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ABSTRACT

This paper considers the use of heuristic methodology as a research vehicle for new science investigations in education. The paper describes heuristic methodology and its use as a means of new science-based research in schools. It also describes how heuristic methodology was used in a 2002 study to explain educational practices through the metaphors of chaos and complexity theory. The heuristic study relied on the intuitive or tacit knowledge of the researcher and seven participants, who held different positions in the school system. Participants attempted to examine their school through a new science paradigm while reflecting on chaos and complexity theories. The paper also discusses how this type of research knowledge might improve educational practices, improve teaching and learning, and influence educational policy. (Author/SLD)

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Heuristic Methodology And New Science Studies

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Heuristic Methodology and New Science Studies

Abstract

This paper considers the use of heuristic methodology as a research vehicle for new science investigations in education. Topics of discussion include a description of : (1) heuristic methodology and its use as a means of new science based research in schools, (2) how heuristic methodology was used in a (2002) study to explain educational practices through the metaphors of chaos and complexity theory, and (3) how this type of research knowledge might improve educational practices, improve teaching and learning, and influence educational policy.

HEURISTIC METHODOLOGY AND NEW SCIENCE STUDIES

As a public high school teacher endeavoring to embrace the tenets of the new science of chaos and complexity, it was clear to me that considerable contemplation and scrutiny was required before I could make sense of the postmodern world using this new model of reality. It demanded that I look at my world with *new* eyes; to see the familiar as if it were strange. Though I could envision the larger universe from the perspective of the new science, it was substantially more perplexing to ascertain the implications of chaos within the seemingly mundane, yet ever-changing activities that propelled me through the school day. Though I *felt* new science metaphors could be used to describe the school, a *shadow* veiled my ability to clearly see, understand, and explain my school in this new language. The purpose of this paper is to briefly describe this quest and to critique the research tool that allowed me to enter and dwell within the *shadow* in order to find meaning and voice.

Purpose and Description of the Study

The focus of this paper is a heuristic study (Erwin, 2002) developed for the purpose of describing a public high school as it might be seen from the perspective of new science metaphors. In doing so I hoped to find greater personal understanding, and perhaps offer insights that might add to the conversations surrounding school reforms.

This heuristic study relied on the intuitive or tacit knowledge (Polanyi, 1969) of the researcher and seven participants. Together we followed Moustakas' (1990) stages of *initial engagement, immersion, incubation, illumination, explication and creative synthesis* in an attempt to discover the school through the new science paradigm.

My own *initial engagement* with the new sciences occurred several years prior to this study, when I first encountered it in Wheatley's (1992) study *Leadership and the New Sciences*. As a result I began to *immerse* myself more deeply in the tenets of the new sciences. However, for the participants who agreed to help in this quest, this study was, in essence, their *initial engagement*. This group was selected as a result of their interest in the subject and their representation of diverse occupations within the school. These seven people had held many positions within the school system and together we represented experiences of an administrator, a secretary, a custodian, a librarian, a vocational counselor, and teachers of science, homemaking, social studies, speech and drama, English and foreign language. The group's experience in public education ranged from four years to over 30 years, while most had worked in secondary schools for at least 15 years. Of the seven, none had previous exposure to the new sciences.

Due to time limitations, the *immersion* process for the participants consisted of reading selections from Briggs and Peat (1999), and an assignment to view the film, *Mindwalk* (Lintschinger, et al., 1991). After this *immersion* process, a period of *incubation* followed. The material was set aside for three to four weeks. Finally, the participants were asked to *explicate* any *illuminations* they had in two general discussions groups and later, in individual interviews with me. After each meeting or interview, I transcribed the taped conversations and then *immersed* myself in the information. These

