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The Evolution of Education: Use of Biofeedback in Developing Heart Intelligence in a High School Setting

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The evolution of education: Use of biofeedback in developing heart intelligence in a high school setting" submitted by Marc Ross in partial fulfilment of the requirements of the degree of Doctor of Philosophy.

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Abstract

This dissertation was born out of years of working with students, sharing my experience of becoming a quadriplegic. My goal was to encourage young people to think about their choices and avoid unsafe risk-taking activities. I felt a gap in my role as mentor to these junior high and high school students; no one was teaching them skills that might assist them in making good choices. Having engaged in spiritual practices for many years, and having a particular interest in newer technologies such as biofeedback, I therefore developed a research question that might provide a useful strategy for youth: How might the development of heart intelligence through the use of biofeedback in a high school setting be facilitated and encouraged?

The research topic demanded a theoretical and methodological approach that was sensitive to uncovering and understanding abstract constructs such as heart intelligence and psychophysiological coherence. I blended together integral theory - specifically Wilber's integral model - with Gadamer and Heidegger's hermeneutic ontology/epistemology, and the consequent hermeneutic phenomenological methodology, into an original qualitative explanatory framework that I named – *integral hermeneutic phenomenology.* Using in-depth face-to-face interviews, focus group discussions, interactions on Facebook, and conversations via e-mail, I gathered the personal accounts of the evolution and expression of the development of heart intelligence in my 15 participants: students and staff at the school site. I also kept track of participants' experiences of learning to operate biofeedback technology and enter the state of coherence.

I then analyzed and interpreted the themes arising from these interactions, so as to compose an integral synthesis of the results for each participant and the group as a whole. The data uncovered eight primary themes:

- achievement of active relaxation and peaceful state of coherence;
- connection between coherence and heart-based living and other spiritual practices/interests;
- glimpses of potential and possibility for health benefits through heart-based living;
- importance of will or personal motivation in the practice of coherence building;
- need for guidance and encouragement from peers, teachers and the school culture in order to live more from the heart;
- effect of developing heart intelligence on relationships with peers, teachers and family;
- challenges and opportunities with the biofeedback computer technology;
- influence of the environment on participants' attempts to practice coherence.

These themes were situated within the quadrants of the integral model that served to shed light on the personal, interpersonal and societal nature of the data. The data also revealed some important considerations for how best to implement this kind of training in a high school setting.

Based on the experiences of the 15 participants, it would appear that biofeedback and the development of heart intelligence can be powerful agents for enabling people to consciously experience the absence of stress, and for supporting those who are motivated in their efforts to live healthier, more balanced and spiritually fulfilling lives. Done properly, this kind of training could assist youth in their struggles towards making good choices and achieving independence. Staff could use the skills personally to deal with the many stresses of being educators, as well as assisting young people in their growth. Potentially, this type of training and focus beyond pure academic content could be a small part of the evolution of educational systems toward a more human-friendly environment.

Acknowledgements

With Thanksgiving - A Poem by Kwad (a.k.a. Marc W. Ross)

Thanks Veronika. Thanks mom and dad. Thanks voice-activated computer. Thanks billion neurons in my brain. Thanks rain falling outside my window. Thanks rice that I just ate. Thanks bus driver who helped me get to my presentation today. Thanks people reading this. Thanks musician who made that beautiful song I heard the other day.

Thanks University of Calgary. Thanks secretaries. Thanks iPod. Thanks Amazon.com.

Thanks galaxies that formed billions of years ago.

Thanks big bang. Thanks God. Thanks future. Thanks bro.

Thanks beating heart. Thanks airplanes. Thanks Isaac Newton. Thanks people who first started playing with fire. Thanks person who invented the wheel. Thanks wheelchair.

Thanks teachers. Thanks students. Thanks Internet. Thanks radiant sun so generous with your energy. Thanks animals that humans eat. Thanks Dolphins. Thanks gladiators who fought and died. Thanks Gandhi. Thanks love. Thanks sex. Thanks BBC documentaries.

Thanks policemen and women.

Thanks people who inspired me. Thanks people who challenged me.

Thanks people who made me realize what I don't want to be like. Thanks people who made me realize what I do want to be like. Thanks pain.

Thanks compassion. Thanks wisdom. Thanks Grace. Thanks life.

Thanks for EVERYTHING!

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CHAPTER 1: INTRODUCING THE TOPIC, THE QUESTIONS AND THE RESEARCHER

Whose truth is the true truth? I ask myself this question from time to time when I am convinced of the truth of a perspective or argument, but upon hearing an alternative or an incompatible truth, I wonder: which is correct? On the heels of this question another arises; does truth evolve or is it permanent? Succinctly, it is my belief that EVERY truth has value and that EACH perspective is correct. However, some truths and perspectives are more evolved and all-encompassing than others; they are perhaps MORE true. It is true that the heart, for instance, is a physical organ that pumps blood to the rest of the body (Armour & Ardell, 2004). It is also true that the heart radiates feelings and sensations that can range from intense to subtle, negative to positive (Wilson & Childre, 2006). Some perspectives say that the heart has spiritual qualities and is the seat of the soul (Godwin, 2001); others view it as a fascinating piece of machinery (Peto, 2007). My truth is that the heart is all of this and more. What follows is a dissertation written in search of the Heart of Truth. More accurately, it is an evolutionary investigation into the good heart, the true heart and the beautiful heart.

Before launching into this endeavour, I would like to share a few words from my heart. It means that I wish to speak openly, genuinely, with depth and with meaning. It means I intend to express what is dear to me, what is closest to my very being. What will be communicated is very important to me, more important than a lot of the thoughts and words that otherwise spill out of me. So here we are:

I wish to express how profoundly grateful I am to have the opportunity to study rich ideas filled with meaning. I truly feel blessed to be engaged in such a beautiful time of

personal and collective evolution. As I have read about the heart, meditated upon the heart, communicated with my own heart, watched for the heart in the world around me, and exchanged extraordinary heart connections with others, my love and awe for the mysterious process that is life has deepened, transformed, and become more.

Perhaps the greatest symbol of my growing connection to the heart is the increase in tears that so often trickle down my cheeks. When I first broke my neck at 17, I had such a hard time crying. Even though I was suffering intense physical and emotional pain, I seemed unwilling or unable to let my hurt out. Things have changed, the biggest change being the opening of my own heart. The more it opens, the more I am awake to the powerful suffering that I see in the world as well as the indescribable joy. I feel connected to both the problems and beauties of my world. I feel strength and power and peace and sadness and love. I treat people better. I have clarity of intention. I feel like I am part of an enormous process that is going somewhere and this makes me want to fall to my knees in worship at the unspeakable majesty of life. So I give thanks for being able to study something so amazing and the encouragement I received to continually reach higher and higher levels of understanding.

Assumptions

Clearly and unabashedly, I must confess some of the fundamental assumptions of my worldview so that this work can be transparent and open to scrutiny from other seekers of the truth. This suggests that I am consciously aware of all my assumptions which, in all honesty, I do not claim to be. Nevertheless, upon serious reflection, here are two of my most deeply held beliefs that not only inform what follows, but have crafted my research every step of the way:

- Consciousness is primary. The material world is resting on a ground of being that is alive and conscious. This indescribable, unqualifiable is-ness at the root of everything, this all-nourishing abyss (Swimme, 1996), is what animates ALL. Thus, in a strange way, everything comes out of this unnamable essence, can never be apart from it, and merges back into it forever and everywhere. The deepest truth is that there is only One. Everything IS this, this IS everything.
- Consciousness, in some ultra-mysterious and deeply sacred manner, "decided" to become. The Big Bang, the "Great Radiance," the beginning of space and time, "GO," whatever the name, the start of our 13.7 billion year journey suggests that something came from nothing, becoming emerged from being, there was, and is, an evolutionary impulse toward ever greater possibilities. Further, we as human beings ARE this evolutionary process. We ARE the universe becoming conscious of itself. And, as humans, we are just beginning to wake up to the tremendous, stupendous realization that we can now evolve consciously, through choice, rather than strictly through random mutation.

The Purpose of this Study

The purpose of this qualitative study is to contribute to the evolution of consciousness; to uncover how high school students, teachers, and principal learn about the mind-body relationship, spirituality, and managing their emotional lives by developing their heart intelligence through the use of biofeedback. Further, this study will use evolutionary/integral theory and a hermeneutic-phenomenological research methodology to illuminate and expand on the quantitative biofeedback studies conducted in school settings. It is hoped that this investigation will yield a deeply needed description

of the various textures and themes that underlie the development of heart intelligence. A group of eight students, six teachers, and the principal at the Integral High School (pseudonym) in Calgary, Alberta participated in this study.

With a richer understanding of the process involved in developing a more integral, holistic relationship to students' hearts through biofeedback, teachers and principals can be more effective in their implementation of such revolutionary and evolutionary training. On a grander scale, this small but not insignificant effort to evolve the field of education might contribute to the evolution of consciousness. Wow! Audacious statement!

A Definition of Heart Intelligence

Because the heart emits powerful signals in the form of biochemical, hormonal and electromagnetic waves along with nerve impulses, all of which dramatically affect how we perceive, think, and perform (McCraty & Atkinson, 2003), a technical definition of heart intelligence might be the following: a conscious management of one's heart rhythms in favour of coherent versus chaotic signals. A more accessible definition could take this form: heart intelligence is the alignment of body, mind and spirit for a healthy life.

There are at the least two aspects of heart intelligence that should be delineated. First are the physical or measurable characteristics of the heart that demonstrate a widespread influence on the rest of the human body; the heart is instinctually, intrinsically, intelligently relaying signals and messages throughout the human system. Second is the metaphorical or symbolic idea that people have the ability to tap into their

hearts for guidance and direction; there is wisdom at the core of every human being that can be consciously reached.

Overview and Background for the Study

Over the past 20 years, neuro-cardiologists have discovered something profound: we have evolved a mini-brain complete with neurons and ganglia that sends detailed biochemical and electromagnetic messages to all of our physical organs, including our brains (Childre & Rozman, 2007). In other words, we have intelligent hearts that impact our mental, emotional, physical, and spiritual wellbeing. Perhaps the most exciting discovery from this area of research is that we human beings are fully capable of tuning into our hearts for guidance. The more time we spend living "through" our hearts, the more balanced we become in all areas of life (e.g. improved physical health, relationships, emotional disposition, mental clarity and alertness, intuition, productivity at school or work) (Childre, Martin, & Childoe, 2000).

Over the past decade, a significant and growing number of **quantitative** studies on the application of heart intelligence in the field of education have consistently yielded impressive statistics (Arguelles, McCraty, & Rees, 2003; McCraty, Tomasino, Atkinson, Aasen, & Thurik, 2000). These studies clearly demonstrate that students and teachers benefit from using biofeedback devices designed specifically to increase heart intelligence (Arguelles, et al., 2003). It has been established that heart coherence (balanced heart rate variability) leads to a reduction in general psychological distress, test anxiety and risky behaviours, while improving test scores, stress resiliency, classroom behaviour, learning and overall academic performance in K-12 students (Childre & Rozman, 2003; McCraty, 1999).

My **qualitative** research aims to fill the gap in our current understanding of the lived experience of students and teachers who choose to develop their heart intelligence. To date, there have been very few in-depth, qualitative investigations of the development of heart intelligence and its impact on spirituality through the use of biofeedback with public school students and staff. Because the quantitative research being done on coherence and the physiological and practical benefits of centering one's self in the heart is robust and convincing, I have decided to focus specifically on understanding the subjective and interpersonal dimensions of engaging biofeedback as a practice. To be clear, my efforts are meant to uncover the personal lived experience of students and teachers living more from the heart in an attempt to complement the empirical/quantitative research that has been conducted in this area. Admittedly, I have an intense passion for learning about heart intelligence and evolutionary spirituality. In part, this comes from my own personal experiences. I had a spinal cord injury which left me a quadriplegic during high school, and I could have benefited tremendously at that time from developing my body-mind-spirit connection.

The Research Problem

Students in the public school system, and in the Integral High School in particular, are burdened with fairly heavy amounts of stress due to family and scholastic pressures (Calgary Board of Education, 2009). Over and above normal school pressures (homework, relationships with teachers and classmates, school environment), many students feel caught between a desire to be autonomous, independent adults and being assigned the role of dependent teenager by our western culture (Van Dyke, 2007). While the origins and sources of student stress are debatable, it is fair to say that high school

students face physical, mental, and existential stress (Disch, Harlow, Campbell & Dougan, 2000).

What does today's school curriculum do to help students handle the stress? Unfortunately, despite a few examples of alternative programs, exceptional teachers, character education initiatives, and school counsellors (Crawford & Bohac-Clarke, 2006), the answer is: not much (Childre, et al., 2000). This answer is particularly distressing when viewed in the light of recent findings which clearly indicate that negative emotions such as anxiety, stress, and a sense of being overwhelmed, in general, lead to health problems, cortical inhibition (less access to higher order thinking), and crises of meaning (Childre, et al., 2000; Childre & Rozman, 2003; McCraty, et al., 2000). However, according to Hall (1904), there is reason to hope: "Adolescence is a new birth, for the higher and completely human traits are now born... these years are the best decade of life. No age is so responsive to all the best and wisest human endeavour" (p. xiii).

Support for Hall's view arises from the latest findings out of the Institute of HeartMath. The Institute, born through the efforts of Doc Childre, has developed a variety of tools and techniques that help people access their hearts and begin to live more emotionally balanced lives. Hundreds of schools around the globe have implemented some of the HeartMath methods with great success (Arguelles, et al., 2003). However, despite a growing number of studies that attest to the benefits of heart-based living, only a handful of investigations looked specifically at the spiritual and evolutionary implications of developing heart intelligence. This qualitative study, therefore, addresses the possible spiritual and evolutionary implications of developing heart intelligence in high school students.

The Research Questions

In developing their heart intelligence through the use of biofeedback, students of all ages have been found to handle stress much more effectively, thus improving their academic performance, their relationships at school, and their overall feelings of well-being (Bradley, et al., 2007). What has not been adequately addressed in the research to date is what a move from head to heart looks like, feels like, and lives like in students with respect to their spiritual unfolding. The following is a list of the four objectives of this study with their accompanying research questions:

1. **Investigate the on-going subjective impact of biofeedback on the participants' mental, emotional and spiritual being (e.g., how does it feel?)**

   What are the participants' personal experiences of learning with biofeedback?

   Are they able to alter their emotional and physiological states through the training? And what is that like from an inside perspective?

2. **Discover the impact coherence building has on participants' physicality and overall actions in the world (e.g. what does it live like?)**

   How do participants learn to operate biofeedback successfully?

   What happens on a physical level when participants enter the state of coherence?

   Does living more from the heart change how participants act in the world?

3. **Document how participants experience the development of heart intelligence and use of biofeedback in school (e.g. what does it look like with others, in the school culture?)**

   What is it like to learn how to practice coherence in the school culture?

   Do student or teacher groups form around the practice of biofeedback?

   Can or do teachers facilitate the student experience of learning with biofeedback?

4. **Describe/Interpret participants' experiences of practicing coherence within the pre-built structure of a high school (e.g. how does it fit into the school environment?)**

   Are there specific places within the school that are better for practicing coherence-building than others?

   What is it like for participants to deal with a new form of technology such as biofeedback?

Theoretical Framework: The Interpretive Perspectives of this Study

Ontologically, the proposed study will be grounded in an existential way of being in the world. Epistemologically, this qualitative research study will be grounded in an integral or AQAL (All Quadrants All Levels) view of knowledge (Wilber, 2007). Flowing from this epistemological position, the theoretical perspective that will inform the study's methodology and provide a context for the research process will be hermeneutics. Governing the choice and use of methods will be a hermeneutic phenomenological methodology. Specific methods used to gather and analyze the data will be a series of interviews, significant reflections and live chat (e.g. Facebook and e-mails), focus groups and observations.

The Significance of this Study

The western educational curriculum has, since the time of the Enlightenment, evolved to privilege logic and the mind above emotions and the heart (Palmer, 1993). Arguably, now is the time for a re-integration, for a re-connection between brain and heart. However, in the field of education, we continue to deal with the momentum and supremacy of the intellect (Jardine, 1999). Our approved curricula based in mathematics, humanities, and the sciences attest to this. So the question arises: How can the intellect,

the curricula and the school environments they have formed make room for the feeling world that plays a critical role in education's very expression and expansion? Perhaps the answer may come, in part, through biofeedback and the host of instruments that have been designed to measure human physiological responses and encourage a deeper understanding and relationship with one's emotional life.

As was identified above, a growing number of studies are demonstrating that emotions and emotional regulation play a major role in how human beings learn, think and act (Arguelles, et al., 2003). Furthermore, there is evidence of an increase in the number of schools around the world choosing to assist students in developing a connection to their hearts (Bradley, et al., 2007). If this is indeed the case, and if there are spiritual aspects that accompany an increase in heart intelligence, then an understanding of those spiritual implications might prove useful to students, teachers, school administrators, or anyone inclined to live more from the heart or, perhaps most daringly, for those interested in conscious evolution.

Therefore, I hope this research study will be significant for several reasons. First, it should have implications for training. What do teachers need to know about biofeedback and teaching and learning? What are the best steps for teachers and administrators when helping students develop heart intelligence? Second, detailed descriptions of how student body-heart-mind-spirit connections are strengthened through biofeedback will be gathered. This may be important information for those interested in furthering heart-based education. Third, insight into how teachers interested in being more holistically helpful to students may be gained. Most audaciously it will, through the above goals and intentions, contribute to the spiritual evolution of consciousness.

Limitations and Delimitations

A fair amount of tension exists between some of the highest aspirations I have for this research project, and the reality of the circumstances in which it has evolved and is still evolving. This evolutionary friction creates a space wherein possibilities and potentials collide with limitations and boundaries. With this in mind, the current study, like all research investigations, has within its design particular limitations that could affect the anticipated findings. Some potential limitations of the study include:

- the purposive sampling procedure will decrease the generalizability of the study's findings
- the small sample size (15 participants) will decrease the generalizability of the study's findings
- the alternative nature of the school also means it is not typical of the broader public school system which limits generalizability of the study's findings
- given that this is an interpretive qualitative research study, the data and findings could be subject to other interpretations

More broadly and subtly, the limitations include: the unconscious motivations of the researcher, the participants, and the doctoral committee; the organizational constraints at both the high school and university levels; space; time; and innumerable other factors that might impinge on the research effort. Alas, the motivation to keep marching in the face of wind, storms and limitations of any sort is an aspect of the human condition that I hold very dear to my heart.

Researcher's Background: Straight from the Heart

"BREATHE MARC, BREATHE!" cried the ICU doctors and the five or six other specialists surrounding my bed as I clawed my way through one of the most frightening experiences of my life: a heart attack. At the age of 23, my heart grabbed my attention and has not let go ever since. Fortunately, despite my fearful perception of my heart for a few years following this experience, I was blessed with new knowledge and a new relationship to my heart that has radically changed my human experience on this earth. Part of this shift in awareness has come from my own experiences with biofeedback and meditation. I now appreciate my heart and my whole being in a way I never before could have imagined.

Following my spinal cord injury at the age of 17, it took me several years of struggling with the physical, carnal reality of my predicament before I began to turn inward, toward my mind and spirit. My dedication to complete high school and the subsequent decision to enrol in university allowed me to begin expanding my mind. Thus began my love affair with ideas. My personal spiritual journey was launched upon my entrance into the Masters of Counselling Psychology program. There, I fell deeply in love with the writings of modern and classical philosophers of consciousness as well as mystics from both the East and West. More powerful than anything has been my own gradual development of heart intelligence. I echo the sentiments of Vokey (2003), "those of us who believe in the importance of spiritual development, whether inside or outside of schools, are advised to attend to our own disciplines of spiritual study and practice. There is nothing, of course, more powerful than leading by example" (p. 180). I maintain an intense commitment to my spiritual life. That is to say, ALL of my life, the distinction

"spiritual" being yet another breaking apart of the unity at the heart of everything, but I digress.

Another reason for my interest in the present topic was my research experience during my Masters studies. Because of my involvement with injury prevention, I chose to conduct a quantitative study of the P.A.R.T.Y. Program (Prevent Alcohol and Risk Related Trauma in Youth). During the course of my research, I became increasingly aware of the discord I was experiencing between my own personal view of health and wellness and the fear tactics the P.A.R.T.Y. Program seemed to be employing in order to prevent injuries in adolescents.

Upon completing my research at the P.A.R.T.Y. Program and finding mixed results as to the effectiveness of its mission and delivery method, I wondered what else could be done to help adolescents avoid unhealthy risk-taking and trauma. Increasingly, I started recognizing the importance of a physically, mentally, emotionally and spiritually balanced state in handling all risky situations and for that matter, life in general. Therefore, although I will not be studying risk-taking and injury prevention in the present research study, I will be attempting to understand how a greater intuitive connection to the heart and spirit can help students to lead better lives. Thus, rather than working from the outside in as I did during my Masters, I will be working from the inside out.

Organization of the Dissertation

What journey will you be taking with me as you read this dissertation? I have attempted to use a mix, an integration let's say, of fact, story, linear thinking, poetic thinking, images, first second and third person viewpoints, technical writing, casual or conversational writing, video, music, and pretty much anything else I have felt necessary

to throw into this educational/creative enterprise. I have taken risks. Why? Because if I am serious about the evolution of consciousness or, more concretely, of education, then how can I crank out the same old same old dissertation? That wouldn't be evolution, would it? And, let's face it, evolution isn't always comfortable. So some people reading this might think that I am much too liberal and way too "cute" with my style. Others might think it is refreshing. What can be said for sure is that it is unique and I hope it is different. Here is how I have structured the chapters:

The first chapter you have just read! (One down, six to go!) The second chapter is a literature review in two parts. The first part deals with the heart, the concept of intelligence and "heart" intelligence in particular, and spirituality. The second part deals with evolution: the epic of evolution, conscious evolution and the evolution of consciousness. The last part of chapter 2 is a very brief summary of the integral model of reality. This conclusion leads nicely into the third chapter, the methodology. I present some philosophical reasons for choosing to study the development of heart intelligence through biofeedback in a high school setting through an integral hermeneutic phenomenological approach.

Chapter 4 introduces the reader to the participants and to the eight principal themes that arose from the data collected. Chapter 5 positions the data through the other four elements of the integral model and opens the discussion of the future of both heart intelligence and biofeedback programs at the high school level. Chapter 6 investigates how the themes and the overall project fit within the current thinking in evolutionary circles and could be called the "so what" chapter. So who cares, Marc? I will attempt to answer this seminal question there… Enjoy!

CHAPTER 2: USING THE LITERATURE TO CONTEXTUALIZE THE TOPIC AND THE QUESTIONS OF THIS STUDY

In order to provide a context for the proposed research study, a review of research pertaining to the heart, the notion of intelligence as well as spirituality in education was conducted. The intent of this overview was not to provide an exhaustive analysis of the literature, but rather to set the stage for the present investigation. By pointing to some of the broad strokes painted upon on the canvas of knowledge so far in these areas, the reader (and researcher) will be better positioned to appreciate not only the research process embarked upon, but also the end result. Further, this literature review demonstrates how the study addresses a unique topic and problem deserving of attention that has not previously been researched adequately.

Following the traditional review, I will present a macroscopic view of life that I believe gives much-needed fuel for our journey together through this dissertation: the epic of evolution. In a sentence, the context of evolution and, specifically, the emerging field of evolutionary spirituality, provide the foundation for my study. My cursory examination of progressive views of evolution will bring us right up to the present, where my humble contribution to the emerging fields of evolutionary spirituality and integral studies takes place. Simply stated, part two of this chapter involves going on a time travel together. Although some might consider this to be superfluous and grandiose, it might very well be exactly what is needed in order to provide the most accurate insights and reflections on my quest as a researcher and the results of the study.

