the 21st century—a radically different, post-industrial, information age. (Norris & Reigeluth, 1991, p. 11)

Table 16 summarizes the major third wave initiatives. According to the Educational Research Service (ERS, 1993) most local implementation of systemic initiatives aligns, by choice or by mandate, with the visions promoted by these programs and projects. These initiatives meet the general Norris and Reigeluth criteria. These initiatives, referred to as systemic reform, create networks. They connect schools through the country that express interest in comprehensive change; however, they are not as systemic as their name implies.

Conflict lingers between the centripetal, centrifugal and systemic forces that influence the third wave initiatives. The third wave represents the final struggle between these competing forces as centrifugal and systemic forces gain supremacy over the long reign of centripetal influence. The third wave of educational reform concerns this revolution. Table 16 catalogues the extent of centripetal influence still contributing to the systemic reform movement.
Table 16
Summary of Major Third Wave Initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Centrifugal</th>
<th>Centripetal</th>
<th>Systemic</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerated Schools Project</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Targets &quot;at-risk&quot; middle school students, goal is to close achievement gaps.</td>
<td>(Brunner &amp; Hopfenberg, 1992; Hopfenberg, 1993)</td>
</tr>
<tr>
<td>Coalition of Essential Schools</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Redesign of high school guided by the &quot;9 Common Principles&quot;</td>
<td>(Conley 1994; ERS 1993)</td>
</tr>
<tr>
<td>Effective Schools</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Improvement of student outcomes through implementation of &quot;7 Correlates of Effective Schools&quot;</td>
<td>(Jones &amp; Ross, 1994; Rossmiller &amp; Holcomb, 1993)</td>
</tr>
<tr>
<td>The Holmes Group</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>School improvement through improved preparation of career teaching professionals</td>
<td>(Holmes Group 1986,1990; Vinger &amp; Hendricks, 1990)</td>
</tr>
<tr>
<td>Mastery in Learning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Comprehensive organizational change creates learning communities</td>
<td>(Barrett, 1992; Livingston &amp; Castle, 1993)</td>
</tr>
</tbody>
</table>
Table 16–Continued

<table>
<thead>
<tr>
<th>Forces of Influence</th>
<th>Centrifugal</th>
<th>Centripetal</th>
<th>Systemic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Site-based decision making</td>
<td>Bottom-up vision</td>
<td>Local control of curriculum</td>
</tr>
<tr>
<td>Initiative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCTM Standards</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Description</td>
<td>All students can and should learn mathematics, integration of science, math and technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>(Carlson, 1994; Romberg, 1994)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Standards Project</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Description</td>
<td>Development of national performance-based standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>(Harrington-Lueker, 1994; O'Neil, 1993; Resnick &amp; Resnick, 1993)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODDM</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Description</td>
<td>Integration of teaching, learning and administration to achieve specific goals through systematic redesign of district</td>
<td></td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>(O'Neil, 1993; Alessi, 1990; Vickery, 1985)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program for School Improvement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Project 2061</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Table 16–Continued

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Development Program</td>
<td>Addresses climate, curriculum and staff development to improve the attitudes, behaviors and values of children</td>
<td>(ERS, 1993; Sykes &amp; Plasterik, 1993)</td>
</tr>
<tr>
<td>Total Quality Management</td>
<td>Improvement of student outcomes through data management and continuous improvement practices</td>
<td>(Tribus, 1994; Losak &amp; Scigliano, 1994; Blankenstein &amp; Swain, 1994)</td>
</tr>
<tr>
<td>Transformational OBE</td>
<td>Schools control the environment for success, focuses on exit outcomes of productive citizenship</td>
<td>(Capper &amp; Jamison, 1993; Spady, 1992)</td>
</tr>
<tr>
<td>Whole Language</td>
<td>Integration of language and thinking skills to produce ability to read and write for meaning</td>
<td>(Clarke &amp; Cummins, 1994; ERS, 1993)</td>
</tr>
</tbody>
</table>
Bureaucratic decision making, top-down vision, pre-determined curriculum and instructional process, and input or practice and pedagogy driven reform reflects the continued influence of centripetal, centralizing forces. These characteristics indicate the influence of the mechanistic paradigm and restrain the system from entering disequilibrium.

Site-based decision making, bottom-up vision, local control of curriculum content and process, and output or outcomes driven assessment reflects centrifugal, decentralizing forces on the rise. These characteristics indicate the influence of the quantum paradigm and prod the system into disequilibrium. Strong systemic influence guarantees successful navigation and growth through the disequilibrium phase. Descent into chaos certainly follows if systemic influence declines.

Interactive educational partnerships, interactive community partnerships, commitment to accountability and assessment feedback, and comprehensive curriculum involvement reflects the systemic influences contributing to the third wave of educational reform. These characteristics indicate the ability of an initiative to create and maintain the web of relationships necessary for an organization to thrive on the edge of chaos. Systemic and centrifugal forces act in concert to take the system into disequilibrium where growth and change occur.

The conflict over the vision source driving systemic reform contributes to the decline of the third wave. The adoption of a comprehensive network supplied vision for school improvement represents top-down, predictive vision. The decision to participate in a reform network usually arises from centralized influence. Surprisingly, many highly decentralized systemic initiatives operate from a centralized vision. The learning organization champions a bottom-up, generative, shared vision. The vision driving most systemic reform initiatives falls short of being completely shared.
Also, many highly decentralized third wave initiatives fail to establish interactive relationships with other educational and community institutions. Interactive relationships allow for the critical transfer of information and hold the key for success in the Information Age (Wheatley, 1992). The ability to have access to and the ability to process information determines the appropriateness and speed of organizational responses. The number of relationships an organization maintains directly affects their ability to generate new information and learn to navigate through turbulent times. Being systemic implies massive connections and strong collaborative relationships with the other systems and the external environment. Most third wave systemic initiatives act in relative isolation, neglecting to respect the influence of relationships.

The revolution is not over, yet. Remnants of the mechanistic paradigm continue to surface and thwart the evolutionary progress of education towards the learning organization. Reversion to centripetal tactics blocks the practice of the learning organization disciplines and diverts the process of evolution.

A vision has indeed evolved for education, one clearer and more complex than ever before but still encumbered with the compromise and compliance that plagued the earlier two waves. The historical evolution, or revolution, describing the development of a vital and compelling shared vision for education will continue in parallel with society's struggle to select a dominant scientific paradigm. Until the selection of the quantum paradigm is universal, the vocabulary and metaphors of the mechanistic paradigm will be rate limiting factors for educational reform.

Analysis. The concept of systemic integration, combining deductive state policy and inductive local implementation, critically influences successful reform. Systemic integration does not occur without conflict. Political systems are however,
more accustomed to the consensual notion.

Legislators build coalitions by bundling together many discrete programs. With omnibus or comprehensive approaches, many policy-makers can share credit and satisfy diverse constituents. Integrated approaches require trade-offs and difficult choices among policy options. (Fuhrman & Massell, 1992, p. 2)

The political element, of the power-coercive strategy, presents powerful barriers to change. Policies driven by compromise and bargaining, fail to establish a shared vision of change. Shared vision evolves through conflict and crisis. Holtzman (1993) referred to this essential conflict as the paradox between vertical, or consensual change, and horizontal, or conflictual change. Vertical change uses consensus to arrive at conformity and compliance. Horizontal change uses dissent to arrive at creativity and change.

What Smith and O'Day (CPRE, 1991; O' Day & Smith, 1993) proposed does not detail a plan for systemic change. Their proposal describes a systematic approach that combines and ameliorates the vertical and horizontal elements of change. Holtzman (1993) reported that this systematic approach avoids many of the problems faced by previous initiatives, where the "fabric of change unravels at one end even as it is being woven at the other" (p. 18).

Political, social, demographic, economic, [and] philosophic tensions have set our educational system to spinning, which in turn has increased the two major sets of forces acting on the system. In one direction, the system experiences a force to centralize, and as it spins, it pulls inward to provide a gravity for its members (centripetal forces). In the other direction, the spin creates movement away from the center as elements seek to escape and break free (centrifugal forces). If either force becomes dominant, the system may become a black hole as it swallows itself, sucking in all energy, or it may become totally random as elements break free in a wild spin through the universe. The delicate balance that holds the system in a dynamic growth state is critical. (Jacobson & Conway, 1990. p. 1985)

The normative-reeducative strategy, with its cultural perspective, also presents barriers to change. Shallow, centrifugal organizational commitment and narrow, centripetal vision present the primary problems this strategy encounters. Vision
development during the third wave tends toward a high degree of centralization. Shared vision continues to evolve from construct to practice in education. The dilemma of developing a shared vision for education has been a consistent issue throughout the three waves of reform. It stems from a failure to empower all stakeholders, especially those at the lowest levels, with the knowledge and authority they need to act individually in the interests of their local environment (Hagans et al., 1992). How can local compliance with hierarchical, state mandated policy or local acceptance of initiative concepts represent shared vision?

Business models as applied to schools lack a methodology for creating consensus about the goals for meaningful reform. While their focus is "systemic," the outcomes are expert- or theory-driven solutions to problems that are not broadly understood. And all too often, these new ideas and practices are imposed from above, with little--if any--discussion among the people most affected: teachers, parents, students, and community members. Without broad agreement about the kinds of changes needed and why, these "systemic" efforts are no more likely to succeed than so many other educational innovations we've seen come and go. (Wagner, 1993, p. 24)

The challenge of discovering or developing a shared vision for education is not as nebulous or ethereal as the organizational development literature indicates. "The real methodology for system change begins and ends with ongoing, authentic conversations about the important questions" (Wagner, 1993, p. 25). Without agreement on goals and values, without explicit linkage to the strategies of a shared vision, organizational or structural reforms, like site-based management, are premature (David, 1989; Hill, Foster, & Gendler, 1990).

The first three waves interpret educational reform as an overarching struggle to achieve school improvement through the implementation of innovation. The underlying motivation to change schools for the better, forms the foundation for the development of shared vision. The desire to change, at this point and throughout the three decades of this study, is comprehensive at the state and federal levels. Stagnation in educational reform results from the many centripetal barriers to local
implementation. The lack of organizational focus on basic questions, such as; what
does better mean, for who will it be better, and how to make it better, produce
astigmatic confusion. Educational vision out of focus at the local level leads to the
misdirection of implementation efforts. Restructuring condenses reform activity
around architecture and instruction to form a common perspective for effective
implementation. Facets of the restructuring movement typify the plethora of reform
activity spanning three decades. Restructuring focuses the attention of reform on
implementation. This implementation perspective (Fullan, 1992) collates the best
from the three strategies, for planned change. Empirical-rational, power-coercive,
and normative-reeducative strategies, in combination with comprehensive, systemic
implementation evolve reform beyond repetitious attempts to institutionalize
innovation. The nascent systemic approach of the restructuring movement leaves
predictive vision behind and moves toward a generative vision for enduring school
improvement.

It has led us, however, to move deeper to a more basic set of problems. It is
not possible to solve the implementation problem by putting into practice one
or more innovations at a time. Substantial progress can be made only by
changing roles or organizations, by creating the conditions for people to
change how they deal with change. (Fullan, 1992, p. 121)

The systemic, generative basis for the implementation perspective evolves
from the realization that implementation of single or comprehensive innovations from
within an immense, loosely coupled system requires conflict (Weik, 1979).
Education functions as a pluralistic system with many, often conflicting goals.
Shared vision for such a system will not be the single best solution education has
longed to predict. It will be chaotic and messy.