data were then set aside as I continued to *immerse* myself in new conversations and interviews. When all participants had related their own stories and insights and it seemed I was generating no new data, I set all the material aside for a period of weeks and let it *incubate*. During this time it was amazing how new ideas began to seemingly pop out of nowhere. I recorded these *illuminations* as they came, simply writing them down with a brief explanation, to be considered at a later time. It seemed a purely random process, as these ideas might come into my consciousness when awakening, cooking, teaching, talking on the phone, or watching television. For me this became the process of *illumination*. After a period of time spent *incubating* and recording *illuminations*, I began the process of *explication*. I returned to the data and records of illumination, ascertaining themes that were emerging. During this process, the *illumination* process continued and could almost be conjured. If I had trouble tying information together I would *indwell* the information as described by Moustakas (1990). Indwelling requires an intense focus on the information for a period of time. For me the best time for this was usually right before I went to bed. Awaking the next morning, *illumination* would emerge. I was aware that I had informally done this many times in my life when something was bothering me. But it was not until this experience that I began to see that *illumination* followed predictably - as a *rule*, rather than as an *exception*. Indwelling focused my mind on the subject, and sleep allowed my tacit powers to concentrate on that problem without interference.

Though these participants had limited knowledge of the new sciences per se, they shared their expertise and experiences in education and provided rich examples and descriptions that helped me to develop a multidimensional portrait of a public high school. Through formal interviews and informal discussions during the course of this

investigation, their continued interest in the project buoyed my own enthusiasm. I remember several occasions when one or another of them found some new *illumination* related to the new sciences. They were as excited as I had been when I first began to see these new tenets seemingly popping out of the woodwork. Interestingly, none of these people had difficulty seeing educational implications for these tenets. For most, these ideas affirmed things they already intuitively felt or believed. In addition to sharing their own experiences, two of seven agreed to read the original composites I *explicated* and helped me refine them through additions or corrections.

Because this study was qualitative and subjective and reflected the unique perspective of the individuals who participated, it would not be replicable elsewhere. It is generalizable only in that people in other schools might have had similar experiences.

Findings

The findings of this chapter were structured around the concept of a walkabout. This walkabout served as the final phase of the heuristic research method, the *creative synthesis* of the data. After *explicating* the data, I began to create a *composite portrait* of our experiences. In this walkabout, the *I* of the narrator reflected the experience of myself *and* these seven participants. As in a walkabout there can be only one traveler, so only one voice can be heard. The voyager leaves familiar bearings and routines (in this case, the modernistic paradigm) and walks into a space of images, memories, sounds and sensory stimuli, relying on intuition for direction. Shedding modernist preconceptions, the traveler is immersed in the quest. Guided by an inner, almost spiritual power, the walker focuses on the expedition.

Embarking upon this quest, I hoped to discover whether or not the high school could be viewed from the perspective of chaos and complexity. The evidence I found suggested that this high school was a self-organized system with multiple feedback loops. It showed evidence of non-linearity and profuse examples of sensitive dependence on initial conditions. I found characteristics of a living, organic system, filled with interconnection and relationship. Examples of open and closed systems, limit cycles, and systems thinking abounded. Bifurcation points and irreversibility, as well as strange attractors, fractals, and holograms could be identified. Because of this, it was my contention that the new sciences offered appropriate metaphors for use in educational research and the interpretation of the intricate relationships within this school.

During the period I spent with this research, I began to see recurring themes emanate. When I followed a particular metaphor to the end, it often returned to the same conclusion of the previous tenet. Several key themes emerged, but *holism* was the all-encompassing theme that seemed to tie the others together. The holistic nature of these findings made it difficult to separate or isolate the themes from one another. Studying the isolated parts of the school diminish the ability to understand the whole system. The parts of the school lose important meaning when removed from the context in which they exist. An explanation of the seven themes follow.