Part One

I will first provide a brief depiction of the heart as it has been viewed in the Western world over the past several centuries, gradually narrowing my focus to some of the latest medical findings on the heart. The next section will link the heart and heart intelligence with spirituality, while also providing information on the role of technology in this connection. Last, an investigation into spirituality and the field of education will be undertaken - moving from a broad description of modern spirituality in the West to a brief overview of spirituality in education.

The Heart

> The heart is the place of union, and since it exists in two parts, it is constantly uniting with itself. It is the very image of love and friendliness... It is body and soul, it is God and man, Aristotle and Descartes, ancient and modern, sacred and profane, physical and emotional, hard and soft, male and female, recipient and creative, suction and expulsion, sex and purity, conjoined twins, red and blue, left and right, hot and cold, flesh and blood. Even its beat is double - lubdub. It cleaves to itself - cleave being one of few words which mean its own exact opposite: to cling together and to cut asunder. It cleaves like the Platonic divide soul-searching for its other half; like Eve cleft out of the flesh of Adam's breast; like the ever healing, never healing wound, the cleft in the rock; like man and woman, self and other, the internal seed of the opposite. It represents both our artificial divides and our longing for unity, which between them, I suspect, make up the human condition. (Young, 2003, p. 339)

The Heart Throughout History

Despite a continuing and stunning evolution in medical knowledge as well as increasingly detailed descriptions of the physicality of the heart over the past 50 years, the World Health Organization states that heart disease remains a leading cause of death globally and is the number one cause of death in the United States. Heart disease, or cardiovascular disease, now accounts for 30 percent of deaths worldwide. In 2006, the American Heart Association estimated heart disease would cost Americans more than $258 billion (Rosamond, et al., 2008). That is the condition of our hearts today it would seem, but has it always been so?

The earliest record of the heart we have dates back to a woolly mammoth with a red heart sketched on a cave wall 50,000 thousand years ago (Rees, 2009). Since that time, the Aztecs sacrificed hearts of brave enemies; Gilgamesh was broken-hearted after touching his friend Enkudu's heart realizing that he too must die; Egyptians weighed their hearts on Anubis's scale to decipher the purity of a person's spirit; Greeks described mythological figures swallowing hearts for safekeeping and were among the first to begin differentiating between the mind and the heart; and the ancient Hebrews entered into a personal relationship with God whose heart was wounded over and over again in their name (Godwin, 2001).

Moving through time and geography, the Hindus believe that the divine being already lives within the secret cave of our hearts and that we are much more than we know. Buddha set the example of what it means to live with a cool mind and a warm heart by teaching us how to clear our hearts of delusion through the Four Noble Truths and the Eightfold Path. Confucius encouraged human-hearted behaviour in the personal

as well as the political arena and Lao-Tzu explained that a heart moving with the universal flow or "The Tao" would always lead to the right action (Young, 2003). Jesus explained that to be clean and pure of heart is much more important than ritual washing or codes of behaviour. Mohammed told his people that the "intelligence of the heart" combines knowing and loving into a single, unified function and Augustine poured out his heart in the first autobiography ever written (Godwin, 2001). The more rigorous scientific investigations of the heart conducted by William Harvey began, in earnest, the great heart divide that we experience to this day (Peto, 2007). Before moving into a deeper discussion of this divide, allow me to summarize 5000 years of history on the heart in a few simple points:

According to Young (2003) and Godwin (2001), some of the ancients believed that the heart:

- Was the locus of intelligence and wisdom (Buddhism)
- Was the home or seat of the soul (Classical Antiquity)
- Had memory capacity (Hinduism)
- Contained secrets and mysteries (Egyptian)
- Was the source of regeneration (Chinese)
- Was the seat and source of love (Christian)

The scientific revolution and the age of materialism rapidly replaced traditional and mystical understandings of the heart with more modern notions of the heart as a pump (Childre, Martin & Childoe, 2000). In an effort to better understand our subjective experiences of the world we live in, the scientific community continued to refine its knowledge and understanding of human biology - with a very specific interest in the

brain (Wallace, Wallace & Hodle, 2008). Rather than viewing the heart as the seat of the soul, we are now taught that the brain sends messages to the heart which causes it to pump (Arguelles et. al, 2003). Not only is this biologically inaccurate (Wilson & Childre, 2006), but it illustrates the pervasive belief that the human brain, with its analytical and intellectual powers, is the storehouse of all that makes us human.

The great "heart divide" as it is described by Rees (2009), points to a gradual transition from a more holistic and metaphysical way of seeing life to a more materialistic understanding of the world and the cosmos. Science has moved from the heart as being a gateway to the divine, to it being a mechanical pump. The following image conveys the idea of a heart split visually:

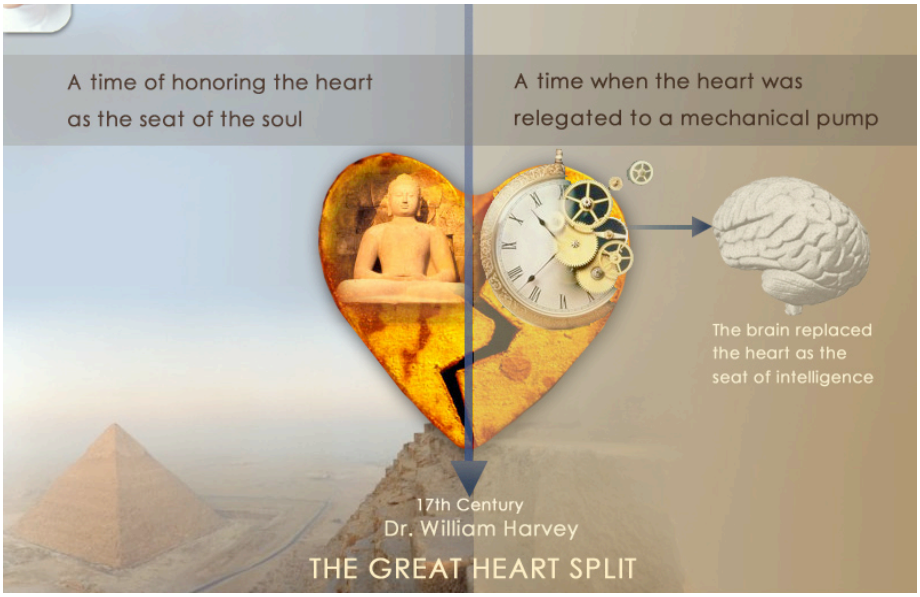

Figure 1. The great heart split. (Rees, 2009, p. 13)

The Advent of Brain Fascination

Thanks to those pioneer scientists who were unafraid to cut open bodies and manipulate human organs we now enjoy medical innovations that were unimaginable even 50 years ago (Guarneri, 2006). Heart transplants, quadruple bypasses, stents, and a

whole host of other interventions have allowed innumerable people to continue living even as their hearts were failing (me included). As we continued to chop and dissect the human body, our attentions turned more and more to the head and to what resides inside the skull. We became fascinated with the brain (Pearsall, 1998).

Certainly, the heart has remained important, but its position as the storehouse of wisdom has been usurped by its neighbour upstairs. Therefore, because some of the most intriguing findings about the functioning of our brains are occurring in the field of neuroscience, and because it is believed that our various capacities for intelligence stem from the electric storms of neurons constantly taking place inside our brains, I will present a model of brain evolution. This is followed by a description of new scientific findings about the heart, and then a discussion of the theory of multiple intelligences as all three topics seem to be tightly correlated inter-related.

The Three Brains

In his book "*The Triune Brain*," MacLean (1990) traces the evolution of the human brain through three distinct phases of development. With the evolution of the physical brain there has been a corresponding evolution in the capacities for intelligence (MacLean, 1990). Essentially, with more neurons and more complex brain structures also comes more refined abilities to think. Although the triune brain model has been criticized for being too simplistic (Reiner, 1990), its neuroevolutionary perspective offers valuable insights (Lambert, 2003) and serves as a useful basis for the discussion of intelligence that follows.

Over the course of millions of years, three distinct phases of brain development occurred (MacLean, 1990). The most ancient and primitive brain MacLean (1990) calls

the reptilian brain. Consisting mostly of the brainstem and structures near the base of the skull connected to the spinal cord, the reptilian brain operates at a sensory-motor level of awareness. It is responsible for the most fundamental and rudimentary capacities we as humans possess, muscle control, balance and autonomic functions. The intelligence displayed at this level of brain function is primarily reactionary and is the home of the fight or flight response.

Next came the mammalian brain, also called the limbic system, which has been described as the seat of emotional, learning and memory capabilities (Goleman, 1995). Behaviour at this level is less rigidly controlled by instinctual reactions, however, it remains highly automatic and heuristic. Stimuli of all kinds are viewed as either agreeable or disagreeable. Family ties and attachment to others are associated with the mammalian brain (MacLean, 1990).

Finally, the neocortex, also known as the cortical brain, gave rise to reasoning capabilities, conceptions of past, present and future, language, and all that makes a human different from a mammal (MacLean, 1990). Although many mammals have cortical structures, they are relatively small compared to those of humans. Divided into four lobes and split down the middle into the left and right hemispheres, the neocortex allows for highly complex and abstract thought and is believed to be the area of the brain that allows humans to create culture, appreciate music, imagine and create art (Pearce, 2002).

Although the three brains are described separately, the triune brain is highly interconnected. According to MacLean (1990), the circuitry connecting these structures is evidence of a highly complex communication system. Recent investigations into the

biology of the human brain (and that of other species) have confirmed a systems perspective of the brain (Redies & Puelles, 2001). It was previously thought that bigger brains meant more intelligence or a greater behavioural repertoire, but it now appears that modularity and interconnectivity between neurons is more important (Chittka & Niven, 2009).

In addition to viewing the brain (and the human organism in general) as an inextricably intertwined system of information exchange constantly adapting to stimuli coming from our inside and outside worlds, there is evidence that lower brain structures, when activated, can hold more sway over our thoughts, feelings and behaviours than do higher brain structures (Pearce, 2002). This goes some way to explaining why, as Goleman (1995) suggests, humans often act "stupidly" when feeling angry or nervous. This occurs in part because the number of neural connections traveling from the emotional centres to the higher cognitive centres is greater than the number going the other way (McCraty et. al, 2006). Put simply, rationality - more refined intelligence - can be hijacked by intense emotion.

The Fourth Brain

The recent field of neurocardiology has revealed important information about the heart and its role in human physiology, specifically heart-brain interactions and emotional regulation. According to Armour and Ardell (2004) the human heart has over 40,000 cardiac neurons, enough to qualify it as a "little brain." Further, the heart has direct lines to the brain through the autonomic nervous system and the vagus nerve that form a feedback loop, with activity or stimulation commencing in either area being immediately communicated to the other (Armour & Ardell, 2004). The intrinsic cardiac nervous

system allows the heart to communicate with itself and regulate much of its own functioning. This is what allows a heart transplant to work (McCraty et. al, 2001). According to McCraty et. al (2001), 90% of the neural pathways in the vagus nerve move from the body (mostly the heart) to the brain using afferent channels.

In addition to the neural transmission of information, the brain has been shown to respond to messages from the heart, and vice versa, through three other distinct forms of output/input: biochemical, pressure and sound waves, and electromagnetic waves. According to Wilson and Childre (2006) the heart was reclassified as an endocrine or hormonal gland when it was discovered in 1983 that atrial natriuretic factor (ANF), a hormone which exerts effects on many different body systems including regulatory processes in the brain, is produced in the heart. Further, the recent discovery of intrinsic cardiac adrenergic (ICA) cells that help with the synthesis and release of various neurotransmitters throughout the human body indicates that the heart influences to a great degree the hormonal secretions taking place in the body (McCraty et. al, 2001). Finally, the heart has been found to secrete oxytocin in concentrations equal to those of the brain. Oxytocin is commonly referred to as the “love” or “bonding” hormone and has been found to be involved in cognition, tolerance, complex sexual and maternal behaviours, the learning of social cues, adaptation and the establishment of enduring pair bonds (McCraty et. al, 2001).

Pressure, sound and, more recently, electromagnetic waves have been found to emanate from the beating heart, impacting everything from mood to immune system function to respiratory rate (Russek & Schwartz, 1996). According to Russek and Schwartz (1996), the electromagnetic waves emanating from the heart are 5000 times

stronger than those emitted by the brain. Because these waves are believed to carry coded information to every single cell of the body, there is reason to suspect that the heart plays a key role in organizing and coordinating all human functions (Pearsall, 1998). I will return to this notion of "cardio-energetics," as it is referred to, in my description of heart intelligence.

What does all this mean and how does it relate to intelligence? According to McCraty et. al (2001), the discoveries in neurocardiology suggest strongly that our thinking capacities are impacted by communication from the heart. Put differently, the heart is believed by some to modulate brain function, among other things (Pearce, 2002; Pearsall, 1998; Russek & Schwartz, 1996). In McCraty et. al's (2006) words,

> The heart plays a central role in the generation and transmission of system-wide information essential to the body's function as a coherent whole. There are multiple lines of evidence to support this proposition. The heart is the most consistent and dynamic generator of rhythmic information patterns in the body; its intrinsic nervous system is a sophisticated information encoding and processing center that operates independently of the brain; the heart functions in multiple body systems and is thus uniquely positioned to integrate and communicate information across systems and throughout the body; and, of all the bodily organs, the heart possesses by far the most extensive communication network with the brain… afferent input from the heart not only affects the homeostatic regulatory centers in the brain, but also influences the activity of higher brain centers involved in perceptual, cognitive, and emotional processing, thus in turn affecting many and diverse aspects of our experience and behavior. (pp. 5-6)

Having reviewed some physiological aspects of the human brain and heart, I now turn to an overview of the concept of intelligence before attempting a definition of heart intelligence and its possible relationship to human biology and the idea of intelligence more generally.

What is Intelligence?

The current scientific paradigm rests on the assumption that the physical universe gives rise to consciousness or intelligence and not vice versa. Therefore, an overarching theme in most conversations about intelligence is how the various abilities we display take place within specific brain regions (Werbos, 2009).

As a subject, intelligence has received a lot of attention over the years. Although our perceptions of what it is have evolved and morphed, there is still is no single, all-encompassing way to define intelligence (Li, Schmiedek, Neil & Paul, 2001). Etymologically the word intelligence is made up of two words: "inter," meaning between and "legere" meaning to choose, pick out or read (Dictionary of Etymology, 2009). So we have inter-legere meaning literally, "choosing between." Viewed in these terms, intelligence is the capacity to choose between options; the ability to make decisions when faced with alternatives. While this definition might appeal to some theorists and thinkers who view intelligence in a singular, general manner, others, who see intelligence as a collection of various attitudes, skills and abilities, find it problematic. What follows is a collection of various viewpoints and definitions of intelligence.

General Intelligence

Following Alfred Binet's original development of psychometric tools designed to measure a person's cognitive intelligence, the g factor theory (general intelligence), was

proposed by the British psychologist Charles Spearman (Gould, 1996). According to scholars who fall into the general intelligence camp, intelligence is a cognitive ability that can be measured and numerically expressed (Gottfredson, 1998). Further, it has been observed that individuals who do well on a particular intelligence test, one that measures verbal fluency, mathematical skills, and spatial abilities for instance, tend to do well on other tests aimed at assessing overall cognitive ability (Gottfredson, 1998). Thus, the inter-correlation or overlap on test scores suggests some type of global intelligence.

Flynn (2007) argues for the strength of general intelligence and states that, "while there may be various components of intelligence, there is nevertheless an overall, fundamental intelligence which can be measured with the IQ tests currently in existence" (p. 344). Furthermore, Flynn (1999) has found that society's general intelligence is increasing over time and that people today are more intelligent than those of 100 years ago. Postulating a 0.3 increase in IQ scores per year, the conclusion reached by Flynn (2007) is that the average IQ score at the beginning of the 19th century would have been approximately 70, a score that qualifies people today as "borderline mental functioning" (Wikipedia, 2011). Reasons for this increase include better diets, earlier ages of school entry, a switch to scientific thinking, brain development and so on (Flynn, 2007). The "Flynn effect" as it is called, has been the subject of extensive debate concerning its nature, causes, and implications (Rodgers, 1998).

Critics of the notion of general intelligence state that no such global capacity exists, rather the tendency to do well on IQ tests is a by-product of a particular cultural context and of a person's opportunities to learn a specific set of skills and related information (Gould, 1996). Countering the view of intelligence in the singular, Thurstone (1938)

believed that intelligence was more accurately portrayed as a collection of primary mental abilities. He postulated that there were seven such mental abilities ranging from verbal comprehension to reasoning to spatial visualization. Thurstone's (1938) work grew out of a reaction to the notion of a singular general intelligence and was key in the evolution of the notion of multiple intelligences later adopted by Gardner (2006) and Goleman (1995), among others.

Multiple Intelligences (MI) Theory

Since the time of Spearman and Thurstone, the concept of intelligence has evolved from being viewed as a singular concept to a plural one, although the debate continues (Gould, 1996). Increasingly, authors and scholars ranging from computer scientists to neuroscientists are developing new and more refined ideas about intelligence. According to Gardner (1999), there is now a movement to

> differentiate among different forms of intelligence, such as those dealing with novel, as opposed to crystallized, information… to broaden the expanse of intelligence to include emotions, morality, creativity, or leadership… to bring intelligence wholly or partially outside the head, situating it in the group, the organization, the community, the media, or the symbol systems of a culture. (p. 24)

Of specific importance to the theory of multiple intelligences is that the various intelligences often work together in concert rather than in isolation. Viewed in this way, a human being might employ several intelligences at a time in order to accomplish a specific feat, understand a particular problem or manage a situation (Sternberg, 1999). Thus, the various intelligences are part of a system, a network of smarts. Gardner (1983) underscored this point as he delineated his original seven intelligences. They included

linguistic, logico-mathematical, musical, bodily kinesthetic, spatial, interpersonal, and intrapersonal (Gardner, 2000). Later, Gardner added naturalistic intelligence to his list, stating that a person can have a very developed and keen sense of the natural and animal kingdoms. Thus, Gardner's theory of multiple intelligences is often called the 7+1 theory. Instead of describing each intelligence, this poem will act as a substitute,

MI Rhyme

"I like numbers"

"I like words"

"I like to think of trees and birds"

"It helps me when I act it out"

"Pictures show me what it's about"

"I like to sort it for myself"

"I like my friends to give me help"

"If I find that it's going wrong, I like to write it in a song"

If YOU turn all the MI's on

You'll operate with 7 + 1 (Evans, 2003, p. 1)

In his work, Gardner (1999) delineates certain criteria that he believes must be met in order for a given set of capacities or abilities to be able to qualify as an intelligence. These include: the potential of isolation by brain damage; an evolutionary history and evolutionary plausibility; an identifiable core operation or set of operations; susceptibility to encoding in a symbol system; a distinct developmental history, along with a definable set of expert "end-state" performances; the existence of idiot savants, prodigies, and other exceptional people; support from experimental psychological tasks; and support from

psychometric findings.

Gardner (2006), echoing Kurzweil's (2000) definition of intelligence as principally a process of pattern recognition, states that "intelligence is a computational capacity - a capacity to process a certain kind of information - that originates in human biology and human psychology" (p. 6). In addition, "each intelligence must have an identifiable core operation or set of operations. As an early-based computational system, each intelligence is activated or triggered by certain kinds of internal or external information" (p. 7).

Gardner, along with other proponents of MI theory, has been criticized for stretching the meaning of intelligence beyond its original significance (Eysenck, 1988). Some critics believe that Gardner has not only stretched the meaning of intelligence but that he has completely mutilated it, including in his list of intelligences qualities that have traditionally been described rather as talents or abilities (Scarr, 1989). Despite these and other criticisms, Gardner's MI theory is being embraced by a growing number of schools, inspiring diverse practices such as matching instruction to learning styles (Klein, 1997).

I turn next to a review of emotional intelligence, an even greater stretching of the traditional concept of intelligence.

Emotional Intelligence (EI)

Originally proposed by Mayer, DiPaolo and Salovey (1990), emotional intelligence is most strongly associated with the ability to recognize one's own emotions and the emotions of others and to respond effectively to these. It includes the ability to feel empathically and to regulate one's emotional reactions. In their own words,

> Emotional intelligence refers to an ability to recognize the meaning of emotions and their relationships, and to reason and problem solve on the basis of them. Emotional

> intelligence is involved in the capacity to perceive emotions, assimilate emotion related feelings, understand the information of those emotions, and manage them (Mayer, Caruso & Salovey 1999, p. 124)

Goleman (1995), who has written about social and ecological intelligence, popularized the term emotional intelligence with a best-selling book on the subject. In his model, Goleman (1990) delineates four primary aspects of EI which include: self-awareness - the ability to decipher one's emotions and recognize their impact while using gut feelings to guide decisions; self-management - the control of one's emotions and impulses as well as adapting to changing circumstances; social awareness - the ability to sense, comprehend, and react to others' emotions while understanding social networks; and relationship management - the ability to inspire, influence, and develop others while managing conflict.

According to Goleman (1995), "a view of human nature that ignores the power of emotions is sadly shortsighted" (p. 4). Goleman's (1995) conviction about the primacy of emotion over intellect is directly linked to the concept of the triune brain discussed earlier. In essence, the emotional world can hijack the cognitive one because it evolved first and is therefore more fundamental (Goleman, 1995). However, the idea that affect is separate and therefore primary to cognition is being challenged in favour of a more interdependent view of cognition and emotion (Storbeck & Clore, 2007). Still, it seems helpful in terms of conceptualization to differentiate between thoughts and feelings.

In line with this differentiation, scholars like Gardner (2000) argue that, "feeling states… are best considered external to the intellectual realm" (p. 29). Although Gardner's interpersonal and intrapersonal intelligences have some commonalities with

Goleman's emotional intelligence, Gardner's work stems from a cognitive science model of the mind and thus his multiple intelligences emphasize cognition – the understanding of oneself and others through intellectual means - rather than emotions and feelings per se. Gardner's (2000) main criticism of Goleman's theory of emotional intelligence is that it blurs the lines between the descriptive and prescriptive. In other words, when Goleman underscores the importance of humility in emotional intelligence, for example, he is no longer describing the construct rather he is promoting certain values (Gardner, 2000). Other criticisms of Goleman's work mirror those levelled at multiple intelligence theory in general, namely an impoverishment of the intelligence construct through overzealous inclusivity (Fernandez-Berrocal & Extremera, 2006), an inability to be tested psychometrically (Gould, 1996), and confounding definitions and conceptualizations (Klein, 1997).

Oodles of Intelligences

According to Scarr (1989), with the advent of multiple intelligence theories has come an unfortunate tendency to label any personality trait or attribute an intelligence. It is now all too common to call something an intelligence in order to raise its prestige without having a solid scientific basis for doing so. Gardner (1999) echoes this sentiment and suggests that without a given set of criteria that an intelligence can be measured against, it is unclear whether we are actually uncovering an intelligence or simply labelling something an intelligence. The latter leads to an impoverishment of the concept of intelligence and detracts from its strength as an empirical, scientific concept (Mayer, 2000).

Nevertheless, the reservations expressed by empirically minded scholars have been largely overlooked in other fields of study and the term intelligence has been adopted to describe a wide range of phenomena across disciplines. In my review of the construct of intelligence, I came across many different areas and types of intelligence. I list a few of these along with a brief description to illustrate the breadth of thought and usages of the term intelligence.