The improvement of quality involves the design of an educational system that
not only optimizes the relationship among the elements but also between the
educational system and the environment. In general, this means designing a
system that is more open, [holistic], pluralistic and complex. (Betts, 1992, p.
40)
Banathy (1991) suggested that the persistence of our mistaken beliefs and perceptions trap education within the boundaries of the existing system. It is imperative that education learn to think beyond the confines of its own boundaries, if true systemic change is to become a reality. The interpretation of current experience using outdated differential models and metaphors decreases the effectiveness of implementation. Examination of the history of reform shows the impotence of the current system. No amount of fine tuning will produce significant improvement. The revolution phase of the paradigm shift promotes a dramatic shift in educational system design. Educational reform activists, acting from within the organization, begin to promote a quantum shift from a deterministic, dictatorial machine systems perspective to one that is purpose-seeking and participative.

If the old paradigm won't work, something fundamentally better suited to the task is needed, a paradigm that illuminates the whole, not just the parts; one that is synthetic, rather than analytic; one that integrates, rather than differentiates. This new paradigm is systems thinking. (Betts, 1993, p. 38)

This thirty year study of innovation provides ample evidence that the seeds of true systemic reform are sprouting. The unmistakable shift from passivity to active participation and from a frantic search for narrow solutions to generative and comprehensive implementation brings systemic educational reform that much closer. The problem facing educational reform does not center on how to implement innovation, but on how to learn the disciplines that will develop an organizational capacity to deal with change. Education demonstrates an increasing generative capacity with each successive wave of educational reform.

In individual and institutional development, how people and organizations cope with the daily demands of maintenance and change becomes the anchor point. Beyond implementation leads us to consider more holistic, and organic questions of how individuals and organizations can become better equipped to manage multiple changes as normal fare. Here success is not whether a given innovation is implemented, but whether the basic capacity to deal with change has been developed. (Fullan, 1992, p. 113)
Transformation. "Systemic reflection, not reflexive reaction, is fundamental to long-term improvement" (Wagner, 1993, p. 24). Educators must begin by first agreeing to withstand conflict long enough to ask the right questions. How can we establish balance, ignite teachers and students to convert, and parents or the community members to support long term diversity and innovation, if we cannot get past our differences to agree on the problems?

Fullan (1993) metaphorically described the barren history of educational reform as a delusive "uphill battle." "The solution is not how to climb the hill of getting more innovations or reforms into the educational system. We need a different hill, so to speak" (p. 3). Systemic reform potentially provides such a hill. Reform needs a hill that generates energy by passing through disequilibrium and that uses chaos as a catapult toward change.

Systemic reform ideas seem to require unprecedented efforts to integrate separate policies, new strategies of policy sequencing, novel processes to involve the public and professionals in setting standards, challenges to traditional politics, complex efforts to balance state leadership with flexibility at the school site, extraordinary investment in professional development, and creative approaches to serving the varied needs of students. (Fuhrman & Massell, 1992, p. 24)

Resolution of the systemic problems facing education will not evolve as a blueprint through the drafting of proposals for better reform strategies and initiatives. The energy intensive nature of systemic reform requires the generative qualities of a system designed to thrive in the state of disequilibrium. Resolution will come from internal revolution. The development of personal mastery, that researches the genuine systems nature of education under the quantum paradigm, contributes to internal revolution. Reflection on and subsequent revision of archaic mental models helps education use change as a catapult for growth. The selection of the quantum paradigm to guide the emergence of a new educational system for the Information Age closely parallels the practice of the learning organization disciplines. Resolution

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becomes possible through the synthesis of a shared vision. A shared vision driven, not by the desire to plan change, but by the development of generative disciplines that facilitate what Stacey (1992) called the management of the unknowable.

The non-linear temperament of systemic change requires the generative abilities of the learning organization to sustain productive change. A truly systemic outcome cannot result from strategies for planned change. Genuine systemic outcomes require generative strategies for embracing change. Education sought, over a thirty year period, to change everything except the perception that it possible to control the change process. The prediction and control of change occur only in a universe governed by Newtonian physics and the mechanistic paradigm. This insistence on the appropriateness of a predictable mechanistic paradigm has education inexorably bound to the status quo. The popular interpretation of systems, as a construct, in the educational literature uses inappropriate mechanistic models and metaphors. This skew between interpretation and organizational behavior slows the progress of systemic reform.

Holtzman (1993) found wide variation in the five currently most popular definitions of "systemic" in the educational literature. He found that educators use the term systemic to refer to the creation of comprehensive and encompassing change. Systemic means: (1) working with school systems to effect change, (2) working with every school in a system, (3) working with every aspect of the school system, (4) systematic, and (5) fundamental change. Third wave reform stresses the importance of connection but, still limits massive changes to the parts contained within the educational system, neglecting the greater whole in which education nests.

The organic metaphor, characteristic of the third wave, "focuses on the fluid movement between separate elements in the environment" (Armstrong, 1992, p. 5). This metaphor expresses the condition of growth. The organic metaphor places prime
importance on the viability and growth of concrete, but connected components. 
Application of this metaphor to the meteoric educational research environment 
presents a dynamic moving picture of the conflicting perspectives and strategies that 
drift in and out of popularity.

The potency of this additive metaphor resides in the prominence of visible, 
measurable improvement that results from an evolving organizational culture. The 
organic metaphor presents a flaw that forebodes decay and annihilation should reform 
efforts slack. The fluidity of the organic metaphor still connotes separate pieces and 
thus falls short of expectation. It cannot nurture the evolution of systemic reform. 
True systemic reform requires the inclusion of relationships that extend beyond the 
boundaries of the educational system.

The organic metaphor promotes piecemeal reform. "Educational performance 
has generally declined in the United States since the 1960s, while costs have 
increased dramatically. Furthermore, it indicates that the situation will continue to 
get worse no matter what piecemeal changes we make," or how much money we 
invest in reform (Reigeluth, 1992b, p. 10). The organic metaphor fails to create and 
connect the systemic relationships the educational system requires to extend beyond 
itself.

Systemic change means more than system-wide change—it is the pervasive 
adaptation of inputs and processes to achieve desired outputs (outcomes). We 
can further differentiate between 'systemwide' and 'systemic' change by noting 
that systemwide connotes number; that is, the units of the system that are 
affected by the change, while 'systemic' connotes quality; that is, the overall 
effect of change on all units of the system.Both, of course are sought by 
comprehensive reform efforts, but we increasingly understand that 
 systemwide change alone is not sufficient. (Hagans et al., 1992, p.14)

Barkely and Castle (1993), in their discussion of systems, paraphrased 
Einstein, as follows: "The release of the power of the atom changed everything-- 
everything but our way of thinking" (p. 29). Kernels of systems thinking do exist.
Knowledge of quantum mechanics has been around for fifty years, and yet the impending paradigm shift will not soon occur if the majority of people within the system fail to revise their perceptions. If the educational system seeks change and improvement, it must embrace disequilibrium and leave the constant stable state behind.

Practice of the learning organization disciplines releases the power that changes thinking. Given the scope of the changes facing education and the depth of the transformation already effected, "we must transform the way we think about the process of educational change" (Reigeluth & Garfinkle, 1992, p. 8). Transformation toward systems thinking safeguards that the changes embarked upon are lasting, consistent and themselves dynamic and changeable.

Paradigm shifts in society require paradigm shifts in all societal systems. This explains the evolution of educational reform. Educators actively adjust their perceptions and alter their underlying metaphors for change to occur at this present junction. While talking the talk of systems thinking, most of the literature still employs the organic metaphor. The organic metaphor represents dramatic improvement, but still misses the systemic mark. Systemically generative efforts encourage learning at the organizational level and improve the whole system. The adaptation and fixing of the parts no longer serves as a viable option (McGill, Slocum & Lei, 1992).

It becomes necessary to search for "metanoia," a fundamental shift of mind (Kiefer, 1989; Senge, 1986). Without this transformative cognitive process, that allows collation and integration of continuous change within a fundamentally conservative system, transient, defensive, and shallow reform in education will perpetuate the status quo. Laing (1992) stated that change is mandatory, but growth is optional. Educators have a choice about how they respond.

The new problem of change...is what would it take to make the educational system a learning organization--expert at dealing with change as a normal part of its work, not just in relation to the latest policy, but as a way of life. (Fullan, 1993, p. 4)

Much of the business world has come to grips with the chaotic nature of what it means to be a "system" in the coming Information Age. It has begun to take steps to learn how to thrive as a system in disequilibrium. Business and industry blaze an evolutionary trail as they practice the disciplines of the learning organization. The practice of the learning organization disciplines identifies the supremacy of the quantum paradigm. The revolution phase of paradigm evolution announces that the time has arrived for education to follow suit.

It is well recognized that schooling in this country has changed little in form and structure in its 200-plus year history. It well may be that we no longer need leaders who simply do more efficiently what has already been done but that we need to develop leaders who can think thoughts that have not been and then find ways to bring them to be. (Jacobson & Conway, 1990, p. 194)

This chapter describes what education perceives through the lens of the Newtonian paradigm. Vision through synthesis appears as a distinct series of waves. Synthesis, by definition, implies the combination of separate elements to form a coherent whole. Education combines the practice of personal mastery and mental models to synthesize an approximation of shared vision. The vision currently held by most of the educational organization lacks the shared element that a more systemic inclusive perspective provides. The influence of the old paradigm constrains the evolution of a shared vision for education thus far.

Reform, from a Newtonian perspective, acts like an ebb tide, sucking the...
organization back to the state of equilibrium. Old paradigm driven reform acts in isolation pointing toward some preconception of the ideal future for education. Reform, from this perspective, ignores the wealth of information available outside its narrow conception of what it means to be a system.

The vision for educational reform through the Newtonian paradigm creates an endless linear progression of reactionary efforts. Vision through synthesis focuses on parts, not wholes. Reform initiatives wax and wane through a series of additive cycles. One wave to change the parts, another wave to change the people, the next wave changes the schools, and finally one wave may evolve to change the relationships. Change, from the perspective of synthesis, serves to correct prior mistakes and maintain equilibrium.

Synchrony and harmony are still the best this perspective can hope to create. Evolution creeps on, in linear fashion, as the consensual theory of change continues to have the edge over the educational reform movement. This chapter illustrates the struggle to see the system through new eyes. As educators continue to practice the disciplines of the learning organization, evidence mounts how and why we create the system we currently have.

Discernment, through the lens of the quantum paradigm, generates something quite different. The relationships between the waves of reform become more apparent. The quantum paradigm illuminates a continuum of relationships expressing multiple perspectives, and reflects the existence of a continuum of reform strategies. The vision of educational reform through the quantum paradigm becomes one that focuses on transformation. Revolution in the entirety and the evolution of generative capacity occur as a result.

The revolution begun during the third wave spills over into a fourth wave. Practice of the learning organization disciplines urgently presses educators to embrace
the quantum paradigm. Accordingly, education embarks on a search for a new, more compatible, organizational metaphor. The quantum paradigm requires a metaphor that connotes holism. The evolving shared organizational vision, one capable of disequilibrium management, requires education to adopt a new metaphor. Evolution toward the learning organization demands replacement of the organic metaphor driving the third wave.