Everything is Related and Interconnected

One theme that permeated the study was that *everything is related and interconnected.* Where one thing ends and another begins in a high school, cannot be known. Without context, it is not possible to fully describe a teacher or teaching, a student or learning. Each subject of focus is immersed within complex webs of

interconnection and relationship. Cutting away the strands of relationship, is like stripping the life giving capillaries, muscle tissue, and nerves away from the bone, destroying the context in which it has vitality and purpose. The complexity of each part increases exponentially when seen in relation to the whole. Consider the relationships and interconnections of an individual student. Without seeing the student in the context of his family background, culture, belief system, economic class, personal goals and desires, or past educational experience it is not possible to fully know or understand that person. These are but a few of the infinite number of interconnections that influence a person. When we place 30 such complex individuals within a classroom, we exponentially increase the number of interconnections and relationships. Before us, in any instant, we glimpse a mere *slice* of the complex whole that *is that individual.* One person exists for us at that moment only in relation to *how we see him* through our own set of complex interconnections. Like matter at a quantum level, we have the *potential* to exist in that unique way, *only at that particular moment and in that particular relationship* to one another.

Everything Matters

Because nothing happens in isolation, everything is related and interconnected and everything feeds back into the system. This means that every person, every action, and every thought has consequence. Whether an influence can be directly observed or not, once it enters the system it is considered at some level. *Everything matters.* This concept continued to emerge with each tenet I examined. Irreversibility suggests that nothing we do can be undone. Sensitive dependence on initial conditions suggests that we cannot predict the effect of the smallest influence. Non-linear, organic systems like

schools must understand the power of each decision made. A simple smile from a teacher might completely change the path a child takes that day. The path a child takes one day, forever changes the journey of his life and the lives of those he influences. Every word a teacher speaks to a child has the power to sway a child and the complex web of relationship and interconnection in which the child exists. We simply cannot know how far our influence will be felt. The good we do can be boundless. The damage we do can be infinite, as well. Regardless of the effect, *everything matters.*

Everything Changes and Nothing Changes

Change is inevitable in any living, non-linear system. Schools are no exception. We choose to fight change or to move with it, but ultimately, *everything changes.* Throughout this study I found constant change. Sometimes, the change seemed inconsequential. Sometimes the change seemed monumental. However, at the same time I observed continual change, it appeared *nothing changed.* It was only after I returned to Capra (1996), that I began to understand this paradox. Capra explained that traditional science and philosophy seek *substance* while the new sciences seek *form*. *Substance* is found in structure (What is it made of? How do we weigh and measure it? How do we quantify it?). *Form*, on the other hand, is found in pattern (How do we map its relationships? How do we qualify it?). The theme e*verything changes and nothing changes* is a synthesis these two approaches. Together they give us a comprehensive understanding of the school.

When *everything changes* often it is only the pattern of relationship or perception that has changed. The school's patterns shift and change constantly, as do the relationships and perceptions of individuals within the school. As profound as these

changes may be (as with paradigm shifts for example) the structures often remain the same or at least remain recognizable. For them it seems *nothing changes.* I was able to walk through the high school from which I graduated and feel as though *nothing had changed,* because the same structures were still in evidence; the building, the classrooms, the hierarchy, the grading system, the school buses, and the parking lot virtually identical 30 years later. Students were in classes and teachers were instructing. It appeared *nothing had changed,* and in the structure of this school nothing *had* changed. Yet I felt alienated and estranged. Like a stranger, I had no pattern of relationship or interconnection with the people who now walked these halls. *Everything had changed.* Understanding the theme *everything changes and nothing changes* helped me realize why the educational reforms of the past two decades had changed schools so little.

Linear Reforms in a Non-Linear Systems

For the past 20 years educational reformers have been attempting to put square pegs into round holes. Reforms have often been ineffective because the high school is not recognized or understood as a non-linear system. Seen simplistically, from the perspective of traditional science and the linear, factory model metaphor, these reforms ignore the patterns of complexity and unpredictability of the real classroom. It is the *pattern* of butterflies not the *structure* of monkey wrenches that foil linear reform in schools. In the factory mindset, the business of education is to produce capable, competent and compliant products. The factory is a *structure* and the events occurring inside the factory are *controlled through structure.* Education is regarded as a *structured,* linear, cause-effect relationship. It is seen as something others do *to* you. However, children are not passive, dimension-less receptacles into which legislated curriculum can

be poured. The more we focus on *structural,* linear reforms, the greater damage we do to our children, our schools, and our nation.