Animal intelligence - According to Matzel and Kolata (2009), "recent evidence from our laboratory indicates that genetically heterogeneous laboratory mice express a trait that is both quantitatively and structurally similar to ‘‘intelligence’’ in humans" (p. 27).

Sexual intelligence – According to Conrad and Milburn (2001), it is possible to test for sexual intelligence with scales developed for this purpose. Citing the large percentages of people who suffer everything from a lack of sexual desire to chronic sexual dysfunction, Conrad and Millburn (2001) explain that many people are in need of developing higher levels of sexual intelligence.

Narrative intelligence - Defined by Randall (1999) as the capacity to formulate and follow a story by means of "emplotment", characterization, narration, generation and thematization. Randall (1999) suggests that our lives are as much biographical as they are biological and that we can and should develop our narrative intelligence throughout the course of our lives.

Self-organizing internet intelligence – Goetzel and Jayne (2007) have detailed the emergence of what they call the global brain. In their words, "hypermedia documents on the Internet form linked, virtual structures. These can be seen as a global analogy to

neural cell assemblies in a biological brain that are considered to provide the basis for cognitive processes like perceptual binding" (p. 309).

Extraterrestrial intelligence (ETI) - Baum (2009) has argued that it would be wise and prudent for the nations on planet Earth to develop a diplomatic protocol for extraterrestrial contact if ever we received communication from extraterrestrial intelligence. While this idea might strike some as ludicrous and far-fetched, Reijnen (1990) points to the increasing numbers of astronomical, astrophysical and exobiological probabilities of terrestrial contacts with ETI (e.g. the recent discovery of water on the moon).

Artificial intelligence (AI) - Is it possible to replicate human intelligence? Machines are now capable of recognizing patterns and displaying “if-then” processing which is considered a form of intelligence (Kurzweil, 2000). According to Kurzweil (2000), pattern recognition is the fundamental basis of intelligence. Mason and Hossein (2003) define artificial intelligence as “the demonstration of intelligence by computers or machines; that is, making machines do things that are usually done by minds” (p. 239). There are now robots with the ability to register human facial expressions and mimic those reactions, even to the point of scanning a scene of several people with different facial expressions to assess how each individual is feeling (Kurzweil, 2000).

Mason and Hossein (2003) explain that there are,

> researchers who believe that AI will eventually result in machines that possess and display all the functional characteristics of human beings. Physically they will be silicon based rather than carbon based; but, they will be able to think, feel, have moods, be emotional, interact socially with others, draw on common sense, and

> have a "soul." Thus, AI-based systems, according to these researchers, will become the next stage in the evolution of life, emerge as our successors, and create a future society populated and governed by computers. (p. 242)

Whether this turns out to be the case or not remains to be seen. Nevertheless, the whole field of artificial intelligence and its potential for unimaginable good as well as unimaginable evil must also be considered through the lens of ethics and morality. Do we really have the moral intelligence needed to handle some of the breakthroughs in artificial intelligence that seem to be on the horizon?

> Moral intelligence - According to Lennick and Kiel (2007) moral intelligence is the mental capacity to determine how universal human principles should be applied to our values, goals, and actions. In the simplest terms, moral intelligence is the ability to differentiate right from wrong as defined by universal principles - those beliefs about human conduct that are common to all cultures around the world. (p. xxxi).

In Wilber's (2006) integral model, both moral intelligence as well as spiritual intelligence are included as separate streams of intelligence to be refined and developed.

Spiritual intelligence - Why do we live? What's the purpose of life? What is love? According to Zohar and Marshall (2000), spiritual intelligence is concerned with ultimate reality and "the big picture." In their view, spiritual intelligence is considered the third and most fundamental form of intelligence (EI and cognitive intelligence following suit) and is evidenced by certain levels of self-awareness, and mastery over life's challenges. Emmons (2000) proposes four components of spiritual intelligence that include: the capacity to transcend the physical and material; the ability to experience heightened states

of consciousness; the ability to sanctify everyday experience; and the ability to utilize spiritual resources to solve problems.

Intuitive/heuristic intelligence - Pretz and Totz (2007) have identified three aspects of intuition that they consider crucial in any attempts to understand the construct, namely the affective, heuristic and holistic elements of intuition. Emotions can accompany intuitions and vice versa; a person can have an intuition about something and feel like it is very accurate or, conversely, one can also have a feeling about someone or something which then translates into an intuitive knowing about what to do or how to act (Pretz & Totz, 2007). According to Radin and Schlitz (2005) there exists a strong correlation between gut feelings (intuitions) and emotions. In one study, it was found that intuitive judgments were linked to mood: good moods increasing the likelihood of making correct intuitive decisions and bad moods doing the reverse (Radin & Schlitz, 2005).

In the decision-making literature, Kahneman and Tversky (1973) have designed experiments to test heuristic decision-making processes in which decisions are made based on limited information. This heuristic processing of information has been labelled intuition although it relies mostly on rational, logical reasons why a person can intuitively know something (Kahneman & Tversky, 1973). In line with this, Frantz (2003) believes that intuition can be likened to subconscious pattern recognition, which is the hallmark of artificial intelligence. In this sense, intuition need not be regarded as mysterious and magical because it is complementary to analytical thinking. Further, research has shown that individuals with more experience often have more accurate intuitions than novices (Simon, 1987).

The holistic intuition model, on the other hand, moves beyond time and space and is interested in how aspects of the nonphysical and physical world are integrated into a knowing, intuitive sense that is completely separate from linear ways of thinking about intuition (Pretz & Totz, 2007). Several researchers have underscored the holistic nature of intuition (Dossey, 2009; Radin, 1997; Targ & Katra, 1999), suggesting that intuitive guidance happens automatically and without the need for logical, rational thought. Thus, intuition has been described as a sense of knowing without being able to explain why you know (Radin & Borges, 2009).

In a series of experiments aimed at investigating intuition, Radin (2006), Radin and Shlitz (2005), and McCraty et. al (2004a; 2004b) examined how participants reacted to emotionally distressing stimuli before the stimuli was available to the physical senses (the eyes in these instances). Participants being monitored by ECG and EEG devices were exposed to a series of images on a screen. The results of the studies indicate that participants experienced physiological arousal seconds *before* disturbing images flashed on the screen. These findings provide evidence for a type of knowing that transcends our typical understanding of space and time. Perhaps more intriguing, and of relevance to the notion of heart intelligence, is that ECG patterns shifted before EEG patterns did, suggesting that the heart receives intuitive information before the brain (McCraty et. al, 2004). Rather than following cause and effect through a unidirectional arrow of time, these types of experiments suggests that the human physiological system is receiving information and reacting to it through means that are currently not understood.

Heart Intelligence

Having now laid the groundwork, I will attempt to answer the question: What is heart intelligence and how does it fit with what we know about the brain, the heart and the field of intelligence in general? Over the past few months I have asked myself this question many times, along with several others: What does somebody with heart intelligence act like, feel like, look like and sound like? What qualities are synonymous with those of heart intelligence? What does the absence of heart intelligence mean? I will try to address some of these questions in the pages that follow.

To reiterate the statement I made at the beginning of this dissertation, I believe heart intelligence means two things. Firstly, the heart is intelligent in both a figurative and metaphorical sense. The heart knows your innermost desires and feelings. The heart is your home. In the solar system of human physiology, the sun is the heart and the earth is the brain. We wear our hearts on our sleeves and have cold hearts, warm hearts, broken hearts, hearts on fire and hearts in good shape. Metaphorical ways of speaking about the heart abound and I will argue that these metaphors can help better understand the idea of heart intelligence.

Secondly, I intend to draw attention to the new science of the heart which indicates that it is a complex, multifaceted, multipurpose component of human physiology that is intricately and intimately tied to the body as a whole through various info-energetic channels, some of which have yet to be discovered (Pearsall, 1998). In this sense, the heart is literally intelligent. Clearly, I am not trying to suggest that the human heart is capable of having a visual representation of grandma or that it is able to perform abstract mathematical calculations like those carried out in the brain. However, I do propose the

possibility exists that the heart can think, feel and remember in its own particular way. This proposition will be supported by evidence from two sources: cardio-energetics and heart transplants.

Metaphorically Intelligent Hearts

According to religious scholars who study myths and parables, metaphors can be every bit as true as facts (Armstrong, 2006; Borg, 2003; Campbell, 2008). Poetry is a case in point. A gifted poet can convey a truth through the use of metaphor and imagery that touches something deep within the soul of a person, just as a scientific fact can ring of implacable truth that strikes us to the core (Armstrong, 2006). The difference is largely one of perspective: poetry is the language of the heart, science the language of the brain. Thus, it is not unreasonable to view the heart as wise, knowing and intelligent. What I and others (Childre, Martin & Childoe, 2000; Guarneri, 2006; McCraty, Atkinson, Tomasino & Bradley, 2006; Pearce, 2002; Pearsall, 1998; Schwartz & Russek, 1997; Young, 2003) are suggesting is that the heart is intelligent in a way that is completely different but complementary to the intelligence of the brain.

In contrast to general intelligence which seems to be based on cognitive and intellectual abilities (Gould, 1996), heart intelligence is much more subtle and elusive. According to Pearsall (1998), the brain and its various intelligences can easily override and suppress the more gentle intelligence of the heart. Part of the reason for structuring this review as I have, is to draw attention to the dominance of logic, analysis, sequence, and supremacy of the brain in educational and western worldviews. You may have felt a few glimpses of my heart entering my writing, but not very much until now. Even addressing you this openly and honestly flies in the face of what I have been taught

during my 25 years of education. It just isn't very scholarly is it? The brain judges this kind of interruption harshly and recoils at its casualness. "How irrelevant," cries the brain! In the midst of something that should be structured a certain way, I hear the voices of professors echoing in my ears, "Make sound and coherent arguments, be able to criticize your work, synthesize the information you have read, follow the specific steps in outlining your ideas, make it logically defendable," and so on.

Meanwhile my heart stirs but remains quiet. So quiet that, if I do not make time to silence my brain and listen to the steady "BADUUM, BADUUMM, BADUM" and wisdom of my heart, I miss it entirely and ever so gradually begin living in a world of criticism, cynicism and division. My heart wants to reach out through this page and connect with you and play with you and be with you. Can you truly say that as you sit there and read these words with your brain, that your heart is not yearning for more fire and passion? Doesn't the thought of throwing this paper into the garbage and going out to live life with a radiating, open heart stir you? Are you really living? Can you feel how quickly your brain shuts down these deep-seated heart desires and reminds you of responsibilities and the unscholarly nature of this writing? This is my point! There is a difference between heart and brain intelligence.

Therefore, as a first step towards defining intelligence of the heart, it may be helpful to juxtapose it to the brain through the use of conversation, images, illustrious language and poetry. For example, the ongoing dialog occurring between my brain and heart over the past few months, although much abbreviated, might help uncover the intelligence of the heart as metaphor:

Brain: Okay Marc, you've got your dissertation questions, now let's get cracking. Get to

the library, get on the computer, start putting together some outlines on paper, and let's make this thing happen.

Heart: Wow, what a beautiful set of questions. I mean, I knew you wanted an opportunity to think about these kinds of things Marc, but isn't it nice to see how beautifully this research process is unfolding and evolving?

Brain: Sure, sure, but we've got to get at this thing. The clock is ticking Marc and you've got to hand in a document that is scholarly and well put together and then DEFEND it. No time to sit around and speculate about the beauty of it all, we've got to mobilize.

Heart: I just want the best for you Marc. I appreciate the depth of your commitment and your courage to keep persevering towards the attainment of your goals. You're doing a great job.

Brain: Okay heart, that's enough. I don't want any more out of you. You just go ahead and do your thing down there Mr. lovey-dovey and I will actually accomplish something important, worthy of esteem and praise. I'm going to damn well prove to that committee that Marc is a brilliant young scholar and that he is insightful and knowledgeable even if it kills me!

Heart: Yes my friend. You have tremendous energy and I applaud your hard work ethic.

Brain: Don't patronize me heart! Your gentle encouragement just ain't going to cut it this time around. You just keep beating and make sure I get enough blood so that I can write this damn paper and move on as quickly as possible to my next big project.

Heart: … I will do as you ask Brain, for the sake of Marc. But Marc, please be aware that I can only handle so much stress and anxiety before I start to buckle under the pressure. I will beat and send you all of the goodness I can as long as I am able…

And so the conversation goes. I suspect that the animosity between my own brain and heart is not foreign to most people living in modern societies. So what would it be like to allow the intelligence of the heart more room in our lives? What would it be like if we could begin to integrate brain and heart wisdom? Please do me a favour dear reader, can you put your hand on your heart right now and take three deep breaths focusing all of your attention on your heart area? Once you have done this, read the following description very slowly and with an open heart…

Someone with refined heart intelligence is very self-aware and aware of others and aware of their environment. They are highly sensitive to the energies and subtleties of any given situation. Because of this keen sense of awareness and clarity, this person is able to make wise choices - in the moment, and also about the future. They know when to listen and when to speak. They know how others are feeling and what they are expressing beyond words and actions. They are considerate of other people's needs, but aware of their own as well. They care, but not to the point where they over-care. They listen to the clues, both inner and outer, that suggest to them what right actions to take. They are very grateful and they smile often. They exhibit a lot of compassion for themselves and others so people enjoy being around them. They are often happy. At the same time, they have a restlessness about them and an eagerness to love fully, to live fully, to evolve and grow. They are resilient and, like the tennis player who gently sways back and forth awaiting the incoming tennis ball, the person with a high degree of heart intelligence is fluid and graceful and ready for action. Guided by the heart, this person is mysterious, intense, but relaxed and a joy to be with…

Finally, in an effort to "prove" my point about metaphorically intelligent hearts, I offer the following poem written by Rumi, one of the great Sufi mystics who repeatedly marvelled at the wonderful and mysterious qualities of the heart…

> Just as your two eyes are under the control of the heart
> and subject to the spirit's command,
> all five senses move as the heart directs.
> Hand and foot also move
> like the staff in the hand of Moses.
> If the heart wills, at once the foot begins to dance,
> from neediness toward abundance. (Rumi, as cited in Helminski, 2000, p. 84)

Literally Intelligent Hearts

Literally, the heart appears to be intelligent (McCraty, et al., 2006; Pearce, 2002; Pearsall, 1998). It keeps track of multitudinous processes happening within and around the body (Armour & Ardell, 2004); it is constantly sensing and engaging in efforts to maintain harmony and stability within human biology (Childre, Martin & Childoe, 2000); it is alive and aware of what is going on not only neurologically, but biochemically and electromagnetically as well (Guarneri, 2006). It is monitoring, pushing, pulling, moving, sensing, coordinating, choosing, remembering, sending, receiving, and living; even if it is ripped right out of our bodies! In an effort to uncover how it is that the heart might be able to think, feel and remember, I will present two primary lines of evidence: the emerging field of cardio-energetics and the heart transplant phenomenon.

Cardio-Energetics

Alongside the breakthroughs in neuroscience and neurocardiology have come some heated debates about the nature of consciousness (Blackmore, 2005). Does consciousness arise as a result of the dance of neurons, hormones, chemicals and electromagnetic waves? Or can consciousness exist outside of the brain, body and material world? According to Crick and Koch (1998), "All the different aspects of consciousness (for example, pain, visual awareness, self-consciousness, and so on) employ a basic common mechanism or perhaps a few such mechanisms" (p. 98). Targ and Katra (1999), on the other hand, argue that, "There are many states of nonlocal consciousness available to humankind, just as there are a variety of states of awareness within ordinary space-time" (p. 3).

Needless to say, there is not yet any consensus among scientists studying consciousness as to its nature and origin (Wallace, Wallace, & Hodle, 2008). What is less controversial, however, is the notion that the material world we see around us is comprised of energy (Schwartz & Russek, 1997). The famous Einsteinian equation $E = mc^2$ is in part responsible for the widespread understanding that, essentially, energy and matter are equivalent. According to Braden (2007), energy is also equal to information or E = I. Thus, we have energy equals information equals matter (E = I = M) and this new formulation may provide insight to how a heart (as well as the brain) is able to think, feel and remember.

The emerging field of cardio-energetics (also known as energy cardiology) is interested in uncovering how energy and information and the material world are connected through the heart (Schwartz & Russek, 1997). Before listing the major

hypotheses of cardio-energetics, however, it is worth taking a little detour into the mysterious world of energy. According to Wikipedia (2009), there are several different forms of energy which include: kinetic, potential, thermal, gravitational, sound, light, elastic, and electromagnetic energy. Furthermore, any form of energy can be transformed into another form, but the total energy always stays the same.

What science has so far been unable to measure and quantify is the universal energy referred to in the majority of ancient healing traditions as well as contemplative esoteric teachings (Tiller, 1993). Given various names such as chi, prana, mana, aura, vital spark, cosmic energy, quantum energy, field energetics and many others, the energy of the transcendent that is believed to animate life and is the stuff of consciousness is simply not understood by the current scientific model (Braden, 2007). Tiller (1993) uses the term "subtle energy" to refer to the host of as yet indefinable aspects of life that physics is unable to account for at the present time.

The Princeton Engineering Anomalies Research Laboratory (PEAR) has conducted numerous experiments aimed at better understanding the world of subtle energy and the role consciousness plays in the physical world. According to their website, PEAR has been "studying the interaction of human consciousness with sensitive physical devices, systems, and processes, and developing complementary theoretical models to enable better understanding of the role of consciousness in the establishment of physical reality" (p. 1). According to PEAR researchers Jahn and Dunne (2005), it appears that human consciousness and directed intention creates a field that can moderate random physical events. Using random number generators, participants in a series of experiments have been able to successfully influence the numbers appearing through intention (Jahn &

Dunne, 2005). Thus, there exists "the possibility that the concept of a consciousness "field," heretofore postulated in various abstract forms by scholars of many disciplines, may now be on the threshold of rigorous scientific demonstration as a driver of physical reality" (p. 230).

Experiments addressing the issue of intention and its role in shaping our physical experience are increasing (Radin, 2006). Because the heart is uniquely positioned to send and receive subtle energies throughout the human body, it is believed that intentions and thoughts held in the brain can be mediated by the information radiating from the heart (Braden, 2007). According to Pearsall (1998), a new portrait of the heart is emerging that can help explain, “how trillions of highly specialized cells can function as an organized, responsive, interactive, remembering, loving whole” (p. 72).

The Institute of HeartMath has conducted experiments testing, among other things, the electromagnetic fields generated by the heart. It has been found that electromagnetic waves that emanate from the heart travel out 8 to 10 feet in diameter from the body in the form of a Taurus Field (see Figure below). This suggests that the heart, radiating energies to the rest of the body and surrounding area, constantly bathes a person and whatever is in his/her vicinity with energy (which, if we recall, is equal to information; Braden, 2007). Using electro-magnetometers as well as monitoring heart rhythms and brain waves, it has been discovered that participants emanating a particular heart rate variability pattern (one associated with the emotional states of appreciation, care and compassion) are more attuned to the brain waves and emotional states of others sitting a few feet away from them (McCraty et. al, 1997). These findings may help explain why people sometimes intuitively sense how others are feeling when entering a room.

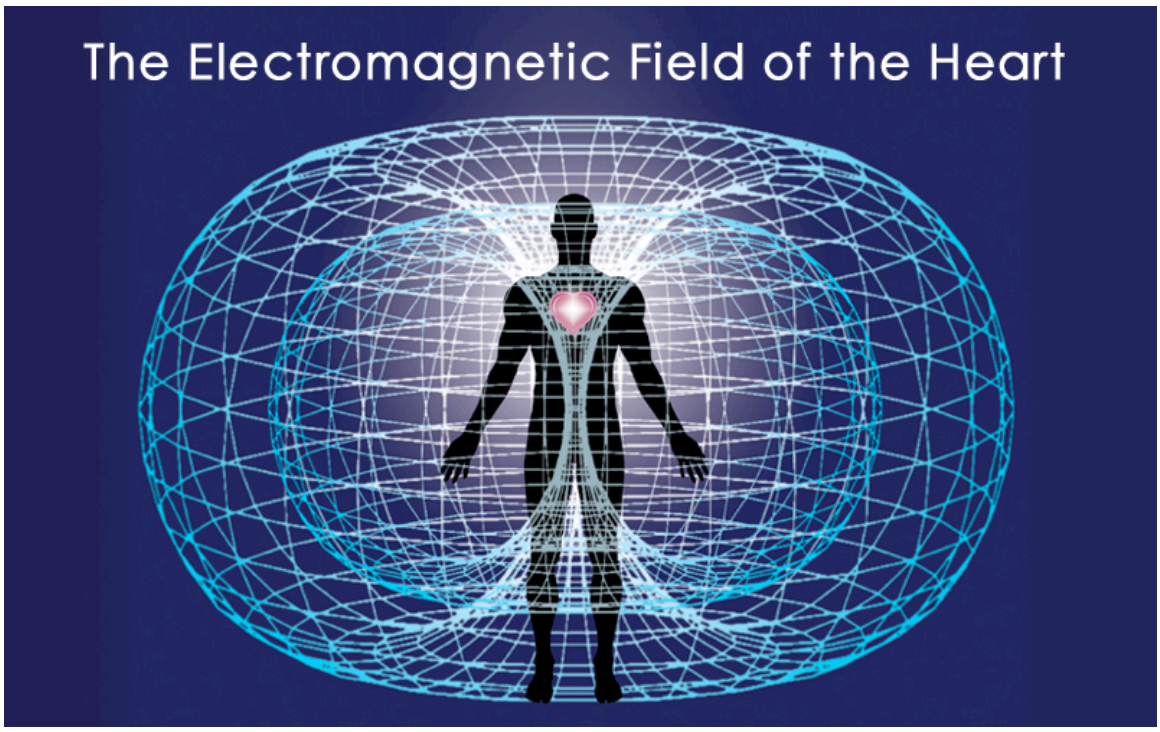

Figure 2. The Taurus Field of electromagnetic waves emanating from the human heart. (Reese, 2009, p. 35).

Cardio-energetics is very much interested in both the heart and energy. Pearsall (1998) identifies the following points as a starting place for understanding energy cardiology (p. 73-74):

1. The heart is our most powerful organ. Compared to all other organs of the body (the brain included) the heart is by far the largest generator of electromagnetic energy in the human body and constantly emits and receives information frequencies through sound and pressure waves as well as biochemical signals (McCraty, et al., 2006).

2. The heart responds directly to the environment. As mentioned previously, studies conducted to test for intuitive capabilities found that the human heart responded to

stimuli well before the physical act of seeing the stimuli (McCraty, et al., 2004).

3. The heart is a conductor of the energy of the body's cells. The information energy patterns radiating from the heart reach every cell of the human body and it is believed that cells receive this energetic information and act in accordance with the messages they are being transmitted. This may help explain the controversial idea of cellular memory (Dossey, 2008).

4. The heart is a dynamic system. According to McCraty et al. (2001) the new science of the heart views the heart as a highly sophisticated information processing center that receives and transmits signals from all other body systems and responds appropriately.

5. The heart is the body's primary organizing force. Integration, organization, connection, balance and mediation are all part of the heart's work to keep itself beating as well as keeping the being it inhabits alive. According to Pearce (2002), the heart may be responsible for how subtle energy is distributed around the body and therefore plays a major role in what it means to be healthy.

6. The heart "speaks" and sends information. The heart communicates through matter, energy and information and therefore it is possible for the consciousness of a person to receive the signals. According to Guarneri (2006), the majority of people do not take the time to quiet their minds and listen to their hearts. Therefore, its messages go unheard.