The learning organization employs a metaphor that uses relationships to harness the accelerating rate of change on the edge of chaos. The next chapter, Symbiosis Through Collaboration, describes initial experimentation with system redesign to produce educational collaboration and the practice of the discipline of team learning. Systems thinking, the final discipline, demands the resonating influence of the quantum paradigm and presents the vision of a new paradigm for schooling. Chapter IV discusses the future of educational reform as the synergy of the learning organization becomes a reality.
Symbiosis describes the mutually beneficial relationship that grows out of individuals living together in interactive communities. Interactive, generative communities, or learning organizations become possible when the individuals within the organization practice the disciplines of personal mastery, mental models, shared vision, team learning and systems thinking. The collaboration that creates interactive communities, within the larger system as a whole, also increases organizational effectiveness. Access to information reporting on the environment internal and external to the system increases as communities begin to connect with one another. Information access and processing provide the keys to maintaining the flexibility and adaptability that are the hallmarks of a dynamic system. This chapter addresses what happens as education begins to formulate the shared visions around which these interactive communities coalesce.

Communities are dynamic systems living in and forming parts of environments that are also dynamic. They change from hour to hour, season to season, year to year, and epoch to epoch. ...Rhythms corresponding with daily, yearly, or other environmental cycles exemplify the dynamic aspects of communities but do not, in themselves, alter the over-all characteristics of the communities. (Simpson & Beck, 1965, p. 659)

Organizational evolution continues as educational reform persists into the twenty-first century. The educational reform movement evolves through the efforts of restructuring, redesign and renewal initiatives (Pellow & Kuhns, 1992). So far the initiatives appear as predominantly structural solutions. Structure only can provide the form for a system. Relationships must provide the function. As the third,
structural, wave of educational reform concludes, a new wave of systemic relationships blooms on the horizon.

Organizations that practice the disciplines of team learning and systems thinking create systemic relationships. The recognition and celebration of systemic relationships lead to the formation of learning organizations (Senge, 1990), also known as high performing systems (Vaill, 1982, 1989). Education continues to evolve towards that point. Education has yet to arrive. The seeds of new reform continue to sprout as the developmental journey gains momentum. What can education expect? What trends are on the horizon? Where can education head from here?

The journey toward systemic, symbiotic organizational relationships begins with the practice of personal mastery and progresses to the practice of team learning and systems thinking. The educational reform movement has only begun to experiment with collaborative initiatives. This chapter employs the coarse focus spiral of the System Development Template to illuminate the developing trends in systemic collaboration and explore the future possibilities for practicing systems thinking in education.

The System Development Template predicts that education progresses up the evolutionary staircase from synchrony through crisis to synergy. This chapter describes the next two steps, Redesign and Resonance, in each of two sections. These two sections examine and describe the practices of team learning and systems thinking, respectively. Team learning and systems thinking complete the evolutionary staircase that leads toward actualization of the learning organization.

Educational reform brings the organization as far as crisis, to date. Organizations choose the journey that leads to synergetic relationships. This choice hinges on the practice of team learning. The first three disciplines--personal mastery,
mental models and shared vision—carry the organization from a state of equilibrium and synchrony to the brink of crisis. The development of team learning serves as a plateau for evolving organizations. The discipline of team learning carries the organization beyond the crisis phase by harnessing the energy of the disequilibrium period. The organization then reaches a new stable state. The new organizational stable state aligns with the dominant scientific paradigm governing the behavior of systems for that period. In this scenario, the educational organization accomplishes transformation from a teaching organization into a learning organization.

The first section, Redesign, addresses the evolution of systemic collaboration. The practice of inter- and intra-organizational collaboration will transport the organization from crisis through synergy. Synergy adds more value and intensity to the combined efforts of individual contributors. Synergy builds and strengthens organizations because a whole is greater than the sum of its parts. Synergy can increase organizational capacity for change because it harnesses the energy of disequilibrium. Without the energy boost that synergy provides, the organization will fail to reach the next evolutionary plateau. Organizations descend into chaos if they fail to achieve this transformation to the next transient stable state.

The second section, Resonance, addresses the nature of the next equilibrium state for the educational organization. The diligent practice of the learning organization disciplines leads to the creation of a new paradigm for schooling. The new paradigm for schooling harmonizes with the now dominant quantum societal paradigm. A glimmer of this new paradigm ripples just beyond our current field of view. Systems thinking and the holistic perspective that accompanies it, provides the generative lens that focuses on the achievement of a shared vision. A shared vision evolves that will guide the future of education and society as a whole.
Redesign–The Evolution of Systemic Collaboration

This first section covers the evolution of systemic collaborative relationships in three parts. Collaboration represents the next quantum leap on evolutionary staircase, but the path to that point is not a solitary one. Many shared local visions catalyze the next phase of systemic educational reform. The many shared visions, contributing to the next wave of educational reform, stem from common paradigms held about the dynamic relationship between teaching and learning for the twenty-first century.

This section first describes the nature of collaboration and explores the systemic changes that education faces as the paradigm shift to the Information Age reaches normalcy. Education faces systemic problems. Collaboration and integration of reform initiatives generate systemic solutions. In the new age there will be multiple solutions to complex problems; therefore, the future of systemic educational reform holds many possibilities and permutations.

This section next focuses in on one such possibility currently enjoying popularity as an emergent reform initiative. This section portrays the dynamism of the learning community movement. This movement forges a multiplicity of inter- and intra-institutional collaborative relationships that foster the development of a true systemic perspective for education.

Lastly, this section projects the potential for a progression from learning community to learning organization. Learning organizations thrive on change and excel in what ever environment that surrounds them. Learning organizations forge their own reality. Under the new paradigm there will be no "one best system." Under the new paradigm, education will participate as an integrated, inseparable component.
of a whole striving toward the creation of a reality founded on relationships rather than isolation.

**A Portrait of Collaboration**

O'Toole (1985) found that teamwork is the essential and central element to successful systemic restructuring initiatives in business organizations. The importance of systemic connections comes through loud and clear in the second generation of restructuring literature. Wide-spread participation by a diverse sample of stakeholders improves the systemic search for ways to improve, adjust, adapt and upgrade the educational organization. Restructuring initiatives, in the next wave, add the discipline of team learning. Team learning critically influences the development of a true systems perspective on reform.

Development of the disciplines of the learning organization is like arranging a column of dominos. The sequential practice of the learning organization disciplines sets off a symbiotic chain reaction that leads to the development of systems thinking. Education pretends, with its' characteristic quick-fix and band-aid perspective, to think systemically. Education attempts to initiate systemic reform without doing the necessary groundwork first. Team learning through collaboration guides education through the necessary steps.

Competitive advantage today comes from continuous, incremental innovation and refinement of a variety of ideas that spread throughout the organization. The entrepreneurial organization is both experience-based and decentralized, so that every advance builds on every previous advance, and everyone in the company has the opportunity and capacity to participate. (Reich, 1987, p. 80)

Alvin Toeffler (1980), in his book, *The Third Wave*, argued that the survival of organizations, institutions and society will depend upon the ability of autonomous units to collaborate in achievement of common goals and objectives. Inter- and intra-organizational collaboration leads to team learning. It also serves as a
communications vehicle. Team learning results in the symbiotic transmission of shared vision and generates system-wide improvement of education. Intra-institutional collaboration builds teams from within the organization. Inter-institutional collaboration builds teams that connect to other organizations within the larger system.

Collaboration is herein defined as a joint endeavor of autonomous units, in our case educational entities, to achieve outcomes desired by all parties but beyond the grasp of any one of these units acting alone. It is a partnership in a theoretical but not a legal sense. Unlike legal partnerships, collaboratives can be informally organized, ad hoc in their purposes, and quickly modified, incremented, or dissolved as circumstances dictate and goals change. (Pine & Keane, 1989, p.5)

The Iterative Nature of Collaboration

The evolution of collaboration is non-linear. The process of collaboration is circular, iterative, and sometimes discontinuous as it traverses a series of hills and valleys. It is more than mechanical matching of needs and capabilities followed by delineation of objectives to generate a cooperative plan. It is more than cooperation. Collaboration is a mutual exercise founded on understanding and shared values. Willingness to confront differences, as they develop, characterizes collaboration. Collaboration leads to the development of personal contracts that outweigh the influence of the administrative mechanism (Matthews & Norgaard, 1984).

Collaborations, as the literature suggests, are largely symbiotic in nature and synergistic in process. To be productive and resilient they require that institutions involved clearly recognize their essential differences in goals, priorities, modes of operating, organizational dynamics, language and culture. Collaboration, if it is to be fruitful, also depends on the participating institutions resisting the inclinations to co-opt each other. The strength of any collaboration lies in the sustained independence, distinct expertise, resources and perspectives that each participant brings to the
partnership. Collaboration serves as a powerful tool for systemic understanding. The collaborative relationship, in turn, contributes to shared, creative problem-solving initiatives as well as risk-taking initiatives that culminate in mutual benefit (Cooper & Morely, 1989, p. 21).

Intra-Institutional and Inter-Institutional Collaboration

Here the development of systemic reform folds back on itself, optimizing and embellishing elements that began during the second wave of reform. "Teacher preparation and professional development are key elements in improving the quality of education and offer a common ground for collaboration for schools and universities" (Pine & Keane, 1989, p. 2). A faculty development model will bring teachers and administrators together to forge a strong commitment to implementing instructional changes. Faculty development, as a collaborative restructuring strategy, "changes fundamental assumptions, practices and relationships, both within the organization and between in organization and the outside world in ways that lead to improved student learning outcomes" (Conley, 1991, p. 15).

Educational institutions cannot afford to afford to operate in isolation from each other. By pooling and redirecting resources, and making them complementary, we can better serve ourselves, and most importantly, the children, adolescents and adults in our schools. Through carefully planned collaboration between higher education and local district personnel, schools can become centers of vibrant learning for children, teachers and university faculty. The relationships between public schools, colleges and universities develop to the point where each acts as an extension of the other regarding teacher education and the improvement of education. Effective educational collaboratives demonstrate that we can, through partnerships, complement resources and integrate theory with practice and research with action in
responding to the complex and demanding challenge of improving the quality of education (Pine & Keane, 1989, p. 26). Educators will begin to ask the right questions and identify their cogent issues from this position of collaboration.

**Education for the Information Age**

The first issue is the shift from a global economy shaped by conflicting political philosophies to one that weakens political and military power while strengthening economic power and competition. Reich (1990) suggested that this shift catalyzes a change in the focus of decision making from things to people. Organizational evolution transforms the workplace as objective and scientific reasoning makes way for more subjective and humanistic patterns. The organizational characteristics of form and function evolve away from the factory model and its' mechanistic operation and toward the more holistic cooperation of the new system model. The organizational perception of the change process evolves as well. Change no longer presents a disruption that might interrupt the flow of profits. Change becomes an advantage when the ability to adapt rapidly becomes essential for survival. "We must undergo a major transformation into a post-industrial society--society with more technology, more knowledge, more emphasis and dependence on human resources rather than physical resources, more social and economic volatility" (Terrey, 1992, p. 1).

"It is estimated that by the year 2000, nearly 90% of the jobs in the U. S. economy will be service related, and that about half will involve the collection, analysis, synthesis, structuring, storing or retrieving of information" (Conley, 1991. p. 2). The skills required to manipulate and interpret data are vastly different from those emphasized by the current educational system. Rather than calculating and recording static information, comparing it to predetermined standards, the worker of tomorrow
will need to evolve to comprehend information holistically and develop an intuitive "feel" for the dynamic patterns present in data (Duttweiler & Mutchler, 1990). It will require educational experiences very different from those currently employed in most American classrooms to develop these crucial skills (Conley, 1991).