I found three types of *structural* educational reforms implemented using this linear, factory model. First there are curriculum changes (altering the formula poured into the passive receptacles). This reform can be seen in any number of failed attempts to alter curriculum in our district in the past 20 years: back to basics movements, character education, phonics versus whole language, multicultural, education, and ever changing and increasing requirements for graduation. In this high school each graduating class for the next four consecutive years *have different courses required for graduation.* Does this mean students graduating one year will have to make do without the ultimate knowledge of the students who graduated a year ahead or behind them?

Reformers quickly and inexpensively institute this type of change: no teachers to extensively retrain, no new facilities to build, relatively little material or equipment to purchase. State legislators, teacher unions, and powerful political action committees can point to these quickly enacted reforms and claim to have made a difference in the education of our children. The problem is, these reforms can (and are) just as quickly and easily replaced. In our school, they generally seem to go away within three years - sometimes sooner. The current graduation requirements, for example, indicate reforms legislated several years in advance have become obsolete before they are ever instituted!

Another type of reform focuses on the *way* in which the curriculum is delivered to the passive receptacles. Focused on teachers, it emphases that there are appropriate and inappropriate *structured* methods (or formulas) for delivering the curriculum. In the past two decades, the teachers in this school have been trained in a variety of methodologies

including: mastery learning, outcome based education, cooperative learning, assertive discipline, TESA (teacher expectations and student achievement), and learning styles to name a few. Implying that the problem with schools is the teachers' expertise, creating the right structure for workers to follow will improve production. Supporters of merit pay belong in this group, also. Although they have difficulty agreeing on what constitutes merit, or how it should be measured, they do believe the failure of education is based on poor teaching. Interestingly they think anyone can teach. The problem it seems is the lack of a particular *structured* method for success. These reforms add costs to staff development (training teachers in new structured methodology) but again they are relatively cheap reforms and the factory structure is preserved.

More difficult to implement and, therefore, more costly to reform are alterations to the factory structure itself. Reforms of this type include: special education and alternative education programs, to fix broken products; block scheduling and year round schooling, restructuring the factory timetable; school vouchers and charter schools, change factory financing. Under any of these reforms the factory does change its structure somewhat, but it remains a factory. Even home schooling, though seeming to replace the factory completely, only moves factory production to a domestic setting. The conveyor belt may be more product-friendly, but it still is rigidly mechanistic.

These have been the reform processes undertaken by business and religious leaders, as well as legislative reformers and educators, throughout the twentieth century. After reflecting on the reforms introduced at this high school during the past twenty years, I asked, "Was anything really re-formed?" Aside from superficial differences, this school operates virtually the same way it did twenty years ago in spite of innumerable

reforms instituted over the last two decades. Factory model thinking continues and the bureaucracy plugs along. The *form* of this school remains fundamentally untouched, but the system has crumbled over the years under the pressure of maintaining the factory illusion while continuing to ignore the *patterns* keeping the system alive. The factory model falls apart when you realize the products you are assembling talk back and have mind's of their own. Henry Ford didn't have to contend with products hurting each other's feelings, or bringing in problems from home. If schools were truly linear systems, these reforms would effect greater change.