7. All hearts exchange information with other hearts and brains. The dynamic interactive effects of cardiac energy patterns are being studied through experiments designed

to better understand how energy blends with memory, emotion and cognition (Bradley, 2006). It is believed that a feedback loop exists between the quantum world and the energies of the heart with each feeding the other information (Pearce, 2002).

8. Transplanted hearts come with their own info-energetic cellular memories. The heart's energetic code seems to imprint itself upon the cells of the human body and on the human heart in particular. Once transferred into another body, there is evidence to suggest that energetic patterns and information accompany the billions of cells that make up the human heart (Pearsall et. al, 2000).

Taken together, these points offer a glimpse into the world of the heart as seen through energetic eyes. The idea of heart intelligence being literal becomes more palatable in light of such findings. Unfortunately, a lot of the above statements are in need of verification and validation by other scientists. The work being done in this area is regarded as highly suspicious and threatening to the established scientific paradigm (Targ & Katra, 1999). This is as it should be: a skeptical stance when dealing with such matters is very important, argues Pearsall (1998), as the experiments being performed by well-trained scientists are often taken up by people less well versed in experimental protocols and then used to support claims that are unfounded.

The Post Transplant Phenomenon

As with energy cardiology, and perhaps even more challenging to the structure of the mechanistic scientific enterprise, is the research being conducted on paranormal phenomena. Near-death experiences, reincarnation, telepathy, clairvoyance, remote viewing, channelling, distant healing, the placebo effect, precognition, and other reported

paranormal experiences have begun to be more rigorously studied in laboratory settings using experimental designs (Radin, 1997). Most pertinent to the present investigation of heart intelligence are the increasing number of case studies conducted with heart transplant recipients. According to Russek and Shwartz (1996), there are a growing number of heart transplant recipients who explain that they are aware of the otherness of the new hearts within their chests and, perhaps of more interest, that they are actually exhibiting traits and characteristics they believe originate from the donors.

Although there have been studies conducted indicating that a majority of heart transplant recipients do not claim to have "changed" as a result of their new hearts (Young, 2003), Dossey (2008) wonders if this may be partially explained by a fear of appearing strange or weird by family, friends or society. Similarly, Pearsall (1998), having interviewed dozens of transplant recipients, wonders if those who report noticing changes and who are able to deeply feel the presence of something or someone else within them are simply more sensitive to subtle energies and their own inner world than their counterparts who report nothing. Clearly, there are those who exhibit personality and character changes as a result of the heart transplant procedure (Pearsall, et al., 2000). According to a 25-year-old young man who received the heart of a 19-year-old female,

> I never told anyone at first, but I thought having a woman's heart would make me gay. Since my surgery, I've been hornier than ever and women just seem to look even more erotic and sensual, so I thought I might have gotten internal transsexual surgery. My doctor told me it was just my new energy and lease on life that made me feel that way, but I'm different. I know I'm different. I make love like I know exactly how the woman's body feels and responds - almost as if it is my body. I

> have the same body, but I still think I've got a woman's way of thinking about sex now. (Pearsall et al., 2000, pp. 67-68)

The case studies and personal reports of post transplant recipients are difficult to read without being deeply moved. In their study conducted with 10 post transplant recipients, Pearsall et al. (2000) observed two to five parallels in each case between recipients' present experiences and their donors' history. Preferences in music, food, art, recreational activities, sexual activity and professional aspirations were noted. Furthermore, specific instances of perceptions of names and sensory experiences related to the donors were observed. For example, one donor was shot and killed with a blast to the face and the recipient had recurring dreams of seeing hot flashes of light in the face (Pearsall, et al., 2000).

Heart transplants resulting in changes in the recipient have been attributed to cellular memory (Lipton, 2008). Although embraced by some as a possible explanation for the changes that sometimes take place (Chopra, 1990; Pearce, 2002; Pearsall, et al., 2000), Dossey (2008) postulates that explanations of this sort surface as a result of a lingering desire to locate consciousness within matter. Dossey (2008) contends that,

> …the consciousness of a donor is fundamentally united with the consciousness of a recipient via nonlocal mind, and that it is this connection that makes possible informational exchanges between the two individuals, which take the form of posttransplant phenomena. Nonlocal connections normally exist between all minds, but the recipient's link with the donor is intensified because of the profound experience of impending surgery and possible death. (p. 292)

Interestingly, Young (2003) suggests that because the heart is imbued with so much

significance and importance (after all, if a heart transplant fails, death is the result), transplant recipients might deeply attune to their donors. If this is the case, the main vehicle for communication between recipient and donor might well be consciousness itself rather than tissue (Radin, 2006). These daring suggestions do not rule out other possibilities for why heart transplant recipients might exhibit character changes like memory lapses, selective memory, wish fulfillment, self-fulfilling prophecy, suggestion, psychological stress, pre-existing pathologies and so on (Dossey, 2008). However these factors do not appear to be sufficient in explaining these phenomena.

One of the reasons paranormal and post transplant phenomena have such a difficult time gaining a footing in the medical-scientific community is the assumption that these occurrences violate the laws of nature and therefore cannot possibly be valid (Dossey, 2009). Dossey (2008) says this about the criticisms surrounding post-transplant phenomena,

> I've been saddened by the viciousness of this debate. Those who attempt objectively to study these phenomena are often subjected to ridicule and savage ad hominem attacks. "Outrageous," "fantastic," "unimaginable," "pseudoscientific," "New Age," "balderdash," "delusional," "gullible," "naïve," "junk science," and "absurd" are commonly used to denounce these reports (p. 288).

Perhaps more case studies or "harder evidence" for the post-transplant phenomenon will create a dent in the shield of the most ardent skeptics who refuse to acknowledge the validity of the stories told by individuals and families who report experiencing changes following a heart transplant. Nevertheless, for the brave scientists and graduate students who look upon the post-transplant phenomenon with some degree of openness, there are

several significant implications: 1) The heart removed from a donor and placed into a recipient carries with it an energy and a sentience that can be consciously felt and experienced; 2) The heart is capable of storing energy or information in the form of memories, thoughts and feelings that can be directly perceived and experienced by other sentient beings (in this case humans); 3) The current scientific model fails to explain how this is possible; 4) There must be an explanation available outside of the current model of reality that must be uncovered in order to fully understand these phenomena.

Taken together, the metaphorical and literal descriptions of the heart as possessing intelligence provided a starting point for future debate and research. The use of the word intelligence in the sense I am using it to describe a sentient heart falls outside of the purview of cognitive psychologists such as Gardner and Goleman. However, this does not mean the construct is invalid, only that it does not fit easily within the realm of intelligence typically referred to by cognitive scientists. Perhaps I should be faulted for suggesting the heart is intelligent without providing concrete proof, although maybe needing concrete proof is the problem. In the words of the great mathematician, scientist and mystic Pascal (1966), "le coeur a ses raisons que la raison ne connait point" (p. 102).

Heart Intelligence, Coherence and Emotional States

New discoveries about the heart stemming from research conducted by the Institute of HeartMath suggest that there are very real and practical applications to working with one's heart intelligence. One of the more exciting findings connected to this line of research suggests that we are fully capable of tuning into our hearts in order to initiate a state called psychophysiological coherence (coherence, for short). According to

McCraty, Atkinson and Tomasino (2001) psychophysiological coherence is a state associated with:

- Sustained positive emotion
- High degrees of mental and emotional stability
- Constructive integration of the cognitive and emotional systems
- Increased synchronization and harmony between the cognitive, emotional and physiological systems (p. 18)

A description of coherence by McCraty and Tomasino (2004) follows:

> …psychophysiological coherence facilitates the maintenance of a physiologically efficient and highly regenerative inner state, characterized by reduced nervous system chaos and increased synchronization and harmony in system-wide dynamics. This psychophysiological mode, termed physiological coherence, is conducive to healing and rehabilitation, emotional stability, and optimal performance. (p. 1)

Institute of HeartMath (described in the next section) has developed various techniques to help people enter into a state of coherence. Cut-Through, Freeze Frame, Heart Lock-In and others have proven effective for people desiring to consciously access the coherent state (Childre, et al., 2000). The simplest and most common technique (to be used in this study) is the Quick Coherence Technique which involves three steps.

1. Heart focus (focus your attention on the area surrounding your heart)
2. Heart breathing (breathe rhythmically while maintaining focus on your heart)
3. Heart feeling (gently introduce a positive feeling along with heart focus and breathing)

Specific technologies (described in next section) have been created to measure whether a person engaged in an exercise such as the Quick Coherence Technique is actually entering the state of coherence. Psychophysiological coherence is measured through the analysis of heart rate variability (HRV), a measure of the naturally occurring beat-to-beat changes in heart pattern (McCraty & Atkinson, 2003).

Other studies reveal that the state of coherence is invariably connected to positive emotional states like appreciation, care, love and compassion (Childre, et al., 2000; McCraty, 1999; McCraty, et al., 2000). Rein, Atkinson, and McCraty (1995), for example, found evidence that there is a major difference between the HRV analysis of frustration and that of appreciation.

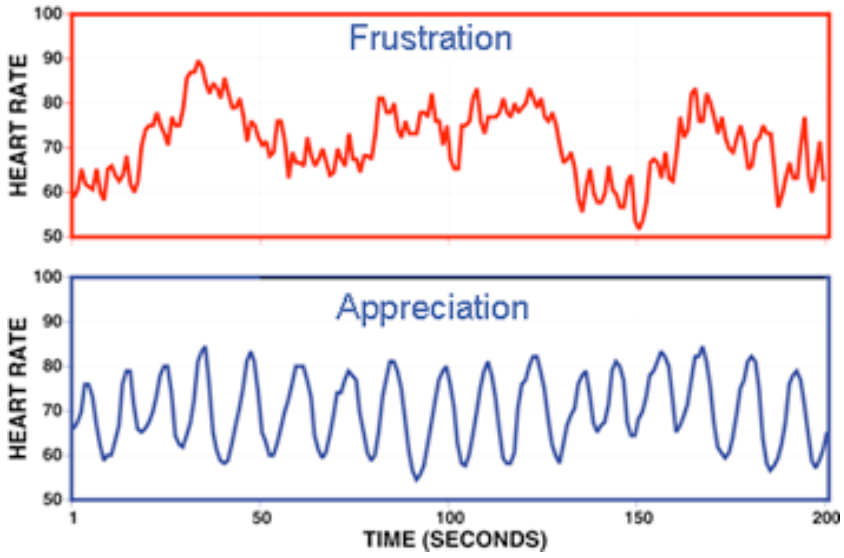

Figure 3. Differences between heart rate variability patterns in the states of frustration and appreciation. (McCraty & Tomasino, 2004, p. 1)

The physiological effects of various mood states, illustrates the drastic change in heart rhythm patterns that result from these two emotions. It has been observed that making an intentional shift from a self-induced state of frustration to genuine feelings of care and appreciation can dramatically improve system-wide functioning in the human body (Childre & Rozman, 2003).

Unsurprisingly, increasing numbers of people, groups and organizations are putting the tools and techniques developed by the Institute of HeartMath to work in their lives. By activating sustained positive emotions, and the coherent state in particular, people from a wide range of backgrounds are experiencing benefits. There are five main areas of research currently being explored by the Institute of HeartMath: 1) Physiology of emotions and heart brain interactions, 2) clinical and health research, 3) educational research, 4) organizational research, and 5) intuition and energetics research.

Among healthcare practitioners, heart coherence is being taught to hospital patients struggling with issues such as high blood pressure and panic disorders (Childre & Rozman, 2007). Veterans and soldiers preparing for or returning from combat are finding advantages to accessing their heart intelligence when faced with high stress levels and post-traumatic stress disorder (Childre & Rozman, 2007). Corporations like Motorola are discovering that their employees work more efficiently together and are more productive following training aimed at increasing heart coherence (Childre, et al., 2000). Sport performance as well as musical performance are increased in those individuals who take the time to access their hearts for guidance (Holden, 2006).

Other than one study using HeartMath tools and techniques that focused on the role of spirituality and recreational therapy in helping women survivors of breast cancer (Battaglini & Peppercorn, 2007), there have been no thorough qualitative investigations conducted on the link between spirituality and heart coherence. Bordering on the spiritual, a series of interesting studies conducted on the impact of developing heart intelligence on intuition and human energetics has recently emerged (Tomasino, 2007). As well, evidence of the electrophysiology of touch and even of electromagnetic transference has been established by McCraty, Atkinson, and Bradley (2004).

Equally pertinent to this study is the research that has been conducted on students and teachers in public school systems who have begun practicing heart coherence. In the words of Arguelles, McCraty, and Rees (2003),

> …by learning to increase physiological coherence, students can increase nervous system harmony and thereby improve emotional stability, cognitive functioning, and academic performance. Physiological coherence can be noninvasively measured and facilitated in school settings using heart-based, positive emotion-focused tools in combination with heart rhythm feedback technologies. Such approaches have been associated with improvements in test scores, classroom behaviors, and social-emotional outcomes... Collectively, results suggest that the integration of heart-based tools and technologies in educational curricula may be an efficient and effective means to facilitate the academic and emotional development of both students and teachers. (p. 20)

I now turn to a discussion of the HeartMath technologies, tools and techniques that have been mentioned in this literature review, as well the possible connection between the heart and spirit.

The Heart and Spirit Through Technology

Our lives are being completely transformed by the rapid evolution of ever newer and faster technologies. Although the range of purposes these new technologies serve is vast, they all share a common thread: they allow us to extend our five senses in ways never before imagined. Telescopes, telephones, trains, and TVs, ipads, voice recognition software (which I'm using right now) all shape us and help us shape the world in remarkable ways. There are even signs that, as we saw earlier with the concept of artificial intelligence, machines may eventually take on a mind of their own. But what about the sixth sense: the transpersonal or spiritual or emotional sense? Have technologies been developed that help us peer into the deepest parts of ourselves? I would argue that the answer is yes and that brain wave technology, biofeedback, music research conducted on sound healing, lightwave technologies, and interactive biofeedback gaming software, are all examples.

According to Zaleski (1997), certain technologies absolutely allow us to reach deeply into ourselves and carry the potential to drastically affect our spiritual lives. Zaleski (1997) cites examples of the Internet being the source of growing spiritual communities as well as a place where some of the long-held secrets of the world wisdom traditions become available at the click of a button. Bauwens (1996) holds a more conservative position and suggests the digital revolution is both a degenerate practice

and/or the means of bringing humankind to a more evolved form of civilization or a higher level of consciousness.

Among very recent developments in the world of the Techne are pocket-sized, portable biofeedback devices and their brethren biofeedback software for PCs and Macs. Initially developed to investigate altered states of consciousness as well as the operant conditioning of the human autonomic nervous system (Roberts, 1985), biofeedback has moved to the heart. The most widely known of the biofeedback technologies targeting the heart specifically have been developed by the Institute of HeartMath.

Very briefly, the emWave and the emWave PC are devices that assist people achieve direct feedback on their heart rhythm patterns. The devices, along with heart focusing techniques, help people control their HRV and enter the state known as physiological coherence. Once a person has placed the ear or finger sensor on himself/herself and followed the basic three steps common to all the HeartMath techniques (heart focus, heart breathing and heart feeling), he/she will then receive visual and/or auditory signals that indicate whether they are in low, medium, or high coherence.

The widespread use of technology in schools may be a perfect entry point into the school curricula for those interested in more holistic or integral forms of education. Using biofeedback with students and teachers to help them achieve greater states of emotional balance and psychophysiological coherence, is not as threatening to those educators who fear reintroducing “things spiritual” into classrooms.

One of the largest investigations into the development of heart intelligence in American classrooms is the TestEdge National Demonstration Study (TENDS). TENDS was a large-scale exploration into the training and development of psychophysiological

coherence building tools meant to be used to reduce test anxiety in junior high and high school students. Major findings include: reduction in feelings of loneliness and isolation; improved capacity to handle stress; more empathy and care towards friends and classmates; less anxiety before taking tests; higher scores on mathematics and language arts exams; increased enjoyment of class; reduced levels of fear and impulsivity; increased engagement, persistence and humor (Bradley, et al., 2007). The TENDS study also indicated that support from the principal and key school administrators was vital in the successful implementation of the initiatives. According to Daugherty (2006) who did a follow-up investigation of TENDS,

> …[there were] considerable problems with curriculum implementation and teacher support. However, even with limited implementation, significant improvements were found in perceived test anxiety and negative affect in the intervention school. (p.5)

In a recent newsletter distributed by the Institute of HeartMath (2011), a schoolteacher had this to say about the implementation of heart coherence training in the classroom:

> Today all fourth-graders in the great state of Florida sat down to take Florida Writes, our annual writing exam. About halfway through the 45 minutes' time, I saw one of my rambunctious little boys put down his pencil, close his eyes, put his hand on his heart and take his breaths. As I watched him, I could see the tension lift and his shoulders relax. When he was finished, about a minute or two later, he picked up his pencil and got back to work. I WISH I'd had tape rolling. Additionally, my kids are always reporting that they're seeing other kids Freeze-Framing before or during tests in other classes. It makes me proud! (p. 1)

Quantitatively impressive and unquestionably practical, the various studies conducted on and by the Institute of HeartMath provide evidence for the important role our hearts play in living balanced lives. What has been unsatisfactorily explored in the literature, however, is what spiritual implications there are to developing one's heart intelligence. In a recent interview of Rollin McCraty, the Director of Research at the Institute of HeartMath, led by Dean Radin, Senior Scientist at the Institute Of Noetic Sciences, McCraty, was probed about the lack of publications centering on spirituality. He explained that the Institute of HeartMath has purposely avoided doing too much research on intuition and spirituality because it does not want to be perceived as being under the new age or spiritual umbrella. Rather, the Institute is heavily invested in conducting research that is guided by an objectivist epistemology. This desire is understandable and is perhaps one of the reasons why the tools are finding a home in school systems across North America. The proposed research study, however, IS interested in precisely this spiritual aspect of developing heart intelligence.

Spirituality and Education

A glance into the world of popular culture reveals that there is a lot of interest in spirituality. From Eckhart Tolle's appearances on the Oprah Winfrey show, to the countless articles in magazines and newspapers on the benefits of meditation, the proliferation of yoga studios, to the millions of bestseller books being sold from the self-help and spirituality sections, there certainly seems to be interest in spirituality. Some refer to this phenomenon as America's "Great Awakening" (Taylor, 2000); others call it the evolution of spiritual life (Wuthnow, 1998); and there are those that suggest North America is becoming "less religious" and "more spiritual" (Marler & Hadaway, 2002).

While the New Age movement is a multibillion dollar industry, a recent news article in the Globe and Mail titled "As churches crumble, communities fear loss of heritage," notes that,

> …the crumbling state of the churches is a physical embodiment of the state of religious observance – and the phenomenon is hardly limited to Quebec. From British Columbia to Newfoundland, places of worship of all mainstream denominations are falling victim to dwindling attendance, rising land values and maintenance costs too onerous for congregations to bear" (http://m.theglobeandmail.com/news/national/as-churches-crumble-communities-fear-loss-of-heritage/article1836185/?service=mobile).

Immediately, questions arise: Why is church attendance plummeting when there is such a boom in the New Age marketplace? What is meant by the term spirituality? How does spirituality differ from religion? Marler and Hadaway (2002) explain that before any attempts are made to understand what spirituality is, we are wise to understand what it is not. Spirituality is not religion because the latter is characterized by a specific set of beliefs and structures whereas the former is typically understood to be an inner exploration of the depths of one's being (Bohac Clarke, 2002). Smith (1991), in his exploration of the great religions and wisdom traditions of the world, found that spirituality tends to be an individual and inner phenomenon whereas religion is often the material and cultural manifestation of this inward quest. Palmer (2003) suggested a straightforward definition, "spirituality is the eternal human yearning to be connected with something larger than our own egos" (p. 377).

Wilber (2006) also underscored the importance of properly defining the term spirituality before any meaningful discussions can occur. According to Wilber, there are at least three important ways of understanding what spirituality is and means. First, is as an experience of transcendence or unity, or in Maslow's terms, a "peak experience." These state experiences can occur spontaneously or through specific spiritual practices. Second, as characterized by transpersonal psychology, spirituality points to the highest stages of human development. Jesus and Buddha are examples of people who have moved well beyond the ego stages of development into the transpersonal realms, or into enlightenment. Third, spirituality, like cognitive intelligence or emotional intelligence or kinesthetic intelligence, can be considered an independent developmental stream or potential within each human being. Wilber's (2006) distinctions will be explored further in the dissertation.

How does all this apply to education? Or to the heart? According to Palmer (1993), there is growing interest within the field of education on the role of spirituality for students and teachers alike. In his article entitled "Against Spiritual Education," Blake (1996) argued in favour of a secular school system stating that,

> Spirituality (including bodily spirituality) is a kind of experience which it is contradictory to incorporate in education, because it puts in question the fundamentals which underpin education. Spirituality, if it is anything, is an escape from, or at least a distancing from the very world of experience that education addresses or serves. (p. 454)

Blake's (1996) position reflects the early separation of religion and education in the public school system. Although this may have been a healthy division at the time Church

and State split apart (Wilber, 1995), increasing numbers of scholars in the field of education are suggesting that nondenominational forms of spirituality *should* be reintroduced into classrooms across North America (Lewis, 2000; Palmer, 2003a; Vokey, 2003).

Vokey (2003), an optimist who endorses various attempts to reintroduce spirituality within public school curriculums, believes that current efforts are unlikely to meet with success. While he cites various reasons for this belief, one of his central points is that there is still no general social agreement on the purposes of public schooling, due to competing economic and political agendas (Vokey, 2003). Those professionals, says Vokey (2003), who seek to incorporate more holistic education within the school system, "take spirituality to be universal where religion is particular, and so believe that implementing proposals to reintroduce it into public education would not compromise liberal principles protecting individual autonomy and cultural diversity" (p. 170). Reinforcing the trepidation Yob (1995) wonders whether spirituality can easily fit into a one-hour class three times a week and suggests instead that spirituality is a way of life and an all-consuming affair.

Although the debate about the inclusion of spirituality in public education continues, there are numerous examples that a shift in this direction is occurring. Lewis (2000) emphasizes that the central processes for spiritual practice are well known and can be easily incorporated into educational curriculums. Examples of spiritual practices being used in classroom settings include: stilling and meditative techniques (Seaman, 2001); guided and scripted journeying or fantasy (Hall, Hall, & Leech, 1990); inner exploration through story and storytelling (Murdock, 1987); and experiential exercises using the body

senses (Hammond, et al., 1990). Various approaches to environmental education also have a distinctly spiritual flavour (Van Matre, 1990).

Arguably, one of the most successful initiatives is the introduction of the Institute of HeartMath's tools and techniques within a number of North American schools. The analogy that follows captures the essence of those educators interested in holistic forms of learning and teaching. Crompton, as cited in Lewis (2000), reminds us of the ancient Hindu view that human beings have been metaphorically seen as a house with four rooms, representing our physical, emotional, mental and spiritual aspects. We are reminded that these four rooms must be visited, aired and cleaned regularly; otherwise, the dampness and mildew caused by ignorance will cause one of the rooms to go stale. Furthermore, if we neglect one room, then the damp, foul air will gradually spread into the other rooms making the entire house less wholesome. Although this analogy is an interesting one, there is stagnation in the idea of a house: it is built, planted and not moving. What is lacking from this image is the sense of movement, growth and evolution that characterizes human life. We are shifting, changing and the house is morphing, ballooning in certain areas, shrinking in others - the rooms are very much in flux. Therefore, in an effort to gain a greater sense of how our individual houses and the collective "house" of our universe are in constant process, we turn to evolutionary spirituality.