Students need the ability to reason, to think in abstract terms, to be able to connect two thoughts, and to connect abstract thought to pragmatic tasks. They need the ability to be creative. Schools have never asked students to learn to be creative before. Now this country must make its living by its wits, staying ahead by being at the cutting edge, not by raw productive power. (Newman, 1990, p. 8)

The second issue, Drucker identified, is the concomitant shift from teaching to learning to educate and prepare students for the fullest employment opportunities in the Information Age. All students will need to learn the higher-level skills of understanding, communication, problem solving, decision making, and teamwork to achieve success in the new global paradigm.

Frank Newman, president of the Education Commission of the States, interpreted this fundamental systemic transformation to mean "changing the nature of schools from the interior, so that students become active learners, partners in the learning process" (Conley, 1991, p. 14). Educational institutions that do not perform as systems will not do well at preparing the systems thinkers required globally for the Information Age.

The Paradigm Shift From Teaching to Learning

The current system of schooling assumes that the right way to learn is listening to someone talk. As it turns out, this is not the best learning mode for most children. The result is a system that expects the child should adapt to the school, not the school to the child. As such, it has been as much a sorting system as an educational system. Students come in, march along, and at some point many fall out. (Newman, 1990, p. 7)

Terrey (1992) described this instructional refocusing as a paradigm shift. This minor shift reverberates into major positive repercussions for the larger dominant
paradigm shift on the horizon. I interpret this switch in education from a teacher centered lens to one that is learner centered as a prime candidate for the rallying cry of a shared vision for education. Metaphorically, the change of focal length that results transform teachers from carpenters to architects. It is imperative that education broaden its field of vision and develop independent learners. Terrey (1992) presented the teaching-learning dichotomy as follows:

Teachers are responsible for delivering content in the form of factual information. Students are responsible for receiving the factual information. The relationship between teacher and student is satisfactorily completed when the student has successfully transferred factual information back to the teacher in the required format in the required time. (p. 6)

Learning as a process assumes a reciprocity agreement between the students and the teacher—sometimes in the form of a learning contract. The underlying assumptions are more concrete—less abstract than those in the teaching process. Students learn to the degree to which they can actively manipulate facts within some general framework and in which they can relate general ideas to specific events within their experience. We have knowledge only as we actively participate in the construction. Students actively participate by engaging, with other students and with the teacher, in a process of inquiry, critical discourse and problem solving. (p. 6)

Reich (1990) speculated that the new symbol analysts of the Information Age will require four skills: (1) abstraction, (2) systems thinking, (3) experimentation, and (4) collaboration.

Abstraction—The learner is taught to get behind the data, to seek new relationships through induction and deduction... In seeking causes, consequences, and relationships the whole becomes the focus, not the snapshots of the parts which are revealed through dates, isolated events and people.

Systems Thinking—Instead of merely solving the problem which is presented, the student is taught to get behind the problem—how does it arise and how is it related/connected to other problems.

Experimentation—A process [which] equips the learner to become independent and thereby to accept responsibility for his/her own learning.

Collaboration—The focus is on group learning rather than competition.

Learning to seek and to accept criticism from peers, to solicit help, and to give credit to others are logical outcomes. (Terrey, 1991, p. 10)

The four basic skills carry learning forward from the classroom to the workplace. In unison, learning comes from doing and the process becomes one of

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networking. Transformation of the teacher's role fosters those conditions that encourage students to construct knowledge using a personally meaningful information network. The role of teacher and student often undergoes a reversal that causes both to become active learners in the process. Students teach each other, and they teach the teacher by revealing their understandings of the subject.

Teachers learn by steadily accumulating a body of knowledge about the practice of teaching. Teaching, in this context, is enabling, knowledge is understanding and learning is the active construction of subject matter. Numbers are actively used. Data are used. Writing is inherent to the process. Thinking is critical. Working with others through writing and speaking is imperative. These are the skills which are being utilized in the workplace by the knowledge workers. These are the skills which are useful in other classes and in other situations beyond the school. For the teacher the psychology of learning is at work. (Terrey, 1992, p. 6)

Nemerowicz and Rosi (1992) stated that this "interactive, experientially based pedagogy played out in democratic classrooms challenges the lecture format, the professor as wisdom dispenser, and the passive student as information regurgitator" (p. 141). Learning for the Information Age challenges the competition and individualism worshipped by the Industrial Age. Collaboration provides an effective environment for learning and features the power of teams to promote creativity and growth.

Perhaps one of the greatest ironies here is that most scholars now acknowledge, at least implicitly, the dynamic nature of knowing as it is manifest in their own lives. Why, then, does there exist such a clinging to tradition, to adherence to pedagogical theories characterized by passivity, and to a view of knowledge delivery system in mechanistic terms? Perhaps that is the question that needs to guide the many other questions in education. (Frost, Pierson, & White, 1992, p. 223)

It is unlikely that traditional didactic instruction sufficiently engages students to engender the quality of understanding sought for the 21st Century. "Teaching that engages students in playing with ideas, in critical analysis and synthesizing, seems more likely to generate the quality of understanding we seek" (Cooper & Morely,
This forecast initiated a close examination of the existing educational system nationwide.

Leaders now have a clear mandate to place teaching and learning at the top of the educational agenda in order to repair the neglect of the past and prepare for a new future beginning in the year 2000. Numerous developments and forces in the late 1980's and early 1990's have contributed to this new emphasis on teaching and learning. Many of these forces have been external to the educational community, but a great deal of ferment within education has also given rise to creative innovations from practitioners and substantive policies and standards from professional leaders. (O'Banion, 1994, p. 22)

The Collaborative Nature of Educational Reform

The lessons of state initiated reform during the late 1980s and early 1990s heavily influence the current push for change in education. Administrators across the country are recognizing that education, as an organization, desperately needs fundamental and widespread change to keep pace with an increasingly complex global society. Reform, renewal and restructuring initiatives abound in school districts scattered across the country yet, observable, enduring change comes slowly. Although many reformers often refer to their efforts as "systemic," most reform efforts so far have been characteristically piecemeal and ephemeral, tinkering at the margins of the system.

If innovations are isolated in segments and not permitted to touch other parts of the organization, they are likely to never take hold, they are bound to fade into disuse, or they will produce a lower level of benefit than they potentially could (Kanter, 1983, p. 299).

David Cohen and James Spillane (1993) presented uncertainties inherent in large scale change that leave many observers pessimistic about the future for enduring change in education. The curriculum reforms of the 1960's, the effective schools movement of the 1970's and the restructuring initiatives of the 1980's are evidence of the errant quick fix methodology. It is easy initially to produce change and
improvement in one component of the system. The challenge for lasting reform is to maintain and spread the innovation to have an impact on the larger system.

Schmidt and Finnegan (1992) stressed that organizations, like education, are large social systems:

They take input from their environment, process it, and deliver output. Systems are made up of interdependent component parts that shift or adjust to accommodate the demands of the environment but do not necessarily coordinate these adjustments. The adjustments function primarily to maintain equilibrium, or the status quo. Changes in one part affect all others in unintended, uncontrolled ways. Organizations maintain equilibrium only through the expenditure of great amounts of energy. All change requires energy. In times of rapid change, it makes more sense to enable the organization to become inherently more adaptive, manipulating the flow of energy so that it does not go primarily toward a return to equilibrium, but rather toward enabling the organization to become more adaptive as one of its integral features. (Conley, 1993a, p. 13)

Evans (1993) asserted that most efforts at reform have largely neglected the collaborative realities of implementation, showing a "remarkable naiveté about how people and institutions change" (Evans, 1993, p. 19). Advocates for change approach reform as a product, focusing on the structural framework, overlooking that people accomplish change. The key is to focus on innovation as a generative, human process with complex personal and organizational dynamics (Shahan, 1976).

The Dynamics of Collaborative Organizational Culture

Organizational culture is the body of solutions to problems that has worked consistently for a group and that is therefore taught to new members as the correct way to perceive, think about, and feel in relation to those problems. Over time, organizational culture takes on meaning so deep that it defines assumptions, values, beliefs, norms, and even the perceptions of participants in the organization. Though culture tends to drop from the conscious thoughts of participants over time, it continues to powerfully create meaning for them in their work and becomes the rules of the game. (Owens, 1987, p. 197)

Educational systems have a fundamentally conservative organizational culture designed to preserve stability and sustain meaning (Sarason, 1990). Curry (1992) made a colorful comparison of the battle cry of the status quo to a transplant rejection.
"The first step in ensuring that change endures is to understand that, at first, like aody receiving a transplanted organ, the first spontaneous reaction of most
individuals is to reject change" (Curry, 1992, p. xv). Observing the issue of change
through a cultural lens, clearly people fear ambiguity and want reassurance that they
are in control of their surroundings. Deal (1987) stated that change creates existential
havoc because it introduces disequilibrium, uncertainty, and makes day-to-day life
chaotic and unpredictable.

Tye (1987) also discussed the organizational culture of schools. She presents
a "deep structure" of schooling that results from the values and assumptions that
society widely shares. "American's do not vary greatly in their views of desirable and
appropriate educational experiences for children and young people" (p. 282). The
power of this image is considerable. Any vision of schooling that strays from the
consensus engenders considerable concern and scrutiny in most communities.
Advocates of renewal, reform and restructuring must be successful at communicating
their vision to teachers and the community.

Deal (1987) suggested that leaders confront the cultural dilemma rather than
attempt to fix superficial problems. This proactive stance will move the organization
forward avoiding the trap of applying the same solutions repeatedly. He presented a
metaphor for educational leadership where the leader artfully reweaves the
organizational tapestry integrating an impossible dilemma into a novel opportunity,
combining old traditions, current realities and future visions. "The goal is to help
teachers, administrators, boards and community members to develop their personal
perspective, philosophy and vision of education in a time of rapid, fundamental
change" (Conley, 1991, p. 2).

Curry (1992) asked the probing question: "How does an innovative
organization bring about change in ways so basic as to influence its culture?" (p. 33).
She then suggested cultural restructuring, "both as an approach and as an expected outcome, as one such attempt at change" (p. 33). Policy analysts Richard Elmore and Milbrey McLaughlin (1988) believed that cultural reform starts at the school level. Policies must help initiate development of solutions, not mandate resource allocation, structure and rules. They suggested the commission of individuals who work in real schools to fashion workable solutions to real problems and allow those solutions the opportunity to fail and the time to succeed.

Beckhard and Pritchard (1992) in their recent book, Changing the Essence, explained that discerning beliefs influencing the process of change is not simply a matter of reconciling differences about the form of innovation. Rather, it includes constructing an organization's history, distinguishing current perceptions of organizational structure and function, and understanding the many visions of organizational structure and function among its members. They stressed the critical importance of dialog between all stakeholders of the reform.

The most important role organizational leaders play is in preparing the organization for change by creating a climate in which change can take place or by influencing the perceptions and attitudes of the organization's members (Peterson & Spenser, 1990). Although leaders must be visionary in initiating change, communications and decision making in professional organizations must be two-directional or the culture emerging from the change will not be shared.