Rethinking Power, Predictability and Control

When I looked more closely at the actual high school classroom from a non-linear perspective I began to understand why traditional reforms did not *re-form* anything. The reality is that in the high school, predictability and control continue to exist only in the dictionary. They are linear terms that simply don't apply to any real, non-linear classroom I observed. The modernistic notions of control become completely distorted when viewed through the lens of chaos and complexity. From the perspective of the new sciences, control in the traditional sense, can be counterproductive in schools. Control based on a linear model of schools views chaos as bad and something to be avoided. In a non-linear model, however, forcing a system to avoid chaos by repeatedly following a defined path leads to stagnation. Whether imposed externally, as with limit cycles from the district office, or internally, as when a student sets a personal limit cycle ("I can't do it"), controls steer the school and individuals within them away from evolution, sending them toward equilibrium and extinction.

The notion of power is related to control and predictability in a traditional, linear sense. Briggs and Peat (1999) see our modernist society as obsessed with power:

> ...the power of money , the power of personality, mind power, computing power, organizational power, political power, the power of love, the power of sex, the power of youth, the power of religion, the power to change our genes or our self-images, firepower, ...the lives of the powerful - how they exercise power and whether they are gaining or losing it. We have become inculcated with the idea that if only we had enough power we would be free to do and be what we want. We believe that if we had the power to control the situation, we would feel more secure... The truth is our obsession with power may be simply the symptom of our sense of our own powerlessness. (p. 36-37)

The new sciences of chaos and complexity give us a different way to view power and powerlessness. The power of subtle influence within each individual is exerted within the *patterns* of the school. This is the power that *changes everything.* There is a misconception that *control is power* in schools. Because of the non-linear nature of the *patterns* of relationship and interconnection in schools, modernist notions of power and control are transcended. Mandated *control* factors may stifle creativity and spontaneity, but generally they *control* nothing.

The reason we fixate on power and control issues in education is because of our modernist notions of order and chaos. Modernists cannot accept a universe that is unpredictable. Modern science is based upon the metaphor of the clockwork universe; life is mechanical. If we take the universe apart, and study it piece by piece, we can understand, predict, and control our lives and everything in them. The high school is built

upon the foundation of modernism. Educators are compelled to run their classrooms by the clock and by the book. Departures from the prescribed routine are unnecessary and potentially disastrous. Why? Because we might lose control, and control is seen as vital.

As I sat, surrounded by the data I collected, and the insights I gained from this journey, in the final analysis of my data I could only declare the modernists were wrong. The high school is not a factory, it is a dynamic, non-linear, self-organized system of infinite complexity and creativity. The high school continues to exist *because* of its unpredictability and uncontrollability, not *in spite* of it. The *patterns* of this system continue to breathe new life into it moment by moment, even as *structure* remains the same. In the high school nothing can be fully comprehended in isolation. Everything is related and interconnected, everything matters and everything changes. The high school does not simply adapt to survive. Somewhere, within the complex webs of relationship and interconnectedness, transcendence evolves.

Critique of the Heuristic Method

Developing a postmodern approach to the study of education is challenging. The heuristic model offers a research tool through which one might see education in a new way. By attempting to view a high school heuristically, through the metaphors created by the new sciences of chaos and complexity, I found *illumination* in a number of areas. However, an attempt by a particular individual to find a particular understanding, within a particular place, during a particular period of time is a search for *an* understanding rather than *the* understanding of the phenomenon. In this regard, the heuristic method lends itself to postmodern studies. The experience of one individual provides a description from a slightly different perspective. The more description, the richer the

portrait. Each slice of life that we *can* see, brings us closer to an understanding of the whole.

The value of this study is as another perspective. However, though others may benefit, by far the most significant value of this study has been to me, the researcher. The heuristic method honors the individual voice. The value of one voice is immeasurable, but it cannot represent all aspects of the whole. To say these experiences fully describe the high school is to ignore the significance of other voices and other ways of knowing. It takes the qualitative description of *patterns* and the quantitative explication of *structures* to holistically comprehend a high school. Above all, this method allows an individual to find personal meaning within a new paradigm. Heuristic research is subjective – the researcher cannot be stripped from the research. It is postmodern in nature. Moustakas (1990) reminds us of this when he states, "I am creating a story that portrays the qualities, meanings and essences of universally unique experiences" (p.13).