Part Two

For a New Beginning

In out-of-the-way places of the heart,

Where your thoughts never think to wander,

This beginning has been quietly forming,

Waiting until you were ready to emerge.

For a long time it has watched your desire,

Feeling the emptiness growing inside you,

Noticing how you willed yourself on,

Still unable to leave what you had outgrown.

It watched you play with the seduction of safety,

And the gray promises that sameness whispered,

Heard the waves of turmoil rise and relent,

Wondered would you always live like this.

Then the delight, when your courage kindled,

And out you stepped onto new ground,

Your eyes young again with energy and dream,

A path of plenitude opening before you.

Though your destination is not yet clear

You can trust the promise of this opening;

Unfurl yourself into the grace of beginning

That is at one with your life‘s desire.

Awaken your spirit to adventure;

Hold nothing back, learn to find ease in risk;

Soon you will be home in a new rhythm,

For your soul senses the world that awaits you. (O'Donohue, 2008, p. 34)

If I could re-title O'Donohue's poem, I would call it "Evolutionary Spirituality" because it captures the deeply mystical qualities of the evolving reality of the Cosmos being revealed to us by modern science. The intention of this section is to situate my very specific study on heart intelligence and the use of biofeedback in classrooms into a much larger context and movement. By including this cursory view of the development and current state of evolutionary spirituality, I hope to lend credence to my research topic and its integral methodology.

Before launching into a description of evolutionary spirituality, I ask the reader to recall what my assumptions are as stated in the first chapter of this work. I have been influenced by many scholars and evolutionary thinkers who do not see evolution as a purely random process. Certainly, a certain randomness is involved (Swimme, 1996), but when we take the broadest possible view, it is difficult for me, along with many others, to say that a particle of light, given some time, just happens to turn into a hummingbird, or dolphin, or loving human mother. This does not necessarily imply that a traditional God has created everything and is somehow manipulating the cosmos as He /She sees fit. Rather there may be an underlying, mysterious force, an eros or evolutionary impulse, at the heart of the cosmos. But I am getting ahead of myself. Echoing my deeply felt intuitions, Bruteau (1974), summarizing Teilhard de Chardin's perspective on evolution, writes,

> When looking at the universe, Teilhard de Chardin sees that everything is born from the past, from some predecessor, and that it grows by morphing through successive phases. In this process of Genesis, life adds to itself, like a memory, some wholeness that is growing through a sequence of living beings…[it] is directed change, is organized becoming. Thus, the universe is all one great organized process and Teilhard calls it Cosmogenesis. (p. 18)

Teilhard de Chardin was one of the originators of what could be called Evolutionary Christianity that is part of a larger movement to integrate evolution and spirit, the worldview being called "Evolutionary Spirituality." In the spirit of intellectual honesty, I forewarn the reader that I have a particular propensity toward the spiritual. It is not a part of my life… It IS my life... and it is evolving.

What is Evolutionary Spirituality?

The idea of evolution itself has been stirring in the mind of humans since at least the time of the ancient Greeks. According to Durant (1953), Aristotle's many investigations into the world of biology led him to have intimations that certain lifeforms can and do develop along predictable lines. However he never did come to the theory of evolution as it is properly known today. Nevertheless, "His metaphysics grew out of his biology. Everything in the world is moved by an inner urge to become something greater than it is" (Durant, 1953, p. 69). Here we have some of the earliest intuitions of an evolutionary spirituality: the interpenetration of science and the divine in a fluid, sometimes chaotic, but steady directional movement. Aristotle's thinking may be seen as one of the earliest signs of an evolutionary understanding beginning to emerge, but there are many thinkers over the last several centuries that have taken these intuitions and

given them a much clearer voice. Thus, before describing evolutionary spirituality as it is understood today, we will sketch a painfully brief timeline of some of the pioneering thinkers who have contributed to its development since the 1600s. According to Huston (2007), McIntosh (2007) and Hamilton (2010), the following individuals were prominent figures in the evolutionary spirituality movement.

Jakob Böhme (1575–1624) was a German shoemaker and mystic who believed that God is seeking to create a world of increasing wholeness and perfection. He was arguably the first to give a description of the modern concept of evolutionary spirituality (Huston, 2007).

German mathematician and philosopher G.W. Leibniz (1646–1716) produced important but rudimentary conceptions of the biological evolution of species. His scientific and theological explorations led him to believe that the process of evolution is ordained by God (Huston, 2007). Immanuel Kant (1724–1804) continued to explore the notion that the physical laws of the universe were created by God, and that He continues to mold the material world into a natural evolution that is ever more perfect in its constitution (Huston, 2007). The French philosopher J.B. Robinet (1735–1820) wrote about the "force" or spiritual energy that is the driver of evolution. He was a proponent of the great chain of being and conceptualized it as a development through time completely infused with holiness and divinity (Huston, 2007).

Meanwhile, in Germany, a series of philosophers continued to further the notion of evolutionary spirituality. Goethe (1749–1832), inspired in part by Darwin, wrote a book entitled "*The Metamorphosis of Plants*" wherein he described evolution as a spiritual process. According to Huston (2007), I.G. Fichte (1762–1814) similarly

"proposed that both subjective mind and objective nature are the evolving ephemeral expressions of a transcendent consciousness" (p. 10). Furthermore, Huston writes that according to Bradshaw (1996), Fichte sensed an "irrepressible belief in the individual's 'striving' toward the ultimate human goal of an absolute moral freedom" (p. 1). F.W. Schelling (1775–1854) a student of Fichte, blended the mysticism of Böhme and the logic of Leibniz into a view of cosmic evolution that saw God fully pervading all levels of being (Huston, 2007). Schelling proposed an evolutionary idealism which held that consciousness, not matter, was the ultimate basis of reality. Schelling, as cited in Huston (2007) wrote:

> It is the universal spirit of nature that gradually structures raw matter. From bits of moss, in which hardly any trace of organization is visible, to the most noble form, which seems to have broken the chains of matter, one and the same drive governs. This drive operates according to one and the same ideal of purposiveness and presses forward into infinity to express one and the same archetype, namely, the pure form of our consciousness. (p. 13)

G.W.F. Hegel (1770–1831) also maintained that life is going somewhere, that it is purposeful, it has directionality. Further, he suggested Spirit as the guiding power behind humanity's cultural development (Huston, 2007). Houlgate (1998) explains that although Hegel disagreed with Darwinian evolution and was even hostile to the notion of naturalistic evolution, he was deeply occupied by the way in which consciousness develops over time. According to Mcintosh (2007) the Hegelian dialectic of thesis, antithesis and synthesis IS an accurate description of the evolution of spirit.

Mcintosh (2007) further explains that the German naturalist Lorenz Oken, (1779–1851) who was a student of Shelling's, put forth the idea that a mystical impulse lies behind the evolutionary transformation of all living beings. Fascinated by notions of unity, interdependence and equilibrium, he believed that higher animals were not created, but had evolved from lower animals.

Fast-forward through the spiritually infused views of evolution developed by such renowned thinkers as Schopenhauer, Emerson, Wallace, Blavatsky, Bucke, James, Bergson, Steiner, Whitehead, Vivekananda, Aurobindo, the Mother, Bailey, Teilhard de Chardin, Huxley, Radhakrishnan, Heard, Rudhyar, Gebser, and Young and we quickly see that the lineage of evolutionary spirituality is long and includes robust ideas that may not be identical in their orientation but which all suggest unequivocally that spirit and matter are united and evolving. It is impossible for me to do justice to the many geniuses that have given birth to evolutionary spirituality be they scientist, philosopher, mystic or spiritual teacher.

As is made clear by the previous descriptors, the spectrum of meaning of evolutionary spirituality is varied and multidimensional. Synthesizing and harmonizing the various views on evolutionary spirituality, Hamilton (2010) suggests that there are three general streams in the movement. First, there is the great story perspective. This is a description of the 13.7 billion year evolutionary trajectory of which we are a part. Second, is the idea of conscious evolution; having awoken to a deep time perspective, there are a growing number of thinkers who are encouraging humans to consider that evolution has not stopped with us, but that it continues through us and, because we are conscious, we can choose to evolve consciously. Third, is a body of work that suggests

that cosmic and biological evolution, seen to be happening in our observable, material universe, also has a parallel evolution of the inner universe otherwise known as the evolution of consciousness. This last perspective will provide the ideal point for us to examine the integral model of reality that closes this chapter and guides us gracefully, if not haltingly, into the next.

The Great Story

The great story perspective is humbling and majestic; seeing the universe through deep time eyes can be a truly spiritual experience (Dowd, 2008). This breathtakingly large evolutionary journey helps us understand what it is to be a human being within a scientific, evolutionary worldview. In a very real sense, modern humans are giving birth to a new creation story, a new mythic understanding (Swimme, 1996). The epic of evolution is a metanarrative through which we can understand who we are, our place in the cosmos, where we are going, and what our purpose might be (Dowd, 2008). It allows us to make meaning. And, importantly, it is the first story that includes EVERYBODY; all of us, none are left out, (Primack & Abrams, 2006).

According to Swimme (1996) great mythic stories have always been a part of humanity, but since the scientific rise and the destruction of all pre-modern myths, rationality has left us bereft of a collective story of which we are ALL a part. For us moderns there has not been a shared sense of what life is about, therefore we experience an existential crisis in which we feel deeply alone, isolated and sad, even those on a spiritual path. The narcissism epidemic spreading through our society has effortlessly made its way into modern or “New Age” spirituality and we often feel a sense of purposelessness with the added shame or guilt that no human beings have ever had so

much wealth and/or opportunity (Twenge & Cambell, 2010). Modern human beings in the West have an unprecedented degree of personal and spiritual freedom, but we have no great overarching theme to connect us all in our spiritual or worldly endeavours. We are bereft of a pattern that connects us all (Swimme & Berry, 1994).

The epic of evolution repairs this, suggests Hamilton (2010). We now have the opportunity to stand in awe of this beautiful, glorious, evolutionary unfolding that has given birth to the human. We are able to look back on the whole with a great, deep and profound sense of mystery (Liebes, Satouris, Swimme & Brynes, 1998). For example, it has been discovered that human bodies and minds are literally born from Stardust in that the elements of our body were formed in the bellies of stars (Dowd, 2008). We are made of star stuff! Rejoice! shouts Dowd (2008) among other evolutionary Christians. Similarly, Swimme (1996) states unequivocally that, "we are living in a miracle" (p.46). For the first time in the history of the universe, the human (who is an expression of the universe) can actually be conscious, and grateful for the intelligence and self-reflective capacity that allows him/her to intuit the sacred context out of which everything emerges. Awakening to a new myth, a new sacred story founded in empirical observations and grounded in scientific rigor, is a foundational piece in the emergence of evolutionary spirituality.

According to Elgin (2009) we are living in a living universe; everything is moving in a fluctuating and morphing manner from the tiniest particles to the great spiral galaxies. The whole cosmos is shot through with life. According to Berry (1988), the evolutionary journey has been one of increasing complexity and consciousness. It has also been the evolution of ever greater levels of caring and love (Dowd, 2008). Of great

significance to the present research study, is the evolution of the heart or, perhaps more daringly and powerfully, the heart of evolution itself. Thanks to the work of countless scientists and researchers, we now have clear evidence that the great story of evolution does indeed have a heart. Swimme (1996) describes this evolution beautifully using different species to make his point:

The heart as a vital organ has developed over time in complexity from fish to amphibians to reptiles to mammals. Certain fish such as the Sand Goby and also a few bird species will eat their young. There is no evidence of care in these species in any sense humans can understand. As we move through evolutionary time, we arrive at lizards, where we move further into the question of caring. Most species of lizards actually bring forth their young as little eggs and protect them until they hatch. They will look after them for a little while and ensure that they are safe, but if they get distracted (e.g. opportunity for food presents itself suddenly), some types of lizard might turn away from their offspring and upon noticing their young in the next moment, eat them. So there is evidence of a rudimentary type of concern of parent toward offspring, however it is clearly not deep-rooted.

Three hundred million years later mammals enter the scene and extend concern so that they can remain bonded, a parent with their offspring, for their entire lives. In fact, it has been discovered that certain mammals can be separated from their offspring for many years and that they, upon being reunited, recognize each other and reconnect all over again. Goodall (2010), in a recent presentation at the University of Calgary, explained that the mammalian mind and heart have been deepening over millennia. She cites a personal example of chimpanzees who have compared their own fingernails with hers

and who then look up into her eyes with a sort of epiphany that suggests, “I am related to this person.”

With the evolution of modern humans, we see the extent of care move outward beyond the family and into the larger group, the tribe, the chiefdom, the village, the city, the state, the nation, the planet, and now the universe. Our deepest values and capacities, like caring, love and compassion, have come out of 500 million years of vertebrate evolution. We now have the potential to extend that compassion far beyond what our ancestors were capable of. Human beings living today are able to care about the Andromeda Galaxy and the baboons and the lizards and the ugly fish that eat their young! Our hearts have expanded and evolved over time – physically, but also emotionally. Because it is such an important point, it is worth repeating: humans have the capability to care about the entire earth and even the universe. Our hearts have become universal hearts.

With an evolutionary understanding of life, it becomes inescapably clear that we are not separate from the earth or from anything (de Rosnay, 2000). We are inextricably linked to everything else and therefore the existential loneliness proves to be a mental illusion when the epic of evolution awakens in the modern human. You and I are literally an ongoing development of the earth and we have been in formation for 13.7 billion years. It required all of this time for us to care as deeply as we do. Five hundred million years of an expanding heart. It has been expanding physically and it has been expanding emotionally.

Taking off my objective, analytical or scholarly persona for a moment I would like to personally express how fundamentally life altering the epic of evolution is when it

begins to stir in my breast and quickly floods my being. As I read and watch the new wave of evolutionary thinkers that have influenced my views, I am, in a very real way, watching the universe reflecting upon itself in the mode of conscious self-awareness. The new understanding of who we are, the acknowledgment of the large-scale structure of the universe in our minds and hearts, is itself an evolutionary event. Never before in human history has there been a generation that has reflected upon the large-scale structure of the universe with the level of understanding that is available today. It was only 50 years ago that we learned of the expanding universe. Hawking (1996) who examined the expansion, found that it is precisely what it had to be for the universe to become this complex, and if the expansion had been slower or faster by a trillionth of a trillion of a percent the universe would have failed, it would have never come into being. What does that mean?

According to Houston (1997), the expansion of the universe is sacred; it represents some kind of amazing wisdom has been operating from the beginning, within and throughout EVERYTHING. The wisdom traditions and mystical insights of the past are being given scientific validity. We are light, say the mystics. According to Swimme (1996), every photon in the universe is exactly that: light. We are made from photons. We are therefore suffused with light and our light pours forth from within. It shines from the stars, it shines from the human heart, it shines from the turbulent processes of earth and invites us into participation with the miraculous creativity that is the cosmos. A deeper feeling for the incarnational presence of the divine throughout the universe is what is achieved through a heartfelt appreciation of the great story of our time. This grand narrative invites us all into a full and glorious participation with and as the Universe.

Conscious Evolution

Now that humans have begun to piece together the Great Story and are becoming more familiar with their Big History, is it possible for them to consciously direct future evolution? Built on the foundation of the new story, the idea of conscious evolution is gaining traction and is a highly participatory call to action within the evolutionary spirituality movement. Recognizing that we can observe the trajectory of evolution toward greater complexity/greater union and observing the trends of biology through the development of elementary particles, to atoms, to cells, to complex cells, to multicellular organisms, and all the way up the chain of life until we get to the emergence of human societies and now a global interconnected network, we can discern what Stewart (2005) calls "Evolution's Arrow" or its directionality. (See figure below)

In the writings of Hubbard (1998), conscious evolution means that our newfound understanding of the direction of evolution affords us the opportunity to consciously participate in trying to evolve ourselves, our society, our culture and the world at large into greater alignment with the heart of evolution. What is the heart of evolution? Where are we going? Are we not being narcissistic in claiming that we can shape the future of evolution? Hubbard (1998) and others suggests that most of us know intuitively where we would like to move to as individuals and as a society: toward ever higher levels of goodness, truth and beauty (McIntosh, 2007); toward greater symbiotic relationships between ecosphere, noossphere and the techno-sphere (de Rosnay, 2000); toward increasing complexity and consciousness (Stewart, 2000); toward a more glorious Dawn of human space travel (Sagan & Steele, 1996).

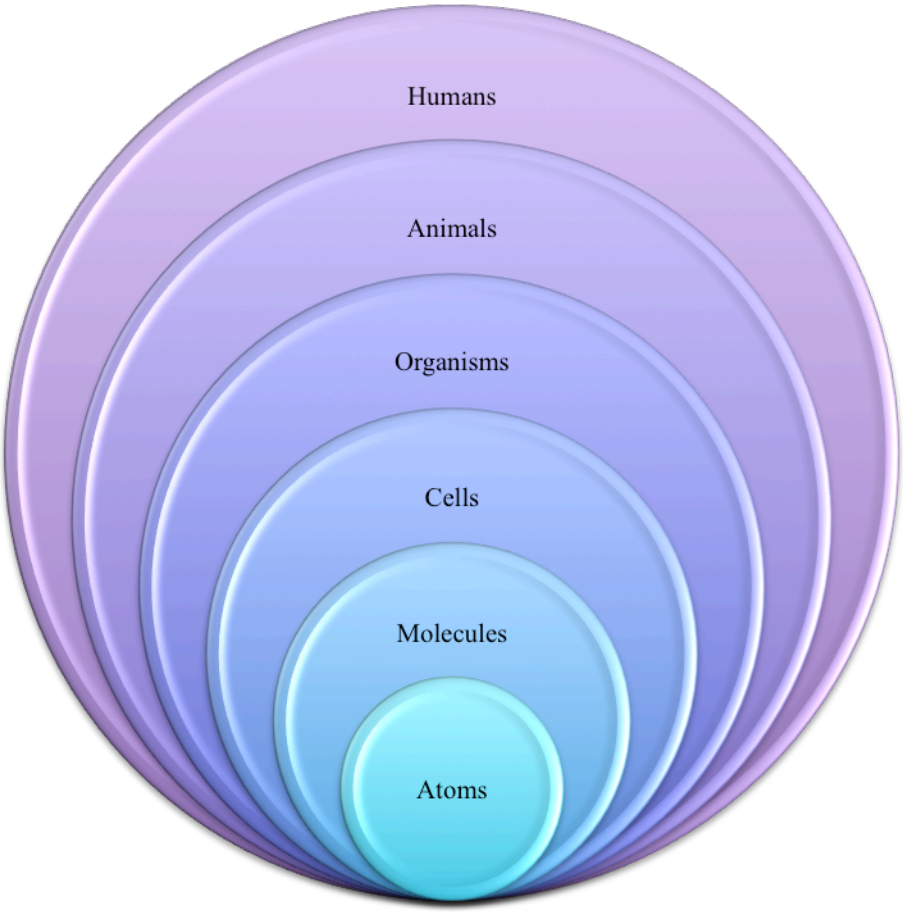

Figure 4. The evolution of complexity and consciousness.

Conscious evolution places a heavy emphasis on the significance of choice. While acknowledging the evolutionary predispositions and preferences that all human beings are wired with (e.g. preferences for sugars, salts and fats), conscious evolutionaries make the case that evolution, with the advent of the human, is no longer guided primarily by mutation. Rather, through self-reflective consciousness and our ability to choose, we now enjoy the very real possibility for conscious, intentional, participatory engagement in evolution. From this perspective, we are awakening to our ability to evolve.

Support for this view is found in nature's Cycles of Unity. Sahtouris (2000) suggests that evolution favours higher levels of unison in a predictable sequence moving from (a) greater individuation through which arises conflict, (b) from the place of chaos

or conflict negotiations where readjustments occur, and as a result (c) cooperation or harmonious relationships are created which can themselves be considered units or individuated wholes. Through this progression, the process is repeated at the next higher level of organization. According to de Rosnay (2000), cycles of unity are fractal in nature in that they can be observed moving all the way up the evolutionary ladder to the level of global economic systems, and all the way down to the level of quanta. The movement has parallels with the Hegelian dialectic described above that moves from thesis, to antithesis, to synthesis. The main point is that by understanding our past, we have a better chance of creating a better tomorrow. Unfortunately, this is not a new insight. What is new, however, is the scale and size of the past we are dealing with.

In a strange way, expresses Elgin (2009), human beings are the first to have actually set themselves apart from the wholeness of creation. We have developed egos and have objectified nature, animals, people and things, and Sahtouris (2000) believes this to be the beginning of a new evolutionary leap toward a planetary civilization. We have split ourselves off from the rest of nature (or perhaps more appropriately evolution has produced yet another form of individuation as the human person) in order to become individually conscious, and we have the ability to forget our fundamental interconnectedness; we are able to hold the pretence that we can look at the universe from a distance – an impossibility since we are very much inside the universe. But what systems science and complexity dynamics are forcing us to see is the reality of interconnectedness and interpenetration; that we are not separate from the whole. We are one. Again, we are confronted with obvious similarities between scientific realities and ancient spiritual notions of oneness. The point that conscious (r)evolutionaries are

making is that through our recognition of the patterns and trends of the very evolution that has produced our ability to reflect on evolution, we are now able to use the evolutionary arrow to guide our next steps. According to the cycles of unity, our next steps include a movement out of the chaos and conflict rampant in our world today toward deeper levels of unity and cooperation (Houston, 1997).

The Evolution of Consciousness

Evolutionary spirituality also encompasses a third aspect, namely the evolution of consciousness itself. Perhaps the most revolutionary evolutionary idea in the spiritual world is that human beings, through deeply committed and intense spiritual and transformative practices, had and still have the potential to consciously evolve the interior of the cosmos. In other words, there is a new focus on the interior universe. Most of our story of evolution concentrates on the external, material evolution of the cosmos. Out here, in the "real" world is where we have fixed our gaze. However, the evolution of consciousness suggests that we can and do give birth to new structures and patterns of consciousness that are in direct parallel with the evolution occurring in the external world (Cohen, 2000; 2002). In Wilber's (2006) words, "for every exterior, there is an interior" (p. 32).

Take culture for instance. Certainly, there are outward manifestations that help us to understand cultures of the past, and archaeology as a discipline is primarily concerned with uncovering what objects and things were used in different parts of the world and in different eras. Do the external, material objects of a cultural group or society reflect in any way the interior consciousness that created these things - be they works of art, buildings, tools etc.? McIntosh (2007) answers in the affirmative and states that the

invisible culture of values, worldviews, meanings and the inner universe we share is evolving, just as the outer structures have been evolving over time. Evidence for this view comes out of the work of values theorists such as Clare Graves and Don Beck as well as through developmental psychologists such as Lawrence Kohlberg and Robert Keegan who have studied the inner development of individuals and groups (to be discussed in the last section of this chapter).

Hamilton (2010) proposes that if in fact there is such a thing as the evolution of consciousness, our traditional understanding of spirituality or the transcendent needs to be reassessed. No longer can we, as spiritual seekers, seek to simply become liberated into a static place of perfection (e.g. Nirvana, Heaven, Inner Freedom) and escape the suffering of this world, suggests Hamilton (2010). Rather we are called to participate in the evolution of consciousness, the evolution of Spirit, and ultimately what it means to be a human being. Thinking in this way inspires questions: Is the human condition fixed? Are human beings as we see them today the end of the story? Are we the pinnacle, or is there more? And, can we participate in what might be coming?