Beckhard and Pritchard (1992) indicated that all the stakeholders touched by the proposed change must share a high degree of involvement. This ensures their participation, blurs distinction and avoids labels such as top-down or bottom-up. They emphasized the need for educational reform initiatives to mesh or blend the roles assumed by faculty, management, the community and leadership when they collaborate in the process of change. The development of mutual goals then includes
diagnosing or determining the need for change through open discussion, designing a solution and its' implementation, and determining the level that changes will achieve and the form it will take as it achieves institutionalization. "The measure of organization members' commitment to change is related directly to the extent of their participation in decisions governing the process" (Curry, 1992, p. 25).

Organizations that want to be innovative must first become learning organizations. As such, organizations must engage in self-study or a kind of reflective practice where learning and innovation are nearly synonymous and where innovation and change form an iterative process. (Curry, 1992, p. 6)

Much of the current thinking about organizational change and cultural restructuring pivots on the construct of innovative organizations as learning organizations (Beckhard & Pritchard, 1992; Senge, 1990). As such, organizations contemplate their identity, purpose, structure, processes and activities. "One characteristic of a true learning organization is that [its] norms encourage innovation. Another is that problems are approached in an integrative way" (Beckhard & Pritchard, 1992, p. 16).

The groundwork for imagining organizational behavior as learning began with a study of innovative, integrative interventions in a for-profit organization (Argyris, 1982). The researchers working with leaders and members of organizational communities began to observe what they believed to be approaches similar to the feedback communication mechanisms observed in biological organisms.

They discovered double loop learning. It "requires 2-way communication in which parties to the process encourage and facilitate development of heuristics in exploring new meanings that support new organizational realities" (Curry, 1992, p. 50). Double loop learning provides an ideal change strategy in that "coupling articulateness and advocacy with an invitation to...confront views, even to alter them, in order to produce action [that] is based on the most complete valid information.
possible and to which people can become internally committed" (Argyris, 1982, p. 103).

Double loop learning provides a breakthrough technique that facilitates cultural transformation in that it allows an organization to learn from the collective mistakes of its members. It aligns learning with change, so that learning and change processes meld and become part of each other. When learning aligns with the change process, the definitions for each term become exchangeable, such that "change is a learning process and learning is a change process. Ultimately underpinning these processes are changes in the way individuals think and act" (Beckhard & Pritchard, 1992, p. 14). The interactive, cyclical relationship shares three common elements. Learning includes the processes of first freeing oneself from currently held beliefs, knowledge or attitudes, then absorbing new or alternative attitudes and behavior, and finally the application phase in the new state. The flexible learning cycle opens to include new information and feedback from the environment. The responsive change process begins with the current state, progressing through the transition state and completing the transformation with evolution of the change state.

A Portrayal of the Learning Community

It is important to include discussion of the systemic solutions that educational reform will need to produce if education intends to meet the demands of society for the twenty-first century. The learning community serves as a nascent example of a systemic solution. The development of the learning community reform movement serves as an instructional template for future systemic reform initiatives. The learning community initiatives begin the next wave of educational reform. They add the element of collaboration and integration to rejuvenate the waning third wave of restructuring reforms.
Education Needs Systemic Solutions

The paradox between what to teach and how to teach presents an issue under national and local debate. Higher education, as part of the whole educational system, is now being called on to produce the leadership necessary to solve the complex, interdependent problems of producing capable workers for the 21st century.

Whether the argument centers on the content of the curriculum—general education, the common core, great works, diversity—or on pedagogy—integrated and interdisciplinary learning, experiential opportunities, discipline integrity—voices from many points of origin are addressing the need to build community on campus in order to meet particular learning objectives. (Nemerowicz & Rosi, 1992, p. 135)

A recent survey of the literature on systemic change highlights the insurgence of a new collaborative entity capable of spearheading the educational system transformation. Innovative institutions of higher education such as Evergreen State University in Washington and Oakland University in Michigan are pioneering the development of what have become known as learning communities.

Terrey (1991) defined a learning community as "a multi-disciplinary program of study involving a cohort of students and a team of faculty drawn from different disciplines; taught in intensive block mode to a central theme: teaching is done in a variety of formats and all faculty attend all parts of the program" (p. 2).

Learning communities are a systemic solution by definition and evolve to embody the five disciplines of a learning organization. Learning communities by incorporating a relationship-based design establish effective systemic networks that foster internal and external communication, support and commitment. Learning communities bring together several important threads in the philosophy of education.

Recent work in such diverse areas as the social construction of knowledge, collaborative learning, writing and critical thinking, feminist pedagogy, and cognitive and intellectual development supports and resonates with the learning community effort. They all stand on the common ground of learning
as development, the value of building connections, and the power of shared inquiry. (Gabelnick et al., 1990, p. 17)

The theme for a recent National Conference of the National Council on Community Services and Continuing Education provided a glimpse of the power of this novel development.

The learning community is the totality of individuals and organizations whose resources must be coalesced to bring wholism, currency and adaptability to the learning experience. As catalysts and scanners of change, [we] should become the learning leaders who with [our] campus, industrial, government, service agency and other counterparts, mobilize the collaboration needed to actualize the learning community. (Bratman, 1992, p. 4)

Learning communities, exist as a collaboration between the college and client organizations and function to serve the learner first. They weave understanding of the mix and match of assessment, general education, skill building and differing delivery processes to build individual learning capacity and fit organizational needs (Bratman, 1992).

"Learning communities describes a pedagogical approach which places emphasis on the student and the instructor as members of a community engaged in the learning process" (Hamburg, 1991, p. 1). Hamburg, Dean of Instruction at Seattle Central Community College, delineated the pedagogy of learning communities: (a) integration of skills and content- learning by doing is the epistemological cornerstone of the learning community; (b) interdisciplinary study; (c) an active approach to learning; (d) restructuring time and space to have more time together.

In the traditional classroom of the Industrial Age, there is an isolated teacher, a solitary disciplinary perspective and a single pedagogical approach. Teaching in this mechanistic tradition is a lonely experience that rarely encourages professional development or the transfer of knowledge between faculty.

In contrast, imagine a learning environment where students and instructors eagerly work together toward understanding concepts, solving practical and intellectual problems, ... and trying to synthesize aspects of different
disciplines. Imagine students and faculty reluctant to quit their activity at the appointed hour, and imagine that 90% of the students complete their classes and receive credit. (Hamburg, 1992, p. 1)

This may seem too good to be true but it is true for learning communities that restructure their curriculum to achieve linking and coordination of content and learners in an environment based upon experiential learning. The learning community movement links higher education with other educational institutions, business and industry, and the community at large (Gabelnick et al., 1990).

The learning community movement demonstrates the practice of the discipline of team learning. It serves as an example of reform from within an organization, flowing from a shared vision for education, that links many of the key stakeholder groups through the process. It does not represent the only example of team learning in educational systems.

**The Learning Community Practices Team Learning**

The Washington Center for the Improvement of the Quality of Undergraduate Education (WCIQUE) defined the learning community as a collaborative effort that "constitute[s] a basic reorganization of the method of delivering higher education and hence of the patterns of association of all of the constituencies and inter-constituencies of higher education: faculty/faculty, student/student, and faculty/student" (WCIQUE, 1988, p. A.9). This approach dramatically increases the amount of firsthand collegial feedback to the faculty. "Validation, as well as constructive criticism, results, and a sense of scholarly community is re-created. An enormous transfer of knowledge results from teaching in this format, and a new type of faculty community is established" (WCIQUE, 1988, p. A.12).

A learning community is any one of a variety of curricular structures that link together several existing courses—or actually restructure the curricular material entirely—so that students have opportunities for deeper understanding
and integration of the material they are learning, and more interaction with
one another and their teachers as fellow participants in the learning enterprise.
(Gabelnick et al., 1990, p. 19)

Gabelnick and her associates (1990) in their book, Learning Communities:
Creating Connections Among Students, Faculty and Disciplines, stated that the
organization of learning communities fall into five categories: linked courses,
learning clusters, freshman interest groups, federated learning communities and
coordinated studies. The implementation typology varies from the simplest single
institution linked course model to the most complex, articulated multiple institution
coordinated studies model.

It is through new and challenging patterns of association, ones which eschew
the isolating and unchallenging patterns of traditional academic organization
and in which are based on judgments of what needs to be taught and learned in
our highly interdependent and complex contemporary world, that renewal
flows. (WCIQUE, 1988, p. A.9)

Faculty exchanges of this sort constitute a quantum leap in approaches to the
articulation of 2 and 4 year colleges. The boundaries between the institutions
become more and more permeable as large numbers of faculty are exchanged
and begin to view the students, the program and the faculty of another
institution as part and parcel of not just a single system, but virtually a single
college. (WCIQUE, 1988, p. A.14)

Learning communities typically are a collaborative initiative of universities,
colleges, community colleges, Intermediate School Districts and high schools. Thus
far, the learning community movement has yet to spread beyond localized pockets of
success. It takes an immense amount of time and effort to establish the groundwork
for a learning community initiative. Widespread practice of the learning organization
disciplines encourages their development, but few educational organizations have
evolved this far. Team learning provides a long term approach to the problem of
reform in educational organizations: however, many organizations still seek the quick
fix popular under the mechanistic paradigm. Team learning requires quantum
thinking and diligent effort. A strong sense of shared vision for the growth and
evolution of the organization fosters the emergence of team learning. Pine and Keane (1989) catalogued the division of labor in a Michigan learning community that developed between Oakland University, Oakland Community College, and Oakland Schools. This exemplifies the vast organizational effort and commitment that learning communities require:

(a) the university has appointed teachers as research associates whose primary function is to design and document local research and development efforts; (b) participating university faculty are released for 1/3 of their time each semester to participate on site in school based curriculum and staff development efforts; (c) the ISD, and the university share facilities, materials, and operational costs to support the collaborative; (d) the university, the community college and the ISD release staff and faculty to provide personnel for staffing the administration of the collaboratives; and (e) local school districts contribute personnel by providing substitute teachers to release classroom teachers for participation in the collaboratives. (Pine & Keane, 1989, p. 22)

The learning community movement exhibits a clear commitment to decentralization and serves as an excellent example of centrifugal educational reform. The learning community projects across the country emerge as prototypical boundaryless organizations and as a result are highly flexible. These new organizations practice many of the disciplines of the learning organization. Leadership in these flatter, more responsive organizations, underscores the value of personal and professional networks. Every part of each organization participating in a learning community continually learns about the interrelated nature of their creation. This generative knowledge strengthens the entire system from within (Gratton, 1993).

A Projection for the Learning Community

The learning community movement, such as it is, is not a response to one problem in higher education: it is a response to a whole complex of issues and the fundamental issues identified by the national reports. It's really a vehicle of response for all of those problems. It is not isolating one problem, nor is it a reform effort like the competency based movement or intern-based education or anything like that. It is a vehicle for responding to a whole cluster of fundamental ills besetting higher education today. (Hill, 1985, p. 1)
The learning community movement provides an example of systemic reform that will continue to evolve and unfold. The learning community concept has yet to catch on. It is much more decentralized and centrifugal in its' orientation than most of the reform initiatives that populate the first three waves of educational reform. It sets the stage for the emergence of the next wave of educational reform. It vanguards the practice of the learning organization disciplines. As the organization of education continues to experiment with the development of shared vision for the new paradigm, more communities of learning will emerge. Relationships beyond the system of education will spring up between communities committed to the vision of learning.