When I began this study, I was apprehensive. I feared I would find nothing worthy of discussion. Insecurity plagued me as I fretted about the validity and reliability of what I was finding. I realize now that my trepidation was merely the clockwork of modernism ticking in my head. I distrusted what I knew and intuitively felt. I do not know when I learned to discount my own ways of knowing. Today, I am satisfied and confident this method allowed me to understand the high school in a deeper, more meaningful way. Upon reflection, I see the seeds of this study were planted years ago, the question formulating itself within my tacit knowledge. In my earliest papers the origins of this quest appear. As I struggled to name this *shadow,* I moved *with* my instincts, catching glimmers of insight and illumination as I sought greater clarity.

Socrates urged his pupils to know *themselves*. They might have benefited from the introspective quality of this approach. Incubation and immersion have enabled me to know *my*self far better as I proceeded on my quest to know the school. The holistic quality of this quest forced me to envision interconnections and relationships from within myself as a vantage point. In a sense, I became the viewer and the viewed, the researcher and the researched. I understand now that I can only understand the high school from my own unique perspective. Though my point of view is unique, it has value in the holistic interpretation of the school. It is only one of many voices that make up the choir, but without this voice something is changed. Likewise, I acknowledge that I cannot know anything until it has filtered through me. Every paradigm filters individual perceptions, but every unique experience filters perceptions yet again. No research is completed before it filters through the researcher's own perceptions. This method simply and honestly drops the pretense of objectivity.

Immersion, incubation, and illumination refined my understanding of the learning/knowing process. By *naming* these aspects of the process, I developed heightened awareness of the process within myself as I came to know. This methodology enabled me to be aware as my insight developed. Rather than disjointed steps, immersion, incubation, and illumination are interconnected, making it impossible to identify where one stops and the other begins. Like a hologram, they are enfolded within one another, both rising and submerging. This experience has been of great personal value to me in many ways. I *know myself* far better now than when this quest began. As a classroom teacher, I have not often had the leisure or purpose to intensely focus on what I do or what I *know* about what I do. The heuristic methodology allowed me the freedom to

explore issues that were relevant to me. In addition, it helped me to see the connections between what we experience and what we know.

Within the tenets of chaos and complexity, all matter has purpose and power greater than that of a cog in a machine; the universe exists within all, as all exist within the universe. Everything is separate and unique, while being a part of and having influence over everything else. It is a science whose descriptions sound contradictory to Newton's student, but at the deep, quantum level of scientific examination, it is the contradictions of chaos and complexity that knit the universe together. When chaos occurs in the Newtonian universe, it is seen as an aberration - something gone awry. Chaos theorists, however, view periods of turbulence as normal and necessary to our survival. The universe could not have developed without it, and systems that attempt to subdue it, die. Order does not free us from chaos. Rather, it is chaos that brings us order. For myself, I must acknowledge that the mechanical clockwork still ticks in my head. As a teacher, I must be constantly aware that the factory perspective still drives the high school. Like viewing optical illusions, I have to remember to shift my focus to see the forest *and* the trees, the figure *and* the ground, the lady at the vanity *and* the human skull. This requires a postmodern willingness to accept the inconsistencies of living in a world bound by interpretations from an out-dated world view, while simultaneously perceiving life through a different and individual lens.

Despair rooted in separated disciplines, information without meaning, and passive students can be seen anew by shifting focusing to the organic, interdisciplinary patterns of interconnections and relationships immersed in context. Thinking reliant upon clock-driven planning, external discipline, and focused on training, can be *re*-viewed with

respect to spontaneous, internal development focused on transcendence. We can rise above artificial, memorized minutia by enveloping information in conversation and reflection in the context of people's lives. The old world view values test scores and grades, but the significance of personal satisfaction and judgments of worth cannot be ignored.