Neuroscientists agree that the physical structure of our brains has not evolved much over the past several thousand years, but they suggest that there has been a change in the way neurons wire together (Hanson, 2009; Kabat-Zinn, 1990). In a sense, the hardware of our brains is not evolving very quickly, but the software of our minds is changing rapidly. Recent studies investigating the effects of meditation have found that people who meditate regularly report being able to gain some distance from habitual, instinct driven responses (Hanson, 2009). Is this the evolution of consciousness? Over and above instincts, how do we relate to challenge or chaos or death? How do we relate

to the unknown? How do we relate to each other? How do we relate to God? It is suggested that these relationships can be evolved and that in giving birth to the new, present-day humans are co-creating the future human being (Hamilton, 2010).

Evolutionary spirituality that focuses on the evolution of consciousness asserts that we can wake up to the evolutionary impulse itself and that we can embody this evolutionary imperative. The divine, creative principle, the urge to evolve that has been evolving for 13.7 billion years is now something we can directly experience from the inside out, suggests Cohen (2000). The evolutionary impulse is described as the surging, evolutionary thrust at the heart of all the universe of creation. Cohen (2002) cites a hierarchy of examples in the human of the evolutionary impulse in action. First, and most basic, is the sexual urge: the intense desire we have for sex is an expression of the evolutionary impulse to procreate. Second, the creative urge can be recognized as the intense passion for creating a work of art or developing a new scientific theory or entertaining a stimulating conversation with a friend. This drive for creativity is the evolutionary impulse surging through the human. Lastly, and most importantly, is the urge to evolve consciousness, the urge toward spiritual practice and realization. Cohen (2000) described the evolutionary impulse this way:

> There is more to enlightenment than the liberating discovery of the inherent perfection of the Absolute or non-dual nature of all things. And that is the emergence of a powerful imperative to evolve. When something came from nothing, and the explosion in motion that is all of life came into being, a perpetual state of becoming was born. In the spiritual revelation, that movement is experienced as an impersonal command from the Self to transcend, to evolve, to

> utterly transform this world so that it can become a dynamic, living expression of the perfection that it already is. This spiritually inspired passion, which arises from the Self, unleashes the fire of absolute love and ego defying compassion into this world. It is always a force to be reckoned with. Its unceasing demand is evolution and its tangible expression is to create order out of disorder. Indeed, the boundless creativity of this evolutionary impulse in action strives to manifest higher and higher expressions of miraculous wholeness and integration. The command to transcend and evolve that is experienced in the spiritual revelation is the unrelenting scream of the Absolute calling on all who have the ears to hear and the eyes to see to surrender wholeheartedly for the sake of that evolutionary imperative. (p. 96)

Coming into alignment with this energy and feeling it start to stir in the breast can give a human being tremendous meaning in life (Beckwith, 2008; Robbins, 1991). However, not everyone agrees. There is a certain reticence in people today, especially those in the modern or postmodern spiritual movement, to be beholden to any higher power, whether it is called God, the evolutionary impulse or Nintendo. In our hyper individualized, ultra-free society that holds personal freedom to be the ultimate goal of life, we shun the idea of giving up our personal preferences or tastes. To read Andrew Cohen's words written above is to hear the call of the divine and this call is not always comfortable. "Who me, Surrender?"

Scientists studying evolution do not necessarily agree with this position either. Shying away from mystical interpretations, a large number of brilliant, dedicated researchers would find the present discussion sorely biased and lacking empirical

evidence. Where is the proof? Where is the evidence? Without straying too far from our present overview, it is clear that the all powerful scientific experiment lacks the explanatory power of the interior, subjective life. According to Schlitz and Amorok (2004) the new frontier of science is consciousness and interiority.

In summary, we are witnessing an extraordinary unfolding of truth that has the potential to radically transform human life, society and even the face of the earth. We also seem to be undergoing growing pains, and according to Sahtouris (2009), it is precisely our self-centered consciousness and the feeling of separation that is giving way to a new human, is causing a new evolutionary leap into what Teillard de Chardin (1959) calls higher orders of complexity – a jump into greater consciousness and even greater freedom. We are being connected on multiple levels so that we experience ourselves as part of the whole and it is through our participation in the whole that we are led to a renewed sense of purpose and meaning that is unmatched by people who are alienated and self-centered (Swimme, 1996).

Certainly, today we are witnessing a kickback towards fundamentalism, but the evolutionary impulse and movement will continue unabated toward greater unity and wholeness (Hubbard, 1990). The present is a nonviable state. What is next? According to Murphy (2004), "The evolutionary story is continually being disclosed to us... Today, [transformative spiritual] practice means getting yourself in sync with the most fundamental urge of the universe itself - namely, to develop, to evolve in a progressive way. (p. 1)

Waking up to the great story, waking up to conscious evolution and also waking up to the evolutionary impulse and the urge to evolve consciousness, we begin to get a

sense of what lies ahead in our journey together. Turning on the nightly news or reading some of the environmental reports we clearly see the predicament we are in. Looking through deep time eyes at our Big History, you and I recognize that we are the most fortunate human beings who have ever lived on the earth. We in the west have education, freedom and an unprecedented degree of wealth. We literally live better than kings did hundreds of years ago, with luxuries beyond imagination. Thus, we have a responsibility and a moral imperative to evolve, to be actively engaged in the world, to transform the structures that are broken and are leading to destruction. To those whom much is given, much is expected.

The Integral Worldview

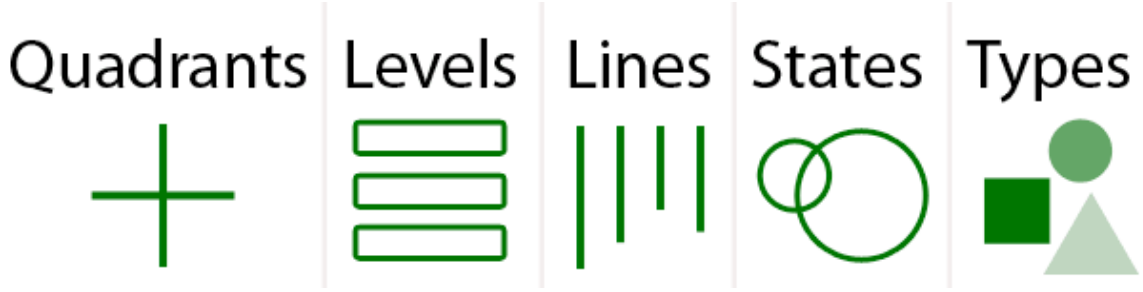

Figure 5. The five elements of the integral model. (Integral Research Center, 2011)

Evolutionary spirituality is part of an even larger shift in understanding that is attempting to make sense of "Everything". Known as the integral worldview, today's integralists are taking the widest possible view of Existence and are including all truths into their models. Perhaps the most widely read integral philosopher today is Ken Wilber who has fashioned a theory of everything that is powerful in its implications and helpful in its ability to guide research methodology (to be described in the next chapter). Needless to say, it is a big theory. As Wilber (2010) himself emphasizes, "It is a map, not

the territory. It is one of the better maps available today, but tomorrow, it will be subsumed into an even more far-reaching and all-encompassing perspective" (p. 77).

All quadrants, all levels, all lines, all states, all types (AQAL) are included in the integral map of reality and the goal of this section is to briefly describe its five key aspects, as they are directly related to the methodology chosen for the present study. It also serves as the lens through which to understand and analyse the data. According to Combs (2009) integral theory itself is an evolutionary leap in understanding.

Quadrants

AQAL posits that there are four fundamental perspectives from which we can apprehend all experiences. These four lenses are simply the **inside** and the **outside** of the **individual** and of the **collective**, and as Wilber (2006) has emphasized, all four quadrants need to be included if we desire to be holistic in our analyses or understandings of the world. Below is a visual representation of the quadrants.

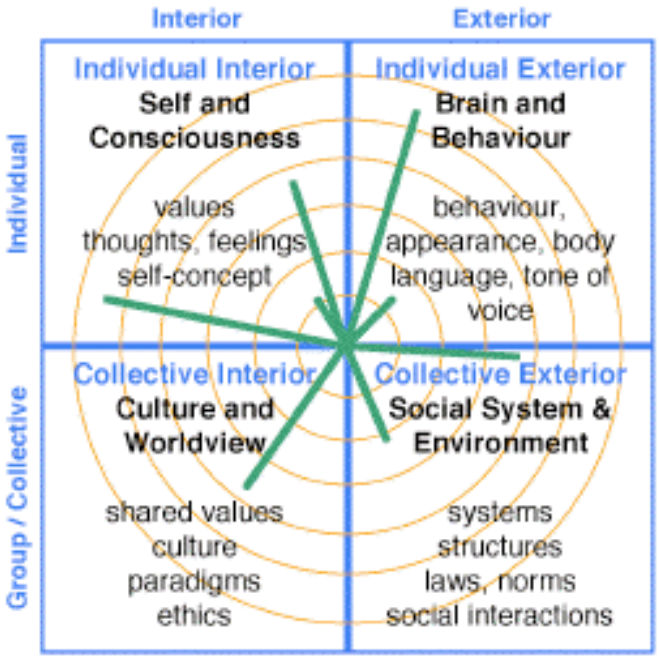

Figure 6. The quadrants of the integral model in blue, accompanied by the lines of development in green and the stages of development as rings emanating from the centre of the figure. (Wilber, 2006, p. 27).

The four quadrants or perspectives are: the interior-individual, upper left quadrant (UL); the exterior individual, upper right quadrant (UR); the interior collective, lower left quadrant (LL); and the exterior collective, lower right quadrant (LR). These four dimensions are characterized by self and consciousness or "I" language (UL), brain and organism or "IT" language (UR), culture and worldview or "WE" language (LL), and social systems and environment or "ITS" language (LR), respectively.

Wilber (2000) encourages us to realize that these four fundamental perspectives "tetra-arise," meaning that all four quadrants are ubiquitously present in any and all sentient beings, at all times. For example, as I dictate this text I am experiencing certain emotions and feelings as well as thoughts that are quite personal e.g. "I hope I am conveying my ideas accurately" (UL). At the same time my neurons are firing, my eyes are blinking and my tongue is engaged in complex maneuvers (UR). Simultaneously, I am using language and ideas to convey specific meanings to you, members of my culture (LL). Concurrently, I am sitting in a highly sophisticated wheelchair using computer technology in a neighbourhood that has shaped the natural environment in a very particular way (LR).

Epistemologically, then, the AQAL framework maintains that all four ways of knowing the world are valid, but partial when taken alone. Unless we can appreciate that all four viewpoints simply represent different ways of seeing the same thing or event, we will forever remain caught in trying to privilege one perspective over another.

Furthermore, any event or experience viewed through one of the four fundamental perspectives outlined by the AQAL model can also be divided into an inside view and an outside view within the quadrant (Wilber, 2006). For instance, the lower left quadrant dealing with the intersubjective "WE" space can be seen from the interior (e.g. what it's like to experience my "I" interacting with your "I") or from the exterior (e.g. a cultural anthropologist studying social exchanges). Entertaining this second division now gives us eight primordial perspectives: the inside and the outside view of an event in any of the four quadrants.

Levels

According to developmental theorists as well as values theorists (interior quadrants) and physicists, chemists, biologists, cosmologists, systems thinkers and complexity theorists (exterior quadrants) life evolves through a series of stages. From the simple, to the more complex or from one perspective, to more perspectives, to many perspectives, life moves through levels of development and change (Keagan, 1982). Certainly, for those who recoil at the idea of hierarchies and who have fought hard against oppressive, dominator hierarchies "levels of development" is a sensitive subject. Eisler (1988) has been very vocal about the danger of embracing the male dominator hierarchies that have plagued our world for many centuries. Furthermore, there are many narrative approaches that are challenging the notion of levels in favour of process and story as a series of transitions rather than stages leading to some endpoint. In this sense, development and change never end (Dowd, 2008).

Keeping in mind the sensitivity around the idea of levels or hierarchies, the notion of growth hierarchies has been gaining momentum as well as evidence in the past while

(Beck, 1996). This is clearly the case in the natural sciences where we see more primitive forms of life being embraced, but transcended into higher levels of organization (de Rosnay, 2000). The example of the simple cell evolving into the multicellular organism was touched on in the previous section. Here, in the world of matter, hierarchies are clear. We can move from more simple, rudimentary forms of life, into more intricate and complicated forms (de Grasse, 2004). This begs the question: can we say that there are levels of development in people or even in whole cultures as well? According to Combs (2009), the answer is yes.

On an individual level, developmental psychologists have, since at least the time of Piaget, discovered concrete evidence of a person's development through life into higher levels of cognition and awareness (Kegan, 1982). We can use our own lives as examples of this progression. From infancy to late childhood to the teenage years to early adulthood and well into adult life, we have been changing and evolving. Physically, emotionally, psychologically, and in many other ways, we have been able (sometimes through will, sometimes through force) to become something more. There is a booming industry that is particularly interested in personal development and in helping people find ways to evolve themselves so that they might lead better, more fulfilling lives. The point is that developmental psychology has a firm footing as a social science and is taken to be true in its general notion of progression through stages. (Here we clearly sense parallels with the evolutionary spirituality movement and its emphasis on conscious evolution and/or the evolution of consciousness.)

Fascinatingly, a parallel, but far less appreciated and studied phenomenon, is the development of whole cultures or groups of individuals who move through a sequence of

predictable stages (Combs, 2009). From animistic, to magic, to mythic, to rational, to pluralistic and then beyond into integral ways of understanding the world, the work of Clare Graves and Don Beck has contributed to the growing understanding that groups of people tend to have a certain center-of-gravity at or near a particular level of development (Combs, 2009). Although there are many different versions of the spiral of cultural development, there are some very clear correlations between the models.

Perhaps the most fundamental aspect of the levels of development for all groups or cultures is that these stages represent a particular set of values or worldviews through which human beings understand the world around them (Beck, 1996). For example, a culture or tribe at the mythic level of consciousness will interpret events much differently than a group at the modernist level. Take an earthquake, for instance, and we can see that a mythic interpretation might be that some kind of magical spirits are at work under the earth or, alternatively, there may be some all-powerful God who is punishing people for their collective sins through calamity and chaos. At the modernist level of understanding, a rational and scientific explanation holds more weight and seems more true. "God is not punishing us," they say, "not at all, it is simply that the tectonic plates have shifted and therefore we feel the effects as these masses of land rub against each other." In other words, the world takes on different meaning when seen through the various levels of consciousness. Before moving into a discussion of the lines of development that move through these levels, it is important to add that the spiral of development or the stages of consciousness are fluid and bleed into one another. We can progress AND we can regress, however once our center-of-gravity has shifted to a new level, we have at once

transcended the previous level as well as included it (and any others below it); we have evolved to a new stage of consciousness.

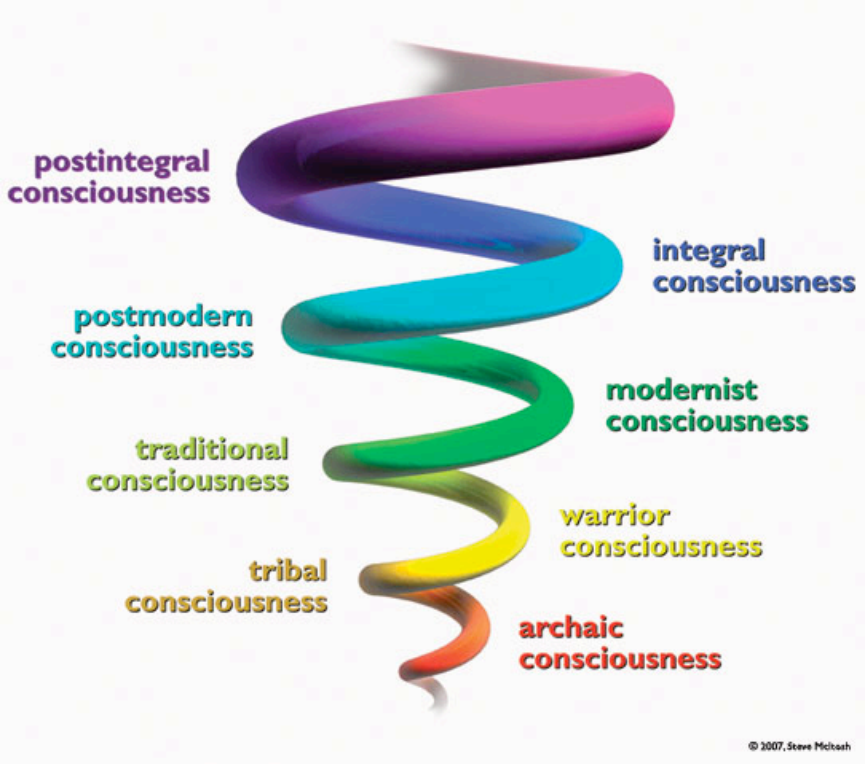

Figure 7. Stages of development of the integral model. (McIntosh, 2007, p. 67)

The present investigation is interested in the development of heart intelligence therefore it is assumed that (a) there is the possibility of development, of progression to a higher level and (b) that there is a type of intelligence associated with the heart. It is therefore to the notion of lines of development or multiple intelligences that we turn to next.

Lines

The integral model of reality also incorporates the idea of multiple intelligences reviewed in the first part of this chapter. Within quadrants and moving through different stages of development, humans have a multitude of intelligences that can and do develop at different rates (Note: Figure 6 visually depicts the first three elements of the integral model - the quadrants, the levels of development [illustrated by the series of concentric

rings within the quadrants] and the lines of development [the green lines moving from the centre of the diagram outward through the levels and into the various quadrants]). Because the various intelligences were reviewed in part one, it is sufficient to explain that you or I may be highly cognitively intelligent, but morally retarded as well as musically mediocre. Alternatively, an athlete might have very high kinaesthetic intelligence, but have a lot of trouble relating to people emotionally. According to the integral system, we all have unique "psycho-graphs" that allow us to get a sense of where we are developmentally with respect to certain lines of development (Wilber, 2000).

States

Human beings also drift in and out of various states of consciousness (Wilber, 2006). Presumably, you as the reader are alert and conscious in a wakeful state of awareness. However, you could also be very drowsy and nodding in hopeful anticipation of sleep, which is itself another state of consciousness. Dreaming, intoxication, intense fear, depression, tremendous sorrow, all of these are states of consciousness that can be experienced throughout life. Deep and profound meditation is a state of awareness that is experienced by those who spend many dedicated hours looking into the subjective experience of selfhood (Kabat-Zinn, 1990). Of particular interest to the present investigation is the state of psychophysiological coherence described in part one of this chapter. The coherent state, as well as the intoxicated state or the sleeping state can be induced or encouraged through practice (McCraty, 2008). The HeartMath techniques and tools have been designed to help people achieve the state of coherence more regularly and for more prolonged periods of time. The cynical or skeptic reader might ask: if states

of consciousness come and go, why practice entering into certain states, preferring some over others?

Two responses to this question present themselves. First, some states of consciousness are more enjoyable than others. For example, it is a more pleasant feeling to be enjoying a warm and encouraging dream than it is to be struggling in the depths of anxiety. The second and more interesting response links states of consciousness to levels of development and relies on the research conducted by Kegan (1982) that suggests practicing certain states of consciousness facilitates the development through the stages or levels of consciousness. This is significant, suggests Wilber (2006), because to achieve a more enlightened and mature society, we need human beings to wake up (experience personal and collective feelings of inner peace and boundless joy a.k.a. enlightenment) and to also grow up (move through the stages of development into higher levels of awareness in order to embrace more and more of reality and hence more and more people). However, not everyone is interested in meditation or in practicing the HeartMath techniques for the purposes of personal and collective evolution. Why is that?

Types

Part of the answer might be that there are different types of people. The final component of the integral model deals with the various personality types found among human beings. The most obvious differences can be seen with the naked eye and include the variances between males and females or between extroverts and introverts. Many classification systems have been developed over time to better understand the various personality types. In fact, there is a whole branch of psychology dedicated to this area of study. Common classifications include Myers-Briggs personality indicators, the

Enneagram, and various trait theories such as those developed by Gordon Allport. Their origins stem all the way back to the time of Hippocrates who believed that individual personalities were a result of particular mix of humors; namely the sanguine (optimistic); the phlegmatic (slow and lethargic) with phlegm; the melancholic (sad, depressed) with black bile; and the choleric (angry) with yellow bile. Because this aspect of the integral model is less important to the present investigation, the point about types of personalities can be put succinctly: there are different personality types and the type of person that you are influences the way you see the world (Wilber, 2000a).

Wilber has been accused of oversimplifying, quoting out of context, gross exaggeration, creating inaccurate interpretations and allowing his own spiritual path to overly influence his view of reality (McIntosh, 2007). He is not widely read and given much attention in the world of academia. McIntosh (2007) suggests that his quadrants should be reduced to the three pillars: the good, the true and the beautiful. Therefore, as a model of reality it is useful, but necessarily flawed. As with any attempt at understanding reality, there will be areas of weakness, places where critics disagree.

Integral worldviews such as the one just described encompass a lot. Representing Everything is of course only a mental trick. The map is not the territory. Even though the integral theoretical framework is only a map, it is a generous and sophisticated description of the terrain of Life. The integral model is being used in politics, business, medicine, art, spirituality, and a host of other domains of activity and understanding. There are other integral roadmaps that emphasize other truths more pronouncedly, but AQAL, with its breadth of scope and elegance, has served as an ideal tool to approach my

research questions, attend to the process of gathering data, and analyse what transpired in my investigation.

Chapter Summary

In summary, the literature review was divided into two parts. The first part was a look at the localized context of my study. I briefly explored some historical and modern perceptions of the heart, the notion of intelligence and the potential for technology and particularly biofeedback to help us connect with our hearts and perhaps even our "heart intelligence." I also explored questions concerning the definition of spirituality as well as the possibility of including spirituality within the public school curriculum. Finally, I remarked upon the lack of research focusing on the spiritual implications of living more from the heart. Part one of the literature review concluded with a call to "evolutionize" some of the spiritual metaphors we use describe our Selves.

Part two should be considered the base of the pyramid providing the foundation for this study. It was intended to be the wide-angle view of our evolutionary story, a story that is necessary to properly understand why I conducted the research I did; why it matters for students to develop their heart intelligence. First, I identified a series of thinkers who have contributed to the notion of an evolutionary spirituality. The majority of part two was aimed at trying to glean a sense of the three main aspects of the evolutionary spirituality movement, namely the Great Story perspective, conscious evolution and the possibility of the evolution of consciousness. The evolution or development through stages of consciousness was one of five aspects described in the integral model of reality. Taken as a whole, the integral map as described by Wilber (2000a) provides room for everything else discussed in this chapter and serves as the

ideal place from which to enter the discussion of methodology and theoretical framework. Hopefully, the overview of these topics and areas of research has adequately positioned the proposed study and given it context. I turn next to the study's proposed methodology.

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AND DISSERTATION

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THANK YOU

CHAPTER 3: REVIEWING THE RESEARCH PHILOSOPHY, THEORY AND METHODOLOGY OF THIS STUDY

Overview

In order to more fully appreciate the research study, a description of the most vital components of any research process namely, the methods, methodology, theoretical perspective, epistemology and ontology, is what follows. Using Crotty (1998) as a guide, the five central components of any social research endeavour can be seen below.