The learning community example illustrates many of the principles the institution of education will need to practice if the organization desires to develop reform initiatives that create and celebrate change. The flexibility necessary for adaptation and generative learning under the quantum paradigm requires the development of a new companion paradigm for schooling. A new vision for education will emerge as the organization practices the learning organization disciplines. This new paradigm for schooling will focus on learning outcomes rather than on teaching inputs. This difference reflects a dramatic paradigm shift of its' own. The learning community initiatives provide the model elements for this new paradigm for schooling. The shared vision behind the new paradigm for schooling, if truly shared and born of systemic relationships, will fuel the continuous evolution of the educational organization. The learning communities model a redesign of the organization. The redesign of education results in the boundaryless, systemically interrelated organization described as a learning organization. This new learning organization with a new paradigm will resonate and transform itself. Educational reform, through the mediation of internal resonance, can create a system capable of meeting the needs of citizens in a twenty-first century society.
This second section covers the selection of a new paradigm for schooling. The future of systemic educational reform builds on the relationships that develop through the practice of team learning. Teams learn to celebrate the systemic, interconnected nature of their current reality. A new shared vision emerges to direct the evolution of a new shared paradigm for schooling.

Systems thinking represents the final quantum leap on evolutionary staircase leading to a new paradigm for schooling under the Quantum paradigm. This new paradigm directs a period of normalcy and equilibrium until the next evolutionary cycle begins. True to the nature of systemic change in the Information Age, the paths to any one point all express equifinality. Many shared local visions, all stemming from common paradigms held about the dynamic relationship between teaching and learning for the twenty-first century, catalyze the new paradigm for schooling.

The new paradigm for schooling will emerge from each local system uniquely suited to address the issues and demands of that environment. This new paradigm will evolve through the practice of the learning organization disciplines. The practice of personal mastery will alter the face of reality education sees when it engages in self-reflection. The practice of mental models will adjust the metaphors that drive the thought and actions that educators use to ply their trade. The practice of the discipline of shared vision will transform the institution of education and carry it through the crisis and conflict characteristic of a global paradigm shift. The practice of the discipline of team learning, from within educational organizations, provides the leadership and followership access to an interactive pipeline of vital information. The practice of systems thinking ultimately results. Systems thinking leads to the formation of vision focused networks dedicated to the systemic spread of educational
reform. The interconnection of various subsystems, all committed to common visions united under a common paradigm for schooling, facilitates the spread of systemic reform initiatives.

This section first describes the nature of systems thinking and explores the changes that education faces as the paradigm shift to the Information Age reaches completion. A fourth wave, often referred to in the literature as the next wave, fast approaches as the third wave wanes. This next wave describes the second generation systemic reform initiatives that recognize the value of bottom-up shared vision. The initiatives growing out of the New American Schools Development corporation (NASDC) pilot programs provide exemplars of this new more systemic wave of educational reform. The initiatives of the next wave recognize the value and importance of establishing systemic interconnections to other stakeholders in the educational process.

This section next focuses in on the evolution of the holonomic metaphor to guide the transformation of education. This new metaphor identifies the integration and holism characteristic of the new paradigm. The holonomic metaphor idealizes the functional relationships fostered by systemic interconnections and portrays a more responsive local, horizontal form for the educational organization.

Lastly, this section projects the potential of the new paradigm for schooling. If education desires to change the paradigm for schooling, the isolationist ways of the past must fall by the wayside.

A Portrait of Systems Thinking

The guiding message garnered from the previous waves of reform insists that better solutions to existing problems will not arise by searching the internal or external environment. The truth of evolutionary success, indicates that evolution
under the quantum paradigm is not about a series of one time adaptations. Adaptation produces changes in the organization. Organizations change in response to changes in the environment. Evolutionary growth, under the quantum paradigm, requires anticipation. Anticipation initiates change to keep the organization in continuous disequilibrium. Organizational evolution in a quantum environment entails continuous improvement in the capacity to grow beyond the limits of the system design. Under the quantum paradigm, change becomes the means rather than the end. Senge (1990) said that systems thinking provides the cornerstone to change.

The Learning Organization Achieves Synergy Through Synthesis and Symbiosis

The discipline of systems thinking facilitates the expression of organizational synergy. It grants an organization the capacity to thrive during turbulent, uncertain times. Systems thinking evolves in an organization that diligently practices the learning organization disciplines. The synthesis of shared vision and the symbiosis that results from collaboration celebrate change through the practice of the disciplines. The synthesis of personal mastery, mental models and shared vision gives reform a direction that flows in a manner fluid and flexible enough to respond to the mercuric demands of a chaotic environment.

These disciplinary elements exist in a symbiotic relationship and create an environment conducive to team learning. Team learning, as an organizational discipline, results in an increased organizational capacity to learn from mistakes. This process leads to an increased number of complex connections that support and maintain an internal environment conducive to growth during constant external change (Land & Jarman, 1992). This avalanche of relationships creates a state of synergy for optimum organizational growth and development.
Learning organizations respect their environments because ideas are out there, politics and partners are out there, and ultimately we are all out there. Indeed the phrase 'out there' is a misnomer for the learning individual and the learning organization. Learning organizations neither ignore nor attempt to dominate their environments. Rather, they learn to live with them interactively. Continuous change is built into the relationship because widespread interactions under conditions of dynamic complexity demand constant attention and movement. Change forces are seen as inevitable and essential to learning and growth. (Fullan, 1993, p. 84)

Educational reform struggles to transform education into a learning organization. Success and failure ride the balance as education practices the disciplines of the learning organization. The outcome of educational reform depends on our ability to embrace the new paradigm and select it to guide and govern our initiatives. The outcome of educational reform depends on our ability to embrace disequilibrium, in that, "the growth potential of any system is fulfilled by connecting with the different and dissimilar rather than building on similarities" (Land & Jarman, 1992, p. 27) The outcome of educational reform rides on a successful resolution of the crisis of perception.

Everything and everybody is connected. Everything affects everything else. No matter how different, no matter how far away, we are all part of an interconnected whole...the fact is that no real division can be found between ourselves, other people, and the world around us—unless we create it in our minds. (Land & Jarman, 1992, p. 104)

The NASDC Provides Opportunity for Organizational Synergy

The New American Schools Development Corporation (NASDC), a bipartisan, nonprofit organization committed to the design and creation of outstanding public schools, currently works toward the transformation of school through system-wide change (Conley, 1993b). It initiates in the next wave of educational reform and models the promise and potential of second generation systemic reform at the national level. This new wave, or second generation of systemic reform, demonstrates a wider range of stakeholder participation in the redesign of schooling. The NASDC
initiatives are each, unique partnerships that involve educators, community leaders, business executives, parents and students. NASDC design teams are implementing initiatives in over 150 schools nationwide (James Walter, Personal Communication, December 7, 1994).

The NASDC schools along with other initiatives such as the Edison Project are all attempting what Cuban (1990) calls second order changes. The first three waves of educational reform initiate first order change. First order change occurs within a stable system that itself remains unchanged. First order changes are of a continuous nature and maintain equilibrium. Second order change occurs discontinuously and acts to transform the fundamental state of the existing system. The difference between first and second order change compares to the difference between velocity and acceleration (Watzlawick, Weakland, & Fisch, 1974). Discontinuous change compares to the Gouldite model for quantum evolution discussed earlier in this work. The point in mentioning these initiatives, which are covered elsewhere in detail (Conley, 1993b; David, 1991; Toch, 1991), serves to indicate the direction of future reform.

Havelock and Benne (1969) prophetically found the cant of the first wave period to be highly mechanistic and called for education to be “concerned with the intersystem relationships beyond basic researchers, practitioners, and consumers in an evolved and evolving organization for knowledge utilization” (p. 124). The organizational changes they sought to implement are striking similar to the characteristics of the learning organization almost a quarter century later. If the new quantum paradigm demands a learning society, then we will require the disciplines of the learning organization to connect and propel our organizations in that direction. We also will require a new metaphor to guide and transform our perceptions and behavior.
The ultimate aim of education is to produce a learning society, indeed a learning globe. The key to learning is the teacher who must combine continuous inner and outer learning. Moral purpose and change agentry—caring and competence—are intimate partners. Neither equity nor excellence by themselves get us anywhere. They must feed on each other. (Fullan, 1993, p. 135)

A Portrayal of the Holonomic Metaphor

The dynamic, unfolding role of the holonomic metaphor (Bohm, 1980) becomes very important in the evolution of the educational organization. Examination of the progression of metaphoric expression identifies a pattern that conforms to the rise and fall of the three waves of educational reform. The educational organization evolves toward becoming a learning organization through the efforts of these waves of reform. The educational organization evolves away from the strictly orchestrated form and function, that underscore, the first wave of reform. The educational organization learns the art of improvisation.

There are bumps and spills along the way as the educational organization learns to identify the importance of misalignment between guiding metaphors and the dominant paradigm. The educational organization develops the capacity for generative learning through the synthesis of vision and the symbiosis of collaboration.

Learning Organizations Improvise

"The metaphor is not the orchestra, with its methodical rehearsals, but rather the jazz group, improvising continuously among its members about melodic progression" (Fullan, 1992, p. 10). A holonomic metaphor drives organizational improvisation. Ultimately the inchoate powers and motivating forces from within an organization emanate from a figurative perspective. Max DePree (1992) in his book,
Leadership Jazz, elaborated on this improvisational theme comparing the context of leadership to the partly known, partly unknown context of the jazz musician.

Jazz-band leaders must choose the music, find the right musicians, and perform—in public. But the effect of the performance depends on so many things—the environment, the volunteers playing in the band, the need for everybody to perform as individuals and as a group, the absolute dependence of the leader on the members of the band, the need of the leader for the followers to play well. What a summary of an organization! ... We have much to learn from jazz-band leaders, for jazz, like leadership, combines the unpredictability of the future with the gifts of individuals. (DePree, 1992, pp. 8-9)

Why does education need to embrace a new metaphor to express organizational behavior? Metaphors contribute to the mental models we hold about our selves, our work, our relationship, and our world. When the metaphors we embrace have flaws, the resulting behavior expresses the nature of those flaws. The metaphors that express the world views or paradigms held by the individuals orchestrating the initiatives guide the first three waves of educational reform. As the evolution of the dominant paradigm progresses through developmental phases, the subordinate metaphors held by the populace evolve in parallel. Dysfunctional behavior and organizational decay result when organizational metaphors and dominant paradigm are out of synchrony. Exponential growth and organizational synergy result when the organizational metaphors and the dominant paradigm harmonize.

The Misalignment of Metaphors Results in Dysfunctional Organizational Behavior

The external focus of the mechanistic metaphor proposes that the external environment fixes the amorphous and fluid response of the first wave reformer. The first wave of reform created a vision that expressed allegiance to the Industrial paradigm. The vision of the first wave gave the power of change to the parts. The
parts, or techniques and materials are external to the system under study. The first wave said that the existing educational system was fine and that school improvement needs to come from the application of innovative educational technology. This wave insisted on the external direction of first order changes in the educational organization.

In contrast, the internal focus of the socio-political metaphor proposed that the internal environment fixes the fluid reality of the second wave reformation. The second wave of reform said that the existing educational system continues to be fine but that change needs to redistribute power among the people. This wave, characterized by a battle between centralizing and decentralizing forces, illuminates and magnifies the dissonance between the emerging and the declining paradigm. The vision created by the second wave points to school improvement coming from the implementation of innovative human resource development. The metaphor changes and thus the focus of organizational behavior shifts. Remnants of the mechanistic paradigm are evident throughout this crisis period. This wave insisted on the internal direction of first order changes in the educational organization.