As an educator I must learn to look at the larger (and for me) truer picture. I must learn to see myself and my students within the context of the world in which we live. Subtle influence has the power to change individuals and systems. I am not alone in my efforts and I must continue to be open to the continual flow of interconnection and relationship as I struggle to evolve and transcend. I must trust the order in chaos.

I understand that no science is exact. I can never see a complete and exact portrait of a high school, even if I limited it to one particular moment. I must be satisfied with an illusive, out of focus snapshot. Even as I view it, it vanishes; lost in the shadow. Describing a high school is akin to describing a river. It appears to run within definable boundaries, moving the same water the same way, day after day. Closer inspection suggests that the river never runs at the same speed or carries the same volume of water. Its path changes by the moment. Sometimes the river is noticeably different, far from equilibrium, as during drought or flood. Rivers are dynamic systems that can only be understood approximately and in relation to time and space.

So it was with high school. The potentiality of chaos lurks in the background. Although chaos is natural, it is not predictable. I can understand a great deal but I can never understand all that is the high school. I must learn to live with mystery. Everything cannot be known. I have to accept *not* knowing. I must be able to live without the

comforting illusion of prediction and control. I must see and *be in* the world as it is, not as I would have it. The new sciences of chaos and complexity tell us that a world completely known and controlled does not and can not ever exist. Additionally, the new sciences remind us that our own subtle influence might be felt far beyond the time and space of our personal existence. As I end this quest, I return to the words of Gill (2000):

> It only remains to be said that we are not participating in this dance of cognitivity as individual knowing agents. Rather, the dance must be seen as a common group effort on the part of the entire human community. Thus, we are dancing in a large circle, joined through out respective embodiments, to each other and to the surrounding world. Sometimes we agree on the proper moves to make, and sometimes we do not; sometimes we agree on the nature of reality, and sometimes we do not. But by means of our common dance, we can and do correct our views and come to a knowledge of the world, one another, and even ourselves. (Gill, 2000, p. 50)

The purpose of this journey was to *see* the high school from a new science perspective. I feel I have done that. Remarkably, though they had limited exposure to these tenets, the people I spoke with along the way echoed many of my own feelings. It was amazingly difficult at times to decide whether an example applied to one tenet of the new sciences or another. It was not until the end that I realized why: the mechanical clockwork still ticks in my head. Human experiences are multidimensional and cannot be explained by only one tenet. They can only be fully understood holistically, which requires complex explanations. The science of chaos and complexity provided me a language with which to formalize my thoughts. Intuitively I have felt things I couldn't

explain. I had a personal need to understand. The second thing that surprised me was that by focusing on virtually any of these tenets, I would return to the same themes: holism, everything is related and interconnected, everything changes and nothing changes, everything matters, and our mistaken interpretations of power, predictability and control.

While completing work on this research, I realized that this quest is far from over. It is, and will continue to be an ongoing and lifetime learning process. Once practiced, the reflective nature of heuristic methodology has engaged many aspects of my life. Sometimes, I feel as though I have tapped into a powerful tool for thinking about my world. This method offers a natural and genuine way to engage tacit knowledge. By naming the steps, I have formalized something that I have informally used throughout my life. Without conscious awareness I have previously experienced the power of immersion, incubation and illumination. I believe my familiarity with the process will continue to develop, becoming an ever more powerful tool. I encourage educators to look to this methodology as a way for understanding not only their schools but their own unique lives. The heuristic method allows us to enter, dwell within, and engage the shadows of our own perceptions.

This journey was initiated several years ago by a chance reading about the new science in the work of Margaret Wheatly (1992). It is only fitting that I bring it full circle today with her inspirational words.

> ...we need the courage to let go of the old world, to relinquish most of what we have cherished, to abandon our interpretations about what does and doesn't work. As Einstein is often quoted as saying: No problem can be solved in the same consciousness that created it. We must learn to see the world anew. (p. 5)

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