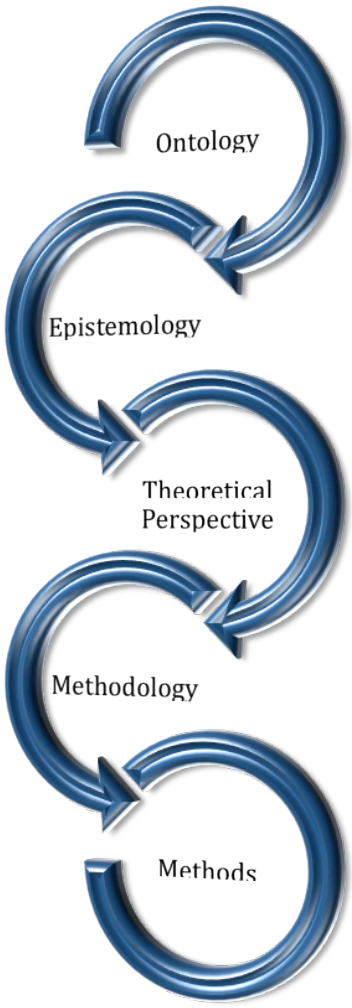

Figure 8. The methodological flow informing this dissertation.

As is made clear, the techniques and procedures used to gather and analyze the data known as the **methods,** spring from the study's **methodology**, which can be described as the strategy or action plan of the research. The methodology, which links the choice and use of methods to the desired outcomes of the study, arises out of a philosophical stance known as the **theoretical perspective**. The theoretical perspective in turn provides a context for the research process as a whole and grounds its logic and criteria. Finally, the theory of knowledge or **epistemology** as well as **ontology** (way of understanding *what is*; concerned with the nature of existence and the structure of reality) both lie as the foundation of the theoretical perspective and hence the methodology and methods.

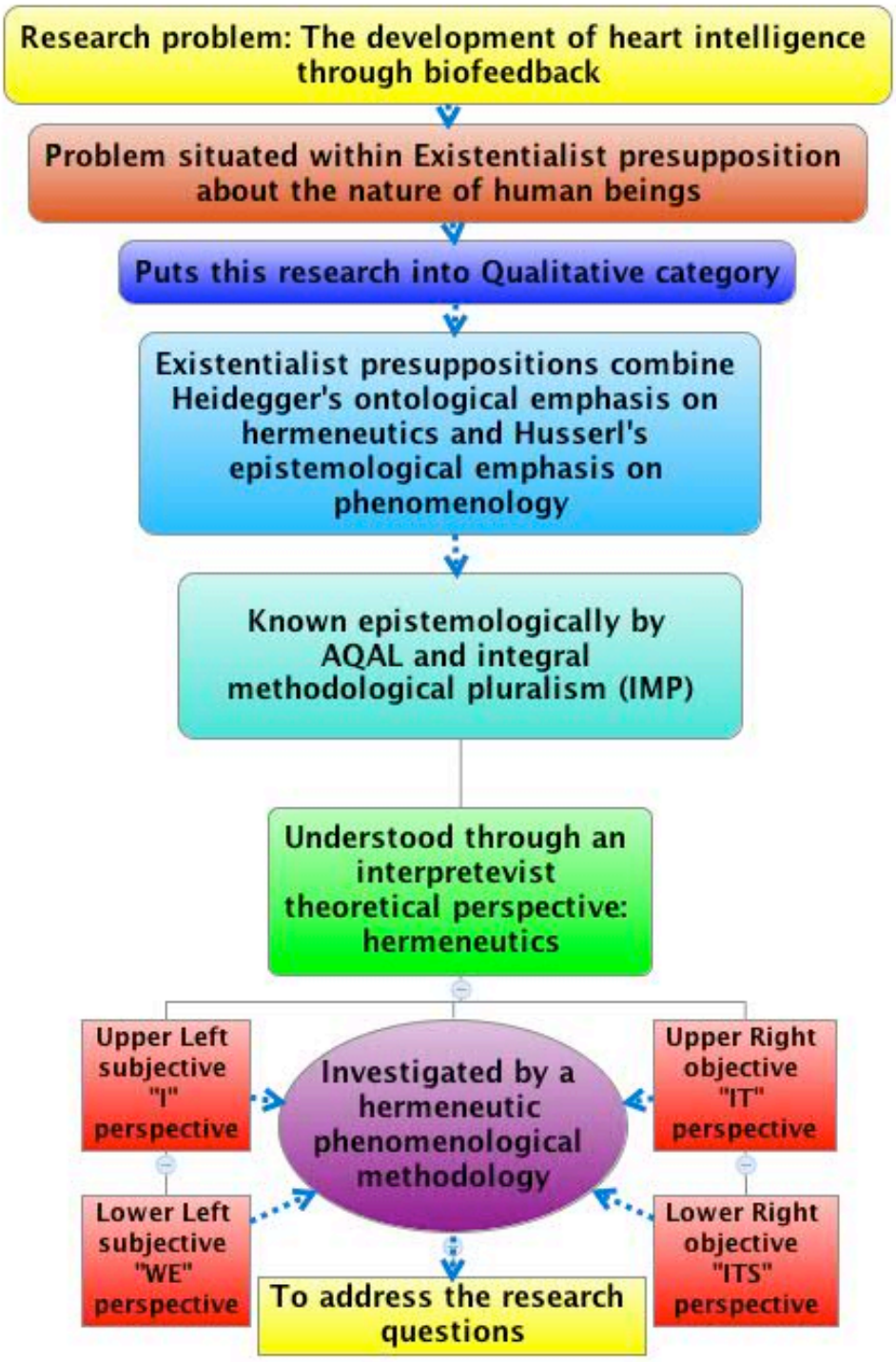

Figure 9. Ontology, Epistemology, Theoretical Perspective, Methodology and Methods

Integrative Intentions

As an aspiring researcher and academic, I am called to choose a perspective from which to know the world (and my topic) so that I might create a piece of scholarly research that is coherent and defendable. Deep in my heart, however, lies a feeling that in privileging one perspective above another or others, I am contributing to the never-ending human drama of division and separation. The depths of my being yearn for connection and peace, not argument and defensiveness. In the same breath I can also express my conviction that some perspectives are more evolved, integral or at least embrace more of creation than do others. So, while I have chosen to study the heart and spirit through a qualitative lens, I realize that my quantitative brothers and sisters who study the mechanics and energy fields of the heart and human energy systems are adding invaluable information to our understanding of what it means to be whole and healthy.

Existential Ontology

Although the proposed study will address the development of heart intelligence through the four quadrants of the AQAL model (to be described in the next section), it will be doing so in conjunction with an existentialist ontology. According to Polifroni and Welch (1999), "existentialism is a philosophical movement that focuses on the uniqueness of each individual and abandons the search for universal human qualities" (p. 237). Further, existentialism relates to the person as a whole being as he or she exists in the world, in contrast to the behavioural science view of human existence for example (Polifroni & Welch, 1999). Many existentialists believe that freedom is ontologically prior to thinking when relating to human existence (Gordon, 1999). Thus, rather than being merely thinking beings, we are whole and free as we engage in relations and

encounters of love, creativity, anguish, profound joy, genuine dialogue and so on. For the present purposes, a glimpse at the philosophies of Husserl and Heidegger, and how these relate to existentialism, will be briefly undertaken as these relate to the study's methodology.

Edmund Husserl launched the school of philosophy dedicated to the systematic analysis of consciousness and its objects, known as phenomenology (Polifroni & Welch, 1999). Phenomenology refers to whatever is given in direct experience regardless of any question of independent existence. Our direct experience encompasses not only physical and material objects, but more abstract thoughts and ideas related to mathematics and music, not to mention our own thoughts, emotions and experiences. Thus, according to Husserl's view, we have subjects contemplating objects or the arising of phenomena by virtue of directed mental content (Polifroni & Welch, 1999). According to Gordon (1999), existentialists following in Husserl's footsteps "were attracted by a philosophy that placed an emphasis on subjectivity… The idea of a return to lived experience, of restoring an immediate contact with things by peeling away the concealing layers of scientific conceptualization, appealed to existentialists" (p. 195).

Husserl's student Heidegger, moved away from his teacher's view of phenomenology toward a more purely existentialist understanding of human beings as already in the world, deeply embedded and enmeshed. Because Heidegger was interested in "the particulars and the uniqueness of the person living in the world, and also because of his concerns with anxiety, care and our thrownness into an existing world" (Polifroni & Welch, 1999, p. 237), he was classified as an existentialist. The belief in existentialism

that a person arrives into a preconceived existence echoed through Heidegger's writings (Gordon, 1999).

Fundamental to Heidegger's ontological questions of being were his notions that understanding is not something we do, but something we are. Essentially, understanding is a mode of being (Ramberg & Gjesdal, 2005). Heidegger's focus on understanding as a process of interpretation indivisible from being, therefore, marked a turning point in the hermeneutic philosophical tradition, which concerns itself with this very process. Although the above paragraphs do not nearly begin to do justice to the streams of existentialist, phenomenological, and hermeneutic philosophy, they serve the purpose of demonstrating that the proposed study's epistemology, theoretical perspective, methodology and choice of methods are set within those specific philosophies.

Integral Epistemology

Integral philosophy maintains that there are (at least) three fundamental perspectives or ways of knowing the world: subjectively, inter-subjectively and objectively. The Big Three, as they are called by McIntosh (2007), can be roughly described as the beautiful, the good and the true. Another way of saying the same thing is that we can see the world from a first-person, second person and third person perspective and these points of view correlate once again to art (aesthetics), religion (morality) and science (knowledge). These three perspectives or pillars of understanding the world are interrelated and interpenetrate. According to Esbjörn-Hargens (2009), truth can be beautiful, morality can be true and art can be good. Although each prospective is epistemologically unique, the three spheres overlap as can be seen in the following figure.

Figure 10. The three fundamental perspectives of integral research. (Integral Research Centre, 2011).

Sitting at the centre of the overlap are the letters IR that stand for integral research, the type of research that integrates all methodologies and methods in order to understand our universe. Before diving into a fuller description of integral research, it is important to make a slight, but significant, alteration to the Big Three. For the sake of clarity, comprehensiveness and continuity, I will follow Wilber's (2006) example and divide the third sphere (i.e. third person perspective, objective truth, material science) in half so that we morph from a triad into the quadrants as they appear in the All Quadrants All Levels All Lines All Types All States framework (AQAL) described in the last chapter.

The four quadrants act as lenses through which we can view life: subjectively (my individual thoughts, emotions, memories, states of mind, perceptions and immediate sensations); objectively (my material body including my brain and anything that I can

taste, touch, hear, smell or observe scientifically in space and time); inter-subjective (our shared values, meanings, language, relationships and cultural background); and inter-objective (the systems, networks, technology, governments and natural world in which we live).

Perhaps a useful analogy is to consider each quadrant as a window on the world. When I am looking through the inter-subjective window, I am primarily concerned with relationships, social roles, conversations with others and the entire human drama as it is understood through relationship. Alternatively, as I peer through the window of subjectivity, I find myself transported into a world of private sensations and feelings and emotions. I experience something completely unique that no one else knows about. I have my own thoughts and reactions that are entirely subjective. Looking through the objective window, I see a heart pumping blood along arteries and veins as well as a brain tucked neatly within a skull that has been shaped to withstand falls and accidents. I see an intricate physiological system that I can pull apart and study with tools and sophisticated devices. The tools and the assembly lines that create them provide me a glimpse at the world through the fourth window, the inter-objective one. Here, I marvel at the interrelationships between objects and systems acting upon systems. It is through the meticulous study of how all of these various parts act upon one another that I begin to understand the complexity of the universe as well as the evolutionary dynamics that give rise to new relationships, new personal experiences and new biological entities.

Mysteriously, the four quadrants fit together seamlessly and it is only through the power of human thought that we can divide our experience into these four fundamental perspectives. Nevertheless, the four quadrants are, as we have seen, unique in their

outlook and also serve as an effective way to understand integral methodological pluralism (IMP), which we turn to next. Below is a visual representation of the quadrants.

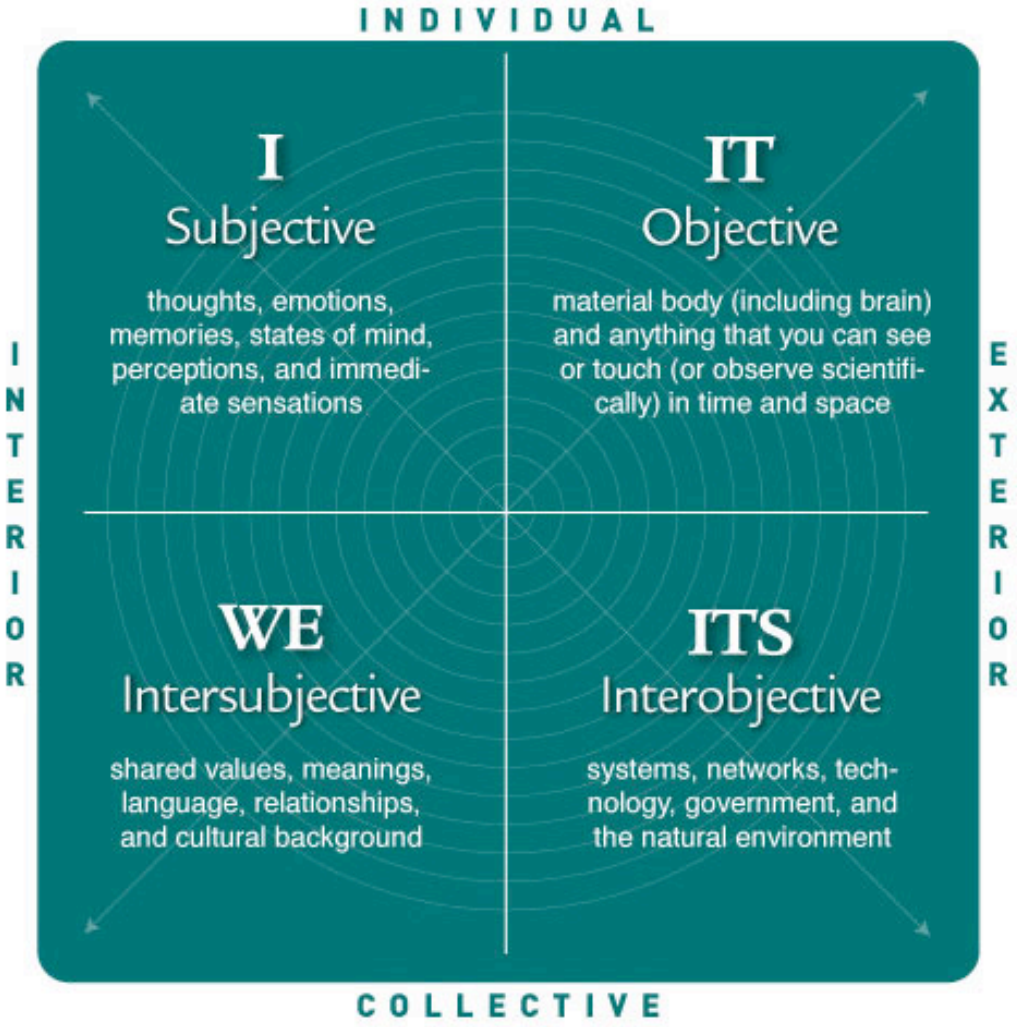

Figure 11. All Quadrants All Level (AQAL) Model. (Integral Health Resources, 2011).

Integral Methodological Pluralism (IMP)

Integral methodological pluralism, like integral theory more generally, is an attempt to synthesize, situate and bring together numerous forms of inquiry. Because the many research methodologies that have developed over time are rooted in

epistemological assumptions, it follows that the various methodologies could be positioned within the AQAL framework. This is precisely what integral methodological pluralism (IMP) achieves. The following figure presents a very general picture of where the various methodologies fit with respect to the AQAL framework (Wilber, 2006, p. 37). The methodology placed within the circle of each quadrant represents the *inner* perspective of the quadrant whereas the methodology placed on the outside represents the *outer* perspective.

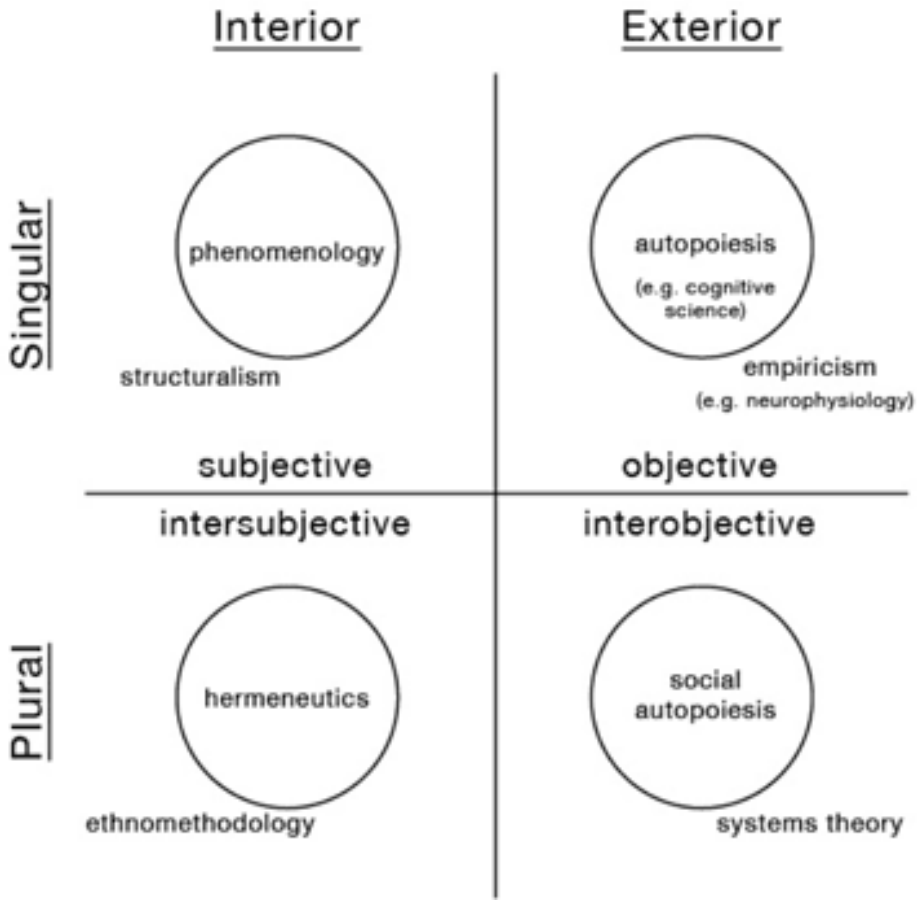

Figure 12. Integral Methodological Pluralism (IMP). (Wilber, 2011, p. 9).

According to Esbjorn-Hargens, Reams and Gunnlauson (2010) integral research is the product of a much-needed synthesis between positivistic and post-positivistic

approaches to knowledge. In the right-hand quadrants that focus on the objective and exterior aspects of existence, we have the type of science that focuses precisely and meticulously on the "things" of the cosmos, known as positivistic science (e.g. systems theory, biology). It is in these quadrants that the hard-won clinical trials, double-blind experiments, and incredibly empirical research has been and continues to be conducted. In the left-hand quadrants, we have the equally intense search for truth happening in the subjective and cultural domains (e.g. phenomenology, hermeneutics). Here, in the inner universe, seekers of truth have attempted deep and profound investigations into the nature of the self through spiritual and, more recently, cultural and social studies.

In a loose and generous parallel, we can perhaps even say that the right-hand quadrants represent brain and mechanical fascination, whereas the left-hand quadrants represent heart and interpretive communication. In the previous chapter there was an image entitled "The Great Heart Split" which touched upon the idea that as we moved away from pre-rational levels of religious interpretation and mythmaking into more rational forms of investigation, the scientific enterprise sacrificed its heart for the sake of its brain. In other words, the time of the Late Renaissance (thanks to thinkers such as Bacon, Galileo and Newton) divided the universe into myriad objects, and in a very real sense, moved from a metaphorical heart to a literal one; we switched our view from the left-hand quadrants, to the right-hand quadrants. Integral methodological pluralism and integral research seek to rebalance head and heart, inside and outside, individual and collective, subjective and objective and re-harmonize the human search for the good, the true and the beautiful.

According to Wilber (2006) the 8 views/methodologies represented above are in effect unique epistemological worlds enacted and brought forth within that perspective. All 8 perspectives engender phenomenological "zones" as they are called by Wilber (2006), but we will be looking at four of the most important, which are numbered in Figure 13 below. These four zones should not be confused with the four quadrants. Rather, they are located within the quadrants and are another useful way to group the 8 primal perspectives (namely, the inside and outside of interiors and exteriors). These zones are described by Wilber (2011) and, in all honesty, are rather dry descriptions of what are otherwise richly textured forms of inquiry:

> **Zone #1**: *interior* holons (an "I" or "we") looked at from *inside* their own boundaries. This means a first-person approach to first-person realities (1p x 1p), in both singular and plural forms. The singular form is the **inside of an "I"** (classic paradigms or injunctions that bring forth, enact, and disclose these first-person singular dimensions of being-in-the-world include phenomenology, introspection, meditation). The plural form is the **inside of a "we"** (which can be brought forth, enacted, and disclosed with methodologies such as hermeneutics, collaborative inquiry, participatory epistemology).
>
> **Zone #2**: *interior* holons (an "I" or "we") looked at from *outside* their own boundaries. This means a third-person approach to first-person realities (3p x 1p), in both singular and plural forms. The singular form is the **outside of an "I"** (which can be approached with methodologies such as developmental structuralism). The plural form is the **outside of a "we"** (which can be approached with methodologies such as cultural anthropology, neostructuralism, archaeology, genealogy).
>
> **Zone #3**: *exterior* holons (an "it" or "its") looked at from *inside* their own boundaries. This means a first-person approach to third-person realities (1p x 3p), in both singular and plural forms. The singular form is the **inside of an "it"** (which can be approached with methodologies such as biological phenomenology and autopoiesis). The plural form is the **inside of an "its"** (which can be approached with methodologies such as social autopoiesis).
>
> **Zone #4**: *exterior* holons (an "it" or "its") looked at from *outside* their own boundaries. This means a third-person approach to third-person realities (3p x 3p), in both singular and plural forms. The singular form is the **outside of an "it"** (which can be approached with methodologies such as behaviorism, positivism,

> empiricism). The plural form is the **outside of a "its"** (which can be approached with methodologies such as systems theory, component systems theory, chaos and complexity theory). (p. 12)

Graphically represented in the figure below, the four zones are a further refinement in the effort to integrate the various methodologies available to us today. The reason I have included such an integrally contextualized look at the most common modes of inquiry is quite simply because having this context helps me to situate my own thinking and my own study on heart intelligence. At its core, my study is a **Zone #1** investigation. I call it "Integral Hermeneutic Phenomenology." Integral because I am looking to be in coherence with the wide world of research approaches and methodologies; hermeneutic because I am interested in the meaning, understanding and awareness that arises through dialogue and exchange with participants; phenomenological because I seek also to comprehend the subjective experience of each participant as well as my own. As was mentioned in the introductory chapter, my choice of methodology is very deliberate: I am seeking to complement the more quantitative and empirical research conducted on the heart by giving voice to the lived experience of learning to live more from the heart as it is expressed by students and teachers. Thus, rather than conducting pre-and post tests or looking specifically at the heart rate variability patterns that were generated by participants, I am zeroing in on the left-hand quadrants of the integral model to see what they say about developing heart intelligence.