The dynamic change from an external to an internal focal point for vision creates an inversion. The organizational vision, the locus of meaning or departure point for reform initiatives, has changed from an external to an internal reality; from objectivity to subjectivity; from parts to people.

A synthesis occurs, during the third wave, that melds the external and internal perspectives. This uncovers an organic, additive or synthetic, metaphor that insisted on the union of the external and internal perspectives. This metaphor evolved beyond the scope of the previous two. The first wave emphasized the external objective reality of technique and technology. The second wave accented the internal subjective reality of people and power. The third wave stressed that the dynamic
space between the external and internal deserved emphasis. The third wave granted transactive power to the relationships between internal and external forces together in dynamic union.

**The Holonomic Perspective of the Next Wave**

The holonomic perspective results from the next metaphoric inversion. It is a reversal of the organic perspective, where the intrinsically connected elements of the whole take shape only as they loosen, and each one emerges to become the other. This derivation of holonomy for the social sciences, as for the physical sciences, describes the canon of dynamic orders whose parts contain information that reflects the whole (Bohm, 1980, 1986; Capra, 1982; Wheatley, 1992).

Observation of the evolution of change perspectives reveals an abrupt "gestalt switch." Historical analysis of the evolution of organizational perspectives on change reveals "large areas of overlap between succeeding models" (Armstrong, 1992, p. 8). The overlapping waves of reform are reminiscent of the theory of holonomy proposed by the theoretical physicist David Bohm (1986) that describes the holographic organization of the universe. Holonomy supports that any portion of an ensemble can reconstruct an entire view of the intact original.

The holonomic metaphor emphasizes the underlying unity, or wholeness, of outwardly separate elements, relying on deep rather than superficial structure. The holonomic metaphor could potentially resolve the crisis of perception in education. Educational reform, thus far, has not been categorically wrong or misdirected. The educational organization, until now, has professed metaphors that disconnect the organization. Disconnection means the absence of systemic relationships. Disconnection prevents an organization from achieving the path to synergy.
It is important to understand that, consistent with the dynamics of change across previous metaphors, the holonomic metaphor is the larger circle within which the preceding metaphors are successively nested. The holonomic metaphor merely expands the circle of perception, and in doing so, acknowledges the unique usefulness of each of the previous metaphors. Further, the holonomic metaphor, unlike the organic, does not prioritize the visible at the expense of the invisible. It conceives of space not as empty, but as a plenitude of possibilities. (Armstrong, 1992, p. 12)

Armstrong (1992) identified the conceptual utility of the inevitable and inherent nature of wholeness as the major strength of the holonomic perspective. The holonomic metaphor encourages understanding and acceptance, discourages fear and judgment, and so facilitates the development of a shared vision for education. This metaphor fosters an environment conducive to the formation of complex interdependent relationships.

The holonomic metaphor orchestrates successful organizational transformation only when accompanied by acceptance of the quantum paradigm. This presents the primary limitation of the holonomic metaphor. The Newtonian paradigm continues to influence the mechanistic, socio-political and organic metaphors driving the first three waves of educational reform. When viewed through the linear lenses of the mechanistic, social-political or organic perspectives, the holonomic metaphor becomes too utopian and abstract to be practical.

A Projection for the New Paradigm

The idea of systemic change relates to the form of wholeness and the function of homeostasis. The basic discovery arising from systemic thinking is that alliances are the bread and butter of learning organizations in dynamically complex societies. There are two reasons for this inevitable conclusion (and starting point for action). First, the problems are too difficult to solve by any one group; moreover, things that any agency does have consequences for all other relevant institutions so agencies affect each other in any case (usually negatively or arbitrarily). Second, in education a variety of stakeholders insist on having a voice in what is happening. The choice is whether such involvement will occur as mutually isolated influences working randomly or at cross purposes or will be developed through joint initiatives. (Fullan, 1993, p. 93)
Systemic reform does not present an easy task. Many of the alliances and collaborations that systemic reform requires involve individuals and groups coming to the table with different experience, perceptions, paradigms and possible solutions. The point to systemic reform, founded in an accurate interpretation of systems theory, is that differences and diversity contain the indispensable ingredients for profitable action. Evolution of the disciplines of the learning organization will enable education to negotiate thirty years of equilibrium into disequilibrium. Disequilibrium fosters the development of a new shared reality where the vital, generative, new solutions lie.

The body of this thesis concludes by projecting the boundaryless nature of educational reform under the new paradigm. Relationships will supplant architecture in the Information Age. The synthesis of shared vision and the symbiosis that results when organizations engage in systemic collaboration create the platform for the emergence of synergetic relationships.

The Future of Educational Reform

The future of educational reform lies in the evolution of organizational vision, the communication of a new organizational voice and metaphor, and the creation of systemic, collaborative relationships. The future of educational reform will be unpredictable. The constancy of the paradigm behind the vision may be more transient than our organizations has ever experienced. Generative shared vision and relational systemic anticipation will collaborate to create an accurate view of our current reality, regardless of the speed at which it changes.

Figure 13 illustrates the jumble of pieces that contribute to what Larry Cuban (1990) referred to as the puzzle of educational reform. Without the quantum paradigmatic perspective of systems thinking, the individual events occur in isolation and appear as tangled as the mythical Gordian knot. Figure 14 illustrates the
contribution of systems thinking to the development of a clear, holistic picture of current educational reform.

Figure 13. The School Reform Puzzle.

Figure 14. The School Reform Picture.
Reform networks will supplant the reform of isolated schools. Education will learn to improvise and rely more on the skills and abilities of key stakeholder groups. Education will become more responsive to centrifugal forces as the transformation nears completion. In the Information Age relationships will increase dramatically in their importance to organizational survival. Formless, boundaryless improvisational organizations will master the new environment. Prediction of where education heads from here becomes impossible.

Only those organizations capable of practicing the disciplines of the learning organization will be able to negotiate what ever comes next, whenever it comes. That perhaps provides the only certainty left in the new age dominated by uncertainty and chaos. Reform during the next wave will be categorically different from all that has come before. This implies that roles and relationships enacted by leaders and followers will be dramatically different as well. Educational reform in the Information Age will be more like an improvisational act of performance and less likely to adhere to a tight, authoritarian script or score.

**Synthesis, Symbiosis and Synergy**

Systems thinking celebrates holonomy. The next wave of reform leading to the evolution of the learning organization delivers power to the whole. The holonomic metaphor, congruent with the dynamics of change, aligns with the ideology of the quantum paradigm. The future direction for education will emphasize organizational self-actualization through synthesis and symbiosis. The development of organizational vision initiates the development of a harmonious and resonant organizational voice. Resonance leads to the establishment of like-minded organizational networks throughout the system as a whole. Networks form the foundation of relationships that allow organizations to touch and interact responsively.
with one another. Max DePree (1992) made an eloquent case for the importance of organizational voice and this more nebulous quality, touch.

Perhaps more than anything, I hope that together we can ponder the mysterious energy lying impounded in the connection between voice and touch. After all, a leader's voice is the expression of one's beliefs ....A leader's touch demonstrates competence and resolve.... They way we build and hold our relationships, the physical settings we produce, the products and services our organizations provide, the way in which we communicate--all of these things reveal who we are. (DePree, 1992, pp. 7-8)

The uncertainty of the times will define the nature of educational reform under the new paradigm. The rise or fall of the educational organization will depend on the metaphor it chooses to guide its' actions, and on the lens it chooses to use for the interpretation of events in progress. Certainly shared organizational vision and collaborative relationships will be major contributing elements during the next wave and beyond.

The Information Age and the quantum paradigm are fast approaching. Success in this new era will come to those organizations designed to thrive on the edge of chaos (Peters, 1987). Organizations determined to thrive will experience the dissonance of the paradigmatic revolution. Out of discord and dissonance relationships will quickly supplant architecture as the vehicle driving reform initiatives. Out of crisis and conflict vision and touch will replace the power and legitimacy of policy and bureaucracy. Centrifugal forces will dominate centripetal influence and improvisation will supplant innovation. Learning organizations will certainly survive and flourish after the paradigm shift--teaching organizations may not.
CHAPTER V

EPILOGUE

This has been an exhilarating year, full of ups and downs and twists and turns. This past year has been almost as turbulent as the object of my devoted attention these past many months. It strikes me, as I pause and take a moment to reflect, that my journey has evolved in a fashion that parallels that of my subject. This epilogue serves to describe the evolution of my search for coherence in the tangled morass of educational reform literature and points to the work that lies ahead.

Post-modern Reflections

This section presents an experimental venture with post-modern reflection. I include discussion on the following topics: (a) the evolution of the research project, (b) the influence of the research on my personal perspective on leadership, (c) and how the emerging quantum paradigm is apt to affect our definitions for the study of leadership in the future.

Present Holonomy

Reflecting on the merits and methodology of this literature based form of qualitative research, it occurs to me that I never considered at the outset, that its' methodology would emerge, develop and evolve in a systemic fashion. I am a scientist by training, and until recently, a complete disciple of the positivist research paradigm. Admittedly, this piece radically departs from the standard procedures of deduction and represents, for me, significant adventure and risk. What I thought
would be a quick Master's project has telescoped into a rich, and amazingly gratifying personal growth experience.

The path I describe to document the progression of my search for methodological enlightenment reveals a systematic attempt to avoid the cookbook approach. I seek to go beyond the linearity of single accounts to reveal the analogies between the accounts. My foray into the literature proves that this is easier to say than to do. This thesis represents my struggle to integrate information from a wide range of disciplines. Surprisingly, the search was not the empirical process I had envisioned at the outset. What I encountered was a nebulous, ethereal and elusive collection of metaphorical elements at the foundation of my inquiry.

My journey, the personal and the professional, evolved through repeating cycles of negotiation and interpretation. Each iteration brought me closer to understanding the complex layers of duality that obscure the investigation of organizational transformation. Creation of a portrait of this process perhaps represents the most difficult and thought provoking aspect of this project. Like Argyris (1980), I searched for a way to make the "undiscussible, and its undiscussibility, discussible." What I need to accomplish this is a metaphor. Conceptualization and description of such a context dependent process as educational reform, would be unintelligible without the judicious use of a metaphorical frame.

At many points along the way, I found myself reflecting on the similarities between the Heisenberg Uncertainty Principle and my investigation. I find it an apt metaphor for many situations. It seemed like the more I read, the farther I got from understanding the true nature of educational reform. What I found was an accumulation of pairs of antonyms describing lexical fields for the metaphors beneath the surface of my search. The inchoate influences driving educational reform, served to increase my confusion and distraction. The harder I would search for terms that
would confine and limit definition, the faster the daunting task would expand. The Heisenberg Uncertainty Principle reflects this duality, in that what I was observing, was not the nature of reform itself, but the nature of reform exposed to my questioning. What I uncovered about educational reform was filtered through the lenses I chose to employ. This project reflects as much about my personal paradigm shift as the one at the heart of my investigation.

I hesitate to reveal my personal reflections and admissions, but in keeping with the post-modern, feminist perspective, I must reveal my voice and speak to the journey behind the journey. How did this all begin? I suppose, like all scientific investigations it started with me, the observer posing a question. In retrospect, I now understand how this simple process could bloom in such an unexpected ways and I would like to share my insight.

I started down this road on what I call a "line drive" toward my Master's degree. I was in a tremendous hurry to get from point A to point B in one year. There were few classes available that would allow me to fulfill my plan. I thought an independent study and thesis would be a quick fix to the dilemma of my own creation. In hindsight, I see that I chose to initiate this project heavily influenced by mechanistic metaphors. These metaphors were ingrained through years of previous training in scientific research. As forward thinking as I presumed I was, I was still very much a prisoner of the Newtonian paradigm. Much like the individuals that comprise the organization of education I chose to study, I was trapped in a crisis of perception that was of my own design. Similarly, as with educational reform, my rigid linearity would soon confront chaos and seek resolution through the adoption of a new paradigm. Let me elaborate.

A study that started out as an analysis evolved into a synthesis. An outline that started out linear and crisply defined, was transformed into a spiral concept map
with many avenues and relationships yet to explore and connect. The growth and development of my nascent scholarship highlighted, personally, the value of learning to practice the disciplines of the learning organization. My thoughts on educational reform evolved the further I looked into myself. The critical point occurred when I came to the realization that I was no longer searching for the right answer but merely to learn to identify the causal threads. The physics behind the movement and evolution of the universe became more than just theories on paper. They prove to be as powerful a force directing the lives of individuals as they are in describing the behavior of molecules. The evolutionary process, behind the development of this thesis, not only illuminated the history of educational reform but served to clarify and mold my aspirations to participate in navigating the chaotic future ahead for educational leadership. Leadership, although I minimize its role in the scope of this thesis, presents an important variable in the organizational change equation.

Personal Mastery

My thoughts on leadership have gone through quite a transformation over the past year. A year ago I would have quoted Burns (1978) and said that leadership was about getting people to want to do something you wanted them to do. I would have said that leadership was about the orchestration of organizational vision, or some ephemeral, highbrow something or other. I would have talked a lot about using vision as a tool to get your organization where you want it to go.

My thoughts, much like the best laid plans of educational reform, have started out really complex and ornate, but over time they have condensed down to an embarrassingly small core nugget of belief. What I feel now, about leadership is quite simple and more subjective that I ever presumed. The becoming aspect of leadership that Burns (1978) alluded to, almost two decades ago, has a decidedly spiritual
foundation. Spirituality and personal growth are not aspects I anticipated. The becoming perspective of transformational leadership can be distilled down to the actions of a single leader. A leader brings out the best in others, their followers, by finding and displaying the best in themselves.

My thoughts are less textbook and more personal now because I see myself evolving into a leader. Peter Senge's *The Fifth Discipline* profoundly influenced the path my journey has taken. I now have a clearer idea what kind of leader I need to learn how to become. The physics driving the paradigm shifts expressed in this thesis, also indicate the unique and highly unpredictable nature of each leadership experience. Change will become a leader's way of life under the quantum paradigm. The qualities I have discovered to be vitally important to organizational evolution also fuel my personal development. From my research experience I learned that if I truly desire to be a successful leader during this time of paradigmatic shift, I will need to become more of a facilitator and less of a manipulator, to become more of a team player and less of a loose cannon and to continue to grow and evolve with the turbulent times.

I continue to think leadership centers around the intimation and promulgation of vision, that has remained constant. The kind of vision I believe to be important to leadership and to organizations, though has changed drastically. I thought vision was about prediction and analysis, about strategy and planning and the isolation and solving of problems. I see now, through the lens of the quantum paradigm, how linear and misdirected my early conceptions were. The way I have come to see the world and its workings, demands that I become more comfortable with turbulence.

In the world, as I see it today, prediction is no longer a possibility that works. Things around our organizations are changing so fast that we, as leaders, have to learn how to encourage our organizations to continually think on their feet. Leaders in the
chaotic organizational marketplace must be able to fly by the seat of their pants, to experiment and make frequent mistakes!

Similar to the behaviors of leaders in self-help recovery groups, the leaders of our dysfunctional organizations set the example and encourage others to want what they have. Leaders model the behaviors that bring out the best in themselves and encourage those around them to experiment with doing likewise. Leaders in the Information Age establish, nurture and maintain a myriad of relationships that generate a learning capacity for the entire organization. It starts with the actions of one and spreads. Organizations led this way learn to stop reacting and learn to be proactive. This takes a new kind of vision, one that has to come from deep within the organization, built from the personal visions of each individual touched by the organization. Vision borne of organizational learning becomes generative and holds the keys to thriving on the edge of chaos.

**Beyond Holonomy**

The holonomic metaphor (Armstrong, 1992; Bohm, 1980) for organizational development serves the normalcy period for the quantum paradigm and the Information Age. I must include at this juncture that this is not the end of the evolutionary line. Organizational evolution continues as the body of knowledge directing the evolution of scientific paradigms continues to transform the ways in which individuals construct meaning. The evolutionary struggles described within the pages of this thesis will resurface and begin again, probably soon. Change persists and fast becomes a natural component of our organizational consciousness. There is a glimmer of a new metaphor for organizational change on the horizon. This next metaphor will be one of drama, tropes, and performance.
The ontological assumptions made by educational organizations evolve as they incorporate understanding of the influence of new science and the quantum paradigm. The perspectives held at the cutting edge of organizational behavior research evolve away from the objective, empirical behaviorist approach towards a more subjective, phenomenological, spiritual approach (Morgan, 1986; Burrell & Morgan, 1978).

The educational organization during the first and second waves of educational reform assumed a machine metaphor and perceived reality as a concrete structure. This highly objectivist approach constrains organizational behavior to environmental changes. The influence of the machine metaphor limits organizational behavior to simple reactive, responses to external stimuli. During the third wave of educational reform, organizational perception progressed to embrace an organismal metaphor that interprets reality as a concrete process. This next wave building before our eyes, moves the organizational perception of reality to the holonomic realm where information holds the keys to successful interpretation of context (Morgan, 1986; Burrell & Morgan, 1978).

What lies ahead for organizations evolving beyond holonomy? Morgan (1986) theorized in his book, *Images of Organization*, that the image of theater and the performance metaphor lie ahead. Organizations ascribing to a performance metaphor will perceive reality through symbolic interpretation of relationships. These organizations evolve toward the social construction of reality and beyond to a reality that exists as boundaryless and limitless as the human imagination. Examination of these evolving forms for organizations will require new lenses that are functionally aligned with the quantum paradigm. When organizations begin to approach reality from a more subjective perspective the research paradigm, or examining lens, must undergo a similar shift. The research techniques necessary to investigate
organizational behavior under the quantum paradigm will become increasingly qualitative.

The increasing influential role of organizational culture and relationships between individuals and organizations indicates that educational research will evolve toward an anthropological perspective. Noted anthropologists, like Victor Turner (1969, 1974) and James Fernandez (1977, 1986, 1991), have long prescribed an ethnographic approach for the study of cultural performances. The investigation of the use of tropes, or metaphors, to manage the "acts of meaning" occurring daily in our evolving organizations will become an important research thread in the years to come (Bruner, 1990).

As I conclude my musing on the semiotic future of organizational evolution, I begin to wonder, what comes next after this? What patterns and symbols will develop and be discovered as organizations continue to practice the disciplines of the learning organization? I understand why I must discard the objectivity of the positivist paradigm and learn to embrace the exploration of pure subjectivity. Now that it will be impossible to predict what the future will bring, access to accurate information and the development of improvisational relationships will limit the rate of evolutionary acceleration. Organizations will become generative and transcendental networks capable of constructing new realities from environmental and interpersonal feedback. What do organizations interested in meeting this challenge need to begin doing now?

It is my hope that my model for the study of system development will be enlightening and encourage more educators to begin to practice the disciplines of the learning organization. The crisis of perception I address must reach resolution if the entire educational organization desires to evolve beyond the tightening grasp presented by twenty-five years of organizational stasis. The practice of the learning organization disciplines provide the linchpin to organizations adopting a flexible
interactive, learning approach. The crisis of perception will progress toward resolution when individual educators begin practice the discipline of personal mastery and begin to examine and reflect on the validity of the mental models guiding their actions within the educational organization.

Organizations under the quantum paradigm will paint accurate portraits of their current and evolving reality, they will portray systemic relationships through vivid social drama, and they will successfully project a symbolic image for their future that transcends the limitations of prior understanding.

Avenues for Further Exploration

This thesis presents a model to facilitate explanation of the evolution of systemic educational reform; as such, this model is highly subjective and lacks empirical substantiation. It alludes to many prescriptive relationships that will warrant further investigation. According to Seymour Sarason (1990) a theory provides a "necessary myth." A theory presents a metaphor that constructs, facilitates and propels understanding into areas yet undiscovered. This metaphor, itself built from the figurative language of the learning organization, will require careful examination to determine construct validity. Operationally defined constructs are yet to be developed, and perhaps will be my next step.

This thesis presents a theory of explanation, it does not attempt to infer causation. The System Development Template forms the core of the theoretical argument and does serve to organize, categorize, explain and predict the patterns that describe the evolution of educational reform. The System Development Template presents a model ripe for empirical and qualitative investigation identifying the practice of the learning organization disciplines in educational environments.
This thesis alludes to a connection between mastery of the disciplines and successful systemic educational reform. It suggests that change follows a different course and meets a different fate in learning organizations. These thoughts present exciting possibilities for further exploration. Above all else, this thesis must be followed with an investigation of the scientific paradigms behind the current crisis of perception in education.

This, I believe, will serve to be the most illuminating and ultimately useful research. Mental models can be changed, meaning can be modulated. According to Lewin's field theory (1939) beliefs must be "unfrozen" before meaningful change will occur. Reflection on individual and organizational mental models provides the fuel to ignite the transformational process. Burns (1978) suggested the role of mental models when he stated that dissonance and conflict are vital, engaging elements that prod a followership to initiate reconstructive behavior. If perceptions equate with mental models and they do, in turn, influence our organizational behavior, then organizational behavior can be altered. If indeed it is the influence of scientific paradigms that direct our mental models, then reform becomes a whole new ball game. The truth of these suppositions remains to be seen.

Summary--The Crisis of Perception in Education

This study represents the synthesis and interpretation of an alternative review of the literature examining the evolution of systemic educational reform. This investigation employs a dual hermeneutic and heuristic template to separate and illuminate the causal threads of multidisciplinary evidence that weave the historical tapestry of educational reform. This literature review extends far beyond the traditional analytic approach of its' genre to suggest that the history and philosophy of
science are the key contributors that influence the unfolding of events in educational reform.

This examination of the metaphoric and historical antecedents of four waves of educational reform activity, indicates that the impending paradigmatic shift from the Industrial to the Information Age parallels and perhaps prompts the evolution of systemic educational reform. The metaphor of the learning organization plays an important part in the synthesis behind the supposition that the history and philosophy of science drive the construction and deconstruction of mental models held by the educational community. The crisis of perception alludes to the possibility that our current mental models, established under the Newtonian paradigm, serve to motivate dysfunctional organizational behavior when interpreted through the lens of the emerging quantum paradigm.

This study attributes the evolution of systemic educational reform to the nascent practice of the learning organization disciplines. The metamorphosis of organizational metaphors and the natural selection of appropriate mental models contribute to the episodic and cyclic evolution of the reform movement. This study anticipates and documents the developmental process as education prepares for alignment with the Information Age.


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