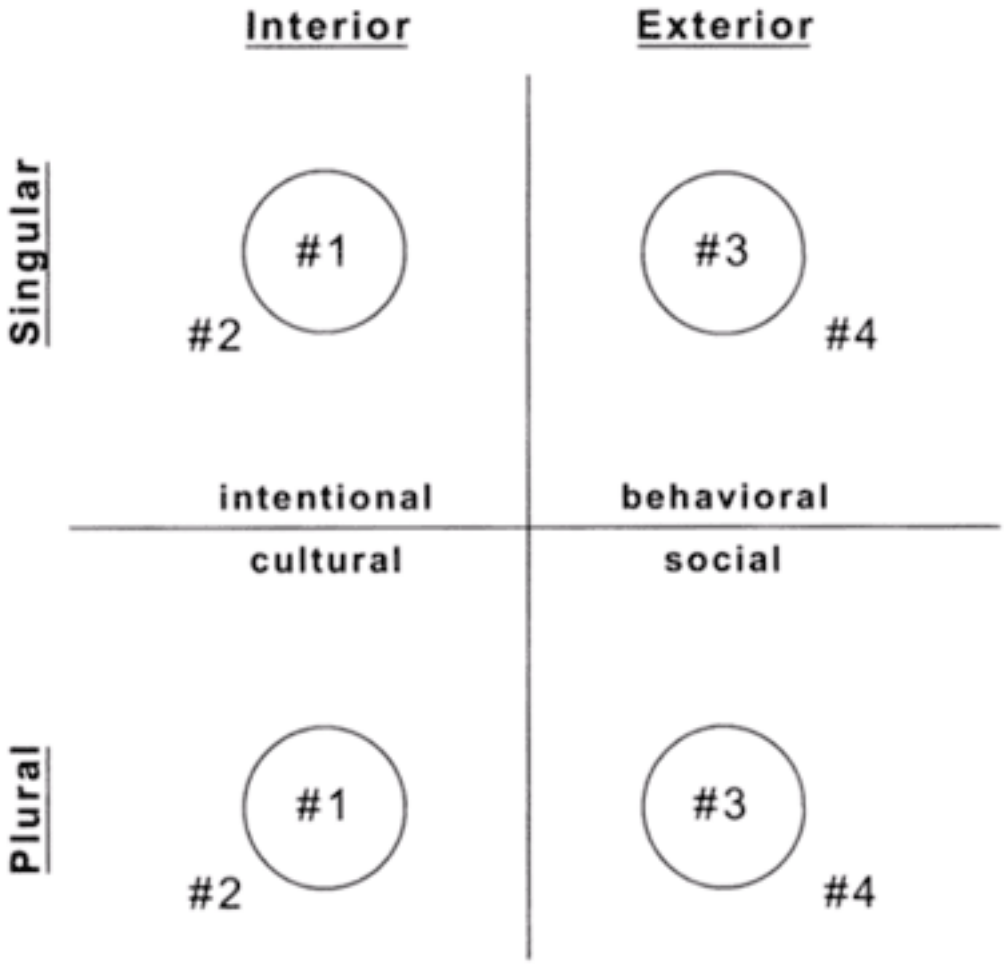

Figure 13. The four methodological zones of the integral model. (Wilber, 2011, p. 11)

Having an integral epistemological stance allows for a fuller understanding of where the proposed research study fits within the overall scheme of research being done on the development of heart intelligence. The literature review revealed that a majority of studies conducted thus far on the heart fit primarily within the UR quadrant (material body) with some bleed-through into the UL quadrant (subjective thoughts and feelings); the focus has been most intensely on the physiological, hormonal, chemical and electromagnetic communication between the heart and the rest of the body. Although the Institute of HeartMath has become more interested in the subjective, qualitative

experiences of people entering the coherent state, most of the research and studies conducted on the heart in our society lean heavily toward biological investigations. The LR quadrant (systems, networks, inter-objective relationships) is only beginning to be investigated by some researchers interested in global coherence and the possible link between the earth's electromagnetic fields and those of the human heart (Global Coherence Initiative, 2011). However, few investigations have focused on the UL and LL quadrants specifically. The current investigation proposes to do just this.

Now that the reader has a working understanding of the integral approach to research, it is worthwhile re-examining the questions that were posed at the outset of this project. Further, it will be fruitful to position the questions within the quadrants of the integral model. As can be seen in the first figure, the four central research questions of this study fit squarely within the UL and LL quadrants: I am interested in the subjective experience of learning biofeedback and practicing the coherence technique as well as the inter-subjective process by which this learning and practice occurs. The right-hand quadrants illustrate work that is being done by other researchers, but that is complementary and deeply related to my own study.

Subjective (UL)	Objective (UR)
5. Investigate the ongoing impact of biofeedback on the participants' physical, mental, emotional and spiritual being (e.g., how does it feel?) **6. Discover the impact coherence building has on participants' physicality and overall actions in the world (e.g. what does it live like?)**	*Quantitative research studies conducted at the Institute of HeartMath (e.g. heart brain interactions, heart rate variability analysis, cortisol and DHEA examinations).*
Inter-subjective (LL)	**Inter-objective (LR)**
7. Document how the participants experience the development of heart intelligence and use of biofeedback in school (e.g. what does it look like with others, in the school culture?) **8. Describe/Interpret participants' experiences of practicing coherence within the pre-built structure of a high school (e.g. how does it fit into the school environment?)**	*Quantitative research studies conducted through the Global Coherence Initiative examining the fluctuations in the magnetic fields generated by the earth and in the ionosphere and how these relate to human functioning.*

Figure 14. The four major questions positioned within zones one and two of the integral hermeneutic phenomenological methodology used in this study.

Before moving on to describe the philosophical parameters of the proposed study that fit within the left-hand quadrants of the AQAL model (Zone #1, specifically), it is worth reiterating how critical it is for research being done in the 21st century to be integrally informed. Koller (2006) confirms the need to be more inclusive in our research endeavours and states that, "the more approaches to truth we include in our purview, the

better chance our Science has of manifesting an embodiment of truth" (p. 161). Echoing the need for an integral worldview and epistemology, Esbjörn-Hargens (2009) states:

> In our ever-evolving universe, integral theory issues to each of us a clarion call to strive towards inhabiting multiple perspectives - especially those that stand in contrast to our own habits of thinking and feeling. Only through developing such a worldcentric perspective can we adequately achieve the mutual understanding so desperately needed on a planet fragmented by conflicting worldviews and approaches. (p.22)

With this integrative spirit in mind and heart, we move to position the present research within the philosophy of hermeneutics.

Theoretical Perspective

Because the theoretical perspective of any research study is essentially a philosophical stance that lies behind the chosen methodology, I will attempt to expound the view of the human world and social life within that world from the interior of the LL quadrant, namely, hermeneutics. Further, a subtle and gradual shift from seeing hermeneutics as a purely philosophical stance towards seeing it as a practical approach to research will be attempted.

Although it has been said that hermeneutics defies straightforward definitions (Rich, 2004), it can be clearly stated that hermeneutics is fundamentally based within the world of "WE" (Wilber, 2006). Perhaps, as an attempted definition, we might say that hermeneutics is the interpretive unfolding of understanding, or that it is an inter-subjective space wherein truth emerges out of a historical and cultural sensitivity to life. In opposition to the right-hand quadrants' objective, mechanical, empirical, systems-

oriented approach to reality, hermeneutics stems from the perspective that everything is inter-communicating and is already/always involved with the total context (Jardine, 1999). Thus, in the process of understanding and meaning making there is a continuous flow from part to whole and from whole to part that is characterized by dialogue and interchange (Rich, 2004). Hermeneutics is this interrelationship.

The interpretive nature of philosophical hermeneutics lends itself particularly well to the study of poetry, metaphor, and the fluidity of human experience (Gadamer, 2007). Although it can be illuminating to know how many times your heart pumps each day (UR quadrant), it is more interpretively challenging to understand what people mean when they say "follow your heart" or "words from the heart" or "heart-based living" (LL quadrant). What is it about the heart that leads us to speak about it in such ways? Why do our school textbooks explain the human heart in terms of valves and beats, rather than as the seat of the soul? Can we develop alternative conceptions of our heart and our relationship to it? According to Gadamer (2004), questions like these, that suggest a desire to understand the connections and interrelationships between things, are at the root of all hermeneutic endeavours. Furthermore, hermeneutics is also the process of sharing any understanding gained with others (Gadamer, 2004).

Interestingly, Jardine (1999) has stated that the sharing of understanding with others is what pedagogy truly is: an interpretive, hermeneutic practice aimed at helping others understand things, topics, and themselves in relation to the life world. Over and above pedagogy, however, hermeneutics is believed to be a way of life, (Gadamer, 2007) not something that is quickly and easily taught, but a way of thinking and living in the world that leads to openness and curiosity, rather than hard, fast answers to questions.

This way of interpreting the world - as a moving, living, interconnected, historically and culturally affected system - is quite different from the quantitative worldview that suggests things are separate objects onto themselves. While this perspective is a valid way of looking at life (as we have seen with the AQAL framework), there are many, Gadamer (2007) among them, who believe that we cannot so easily extricate ourselves from the things we are interested in studying.

Although a much fuller and richer description of key elements within hermeneutics such as language, the hermeneutic circle, the fusion of horizons etc. will be attempted during the dissertation, the intention behind this brief overview of hermeneutics is simply to convey the theoretical perspective of the proposed research study. I move now to the study's methodology: hermeneutic phenomenology.

Methodology

According to Laverty (2003), hermeneutic phenomenology emphasizes discovery, description and meaning; it is a methodology that arose out of the disenchantment with the logical-empirical (right-hand quadrants) approach to research that continues to evolve to this day. Wilber (2000) expressed the essence of hermeneutic phenomenology in this way:

> You, as subject, will attempt to understand me as a subject - as a person, as a self, as a bearer of intentionality and meaning. You will talk to me, and interpret what I say; and I will do the same with you. We are not subjects staring at subjects; we are subjects trying to understand subjects - we are in the inter-subjective circle, the dialogical dance. (p. 161)

According to AQAL, and IMP specifically, hermeneutic phenomenology occurs when the inside of the "WE" (LL quadrant) meets the inside of the "I" (UL quadrant). So, if hermeneutics is the inter-subjective space and phenomenology is the subjective space, then hermeneutic phenomenology as a methodology would aim to understand a phenomenon or topic or experience through dialogue and a coming together of worlds. Put differently, the description of the essence of phenomena (phenomenological) is an interpretive, dialogical process (hermeneutic).

So what does a hermeneutic phenomenological methodology look like in practical terms? Van Manen (1997) provided a useful overview of six principal research activities that he believes to be dynamically interrelated in interpretive research. We should be:

1. turning to a phenomenon, which seriously interests us and commits us to the world
2. investigating experience as we live it rather than as we conceptualize it
3. reflecting on the essential themes, which characterize the phenomenon
4. describing the phenomenon through the art of writing and rewriting
5. maintaining a strong and oriented pedagogical relation to the phenomenon
6. balancing the research context by considering parts and whole (pp. 30-31)

These six activities guided me in my quest to understand the development of heart intelligence and its potential impact on students' lives. Over the course of almost 2 years, I consistently turned to the heart and the notion of heart intelligence with a deep commitment to understanding what it means and how it is expressed in the world. I worked on uncovering the lived experience of my participants as well as myself - learning to live more from the heart. I read, re-read, listened and re-listened to the transcripts and recordings of the participants. I sorted through all of the interviews creating themes and groupings by topic, by quadrant, by common words or phrases. I described the development of heart intelligence in music, art and in conversations with

friends etc. I also asked people (e.g. strangers at a party) what they thought of heart intelligence and how it might be developed. And of course, I diligently turned to my participants to clarify my understanding of what they had described as well as delved more deeply into those areas where I was unclear.

Further, I attempted to balance myself and my research project between parts and whole, meaning that I was aware of each participant as a unique, individual as well as part of a cohort, part of a research study, part of a school, part of a university investigation, part of a city and so on; all the way up and all the way back down, linking people, ideas and themes as they arose. And I did all of this with a deeply contemplative spirit. I literally and figuratively opened my heart to the process, to the participants, to the project and to the data. In essence, I attempted to find the balance between gaining as much clarity as I could from a cognitive, intellectual point of view as well as allow my heart to be touched and to touch the endeavour.

Essentially, the strategy or plan of action of my research study was to dig deeply into what it means to develop one's heart intelligence by engaging the six activities proposed by Van Manen (1997). Specifically, after recording the interviews and accumulating all of the Facebook/e-mail interactions, I organized the data by participant. Thus, I ended up with 15 separate documents that went through a narrative starting with initial questions, first impressions, interviews, e-mails, live chats etc. in chronological order from the beginning of the study to the end. I then shaped the data into information. I assessed or analyzed the data by sorting, noting down different categories or types of responses into different documents on my computer. Next I started to separate the information into groups that shared similar characteristics. I started with a large number

of categories, but was able to reduce the number to eight. I then tried to interpret and summarize the categories and rather than quantifying the responses, I sought to find a multiplicity of perspectives being expressed and attempted to ensure all opinions and views were represented. Finally, over and above discovering eight primary themes, I tried to explain the information through the lens of the integral model. Careful not to make rash conclusions, I suggested possible practical applications that emanated from this entire procedure.

Crotty (1997) warned that any methodology is bound by certain assumptions and that an elaboration of one's methodology must necessarily include a statement of the assumptions brought to the research task. According to Benner (1994), there exist five major assumptions within the hermeneutic phenomenological methodology. These are:

1. Human beings are social, dialogical beings.
2. Understanding is always before us in the shared background practices; it is in the human community of societies and cultures, in the language, in our skills and activities, and in our inter-subjective and common meanings.
3. We are always already in a hermeneutic circle of understanding.
4. Interpretation presupposes a shared understanding and therefore has a threefold structure of understanding.
5. Interpretation involves the interpreter and the interpreted in a dialogical relationship. (p. 71)

These assumptions lie as the ground upon which hermeneutic phenomenology rests and provide insight into why the study uses the methods it does.

Methods

The techniques or procedures to be used in collecting data on the development of heart intelligence and its impact on students' spirituality were the following: a series of interviews, significant reflections via live chat (e.g. Facebook, e-mails), focus groups and participant observations. By using these four methods, I was engaged in the "inter-

subjective circle" while also enabling a more traditional triangulation which, in short, helps instil confidence that the findings are balanced and have been cross examined within the study (Patton, 2002).

Patton (2002) described numerous possible styles of interviewing within the field of social research. In order to gather data I conducted a series of semi-structured interviews with the hopes of gaining insight into the four broad questions identified in the research questions. Three interviews were conducted with each participant: one before the six-week training program began, one at the three-week mark, and one upon conclusion of the six-week program. Interviews took place in a private room at the high school chosen for the study and were conversational in nature. The interviews were recorded. Although I had a piece of paper with several questions I hoped to have answered with me during the interviews, my plan was to be open to deviations and information that might not "fit" into my pre-planned set of questions.

I asked open-ended questions and employed active listening skills. Further, in my interactions, I made a conscious effort to enter a state of psychophysiological coherence for approximately 5-10 minutes before conducting the interviews. I also encouraged a brief few moments in coherence at the beginning of the majority of the interviews and focus groups. In short, the interviews were meant to be heart centred and loosely guided.

Alongside the interviews, I made some attuned observation of the participants. I watched participants closely as I taught them to enter a state of coherence. As I trained participants to enter their hearts and use the biofeedback devices, I was relying not only on my intuitive sense of how coherent participants were, but also on how they seemed to be handling the process of learning to live more from the heart. Further, there were the

coherence scores from the biofeedback device that I was able to monitor and track. Do participants learn quickly and effectively? Are participants interested and keen to know more? What does their body language suggest? What energetic vibrations are they giving off? I attempted to answer such questions by taking notes immediately after the interviews, recording my impressions and observations.

Over and above interviews and observations, participants were asked to record their own observations of the process of developing heart intelligence. Reflections in the form of journal entries, blogs, or even e-mails containing questions, clarifications, impressions etc. were encouraged but, perhaps not surprisingly, most of the students preferred Facebook (live chat in particular) over other means of communication. Therefore, I added each participant as a "friend" and was able to communicate with them via the Facebook e-mail system as well as live chat. In order to keep participants engaged in self-reflection, I sent weekly or biweekly (depending on participants' preferences) e-mail reminders. By asking participants to reflect on their experiences, they, and I, were able to gain a fuller appreciation of what is involved when trying to live more from the heart.

Finally, 2 focus groups were conducted so as to stimulate group dialogue and discussion around heart-based living. These focus groups lasted one hour and were held at the high school. It was hoped that the group setting would facilitate the unearthing of questions, experiences, concerns, and learnings that had not surfaced during the interviews, observations, or self reflections. I led these groups and suggested themes and questions surrounding the topic of heart intelligence. Like the interviews, the focus groups were semi-structured as I had some questions written, however, the thrust of the

discussion was mostly spontaneous. Again, as with the interviews, the focus groups were initiated by a few moments of heart centred breathing as a group in order to set a coherent tone for the discussion. In short, my intent was to reach inter-subjective understanding with the research participants by collecting texts through the four methods described and having participants engage in member checking i.e. participants reviewed transcriptions and created texts to ensure accuracy and mutual understanding.

Why Integral Hermeneutic Phenomenology is Well-suited to Studying the Development of Heart Intelligence in a High School Setting

Taken together, an existential ontology, an AQAL/IMP integral epistemology, a hermeneutic theoretical framework and a hermeneutic phenomenological methodology are well suited to this qualitative study of heart-based spirituality as they enable and engage a deeply personal exploration into the interior and exterior aspects of student spirituality and personal wholeness in the public school setting. This approach uses reflexivity, dialogical exchange, and guided conversations as a means of providing space for the necessary levels of research intimacy that will invite and encourage the participants' understandings about their hearts to emerge, such that their personal wholeness is enhanced.

Participants

The Integral High School in Calgary was created in 1974 by a group of parents who were looking for "another way" for their sons and daughters to acquire a high school education. The philosophy of IHS promotes highly personalized learning within an informal and democratic environment, so that students who have not met with success in the regular school environment have a chance to succeed. According to the CBE website

(2009), “The Integral High School has adopted the "Circle of Courage" philosophy which unites the four corners - Belonging, Mastery, Generosity, and Independence - into a cohesive theme that provides guidance for the ideals, values, customs, and traditions of Integral High School” (p. 1). Of particular interest to this study is the Mastery corner wherein students are to meet emotional, spiritual, mental and physical challenges (Calgary Board of Education, 2009).

Thanks to a connection my supervisor Dr. Bohac-Clarke had with IHS, I was able to have a meeting with the principal to discuss the possibility of conducting my research study in the school. After reviewing the proposal and experimenting briefly with the biofeedback technology, the principal told me that as long as all of the ethical approvals and guidelines were met, he would be more than happy to allow me to make a school presentation in order to recruit participants and that he would like to participate as well.

Thus, a couple of months later, after receiving ethics approvals from both the University of Calgary as well as the CBE, I went in with Dr. Bohac-Clarke to give an assembly presentation on “practical spirituality.” During the course of the presentation, it was mentioned that I would be conducting a study on biofeedback and heart intelligence and its role in helping students (and teachers) lead a more balanced life as well as develop spiritually. Many students approached me after the presentation and expressed keen interest in participating in the project. Also, several teachers as well as the school secretary were eager to take part in the study.

However, after contacting students who had shown interest in participation to ensure that they and their parents had signed the consent forms, the number of participants (dozens of students who originally volunteered and took home consent forms

after my presentation) was reduced to a manageable size (eight students, seven teachers and staff). At this point, a formalized and more comprehensive overview of what participation in this research study required was conducted. At this meeting, participants returned consent forms and were shown briefly how to use the biofeedback software as well as the quick coherence technique. The meeting ended with a few questions and a connection with most students on Facebook in order to communicate and set up the first one-on-one interviews. Because the goal of this qualitative investigation was to arrive at an authentic and trustworthy understanding of the development of heart intelligence as opposed to a reliable and generalizable description characteristic of quantitative research, most participants had expressed a personal interest in learning about spirituality and the mind-body connection. Other than having access to the emWave biofeedback software for a period of several months, participants were unpaid volunteers.

Demographic Information and Informed Consent

Participants who chose to take part in this research study were informed about the nature and purposes of the study by an introductory letter and the 30 minute presentation (described above) prior to any information gathering. Following this introduction phase, all participants discussed informed consent with the researcher and then completed and signed an informed consent agreement (students under the age of 18 were required to have parents or parental guardians sign consent forms as well). All of the participants were treated in accordance with the ethical guidelines of the Conjoint Faculties Research Ethics Board at the University of Calgary, and the Calgary Board of Education.

Before participation in this study all participants were informed as to their rights and choices with respect to privacy, confidentiality and consent. All of the participants

were informed of their right to withdraw from the study at any time, and if they did so, their personal information was shredded and in respect of their privacy, they were not to be contacted again. All participants were given the choice to have their identities coded for data gathering and analysis purposes only and not disclosed in any manner without the participant's written permission. Finally, the same process was carried out a second time one month into the study, in case some of the participants' schoolmates became interested in the research and wished to take part.

Data Gathering Process and Brief Outline of Training Program

In order to help participants develop their heart intelligence, a training program was created by fusing ideas from the Institute of HeartMath's TestEdge program as well as mixing educational tools and presentations to offer participants opportunities to learn about spirituality, the heart, biofeedback and personal wholeness through various communication channels (e.g. web, video, face-to-face interactions). What follows is a brief summary of the three phases of the training program:

Phase 1

- Study commenced with a 30 minute presentation to students, teachers, staff and principal about the heart and developing heart intelligence. This 30 minute session included the collection of signed consent forms, a script, a brief introduction to the support materials available, and a demonstration by me followed by participant group trial of the emWave PC program. Participants were instructed on how to reach a state of psychophysiological coherence by using the Quick Coherence Technique (heart focus, heart breathing, heart feeling) and were free to engage the emWave computer program.

- After the initial session, one-on-one interviews and coaching sessions were set up with each participant via Facebook or e-mail. (This phase also included attaining the software package from the Institute of HeartMath as well as the 12 sensors needed to operate the biofeedback program. This process took two weeks longer than anticipated because of some technical difficulties at the school). I offered to be of assistance and to coach anyone who desired help or more clarification during this time.

Phase 2

- Six weeks of biofeedback use by participants. Three times per week (school days) participants were asked to attain a minimum of 2 five-minute sessions per day (or one 10 minute session if they preferred). After each 5 or 10 minute session, participants were asked to mark down their general feelings about the session by either sending me a text message, an e-mail, a live chat on Facebook or writing in their self reflection journal.
- E-mails were sent out to students who seemed to be lagging with their practice to serve as a reminder and encouragement to keep practicing. Although I committed to being available Wednesday evenings at 8:00 PM online for any live chats, it turned out that most students preferred contacting me at their convenience. I also committed to be at school every Tuesday over lunch hour in case any participants needed assistance. At the end of week three, two one-hour focus group sessions were conducted with each participant grouping (students and staff separately - it was felt by students that this would provide more privacy and engagement) providing a chance to share their experiences and ask for further clarification.

This session was recorded and was meant to generate themes and dialogue. Overlapping this were the second one-on-one interviews conducted with each participant lasting one-hour.

Note: by this time fellow students of the participants who were interested in the study and wished to take part, were invited to participate. Unfortunately, most students felt overwhelmed with schoolwork and did not want to overcommit.

- At the end of week six, a wrap up focus group session with all participants was conducted with a similar intention as the first focus group sessions. Overlapping this were the final one-on-one interviews conducted with each participant lasting one-hour. This was also an opportunity to debrief and to learn more about the future of the practice as well as the technology in the school.

Phase 3

- Extension of the study into the next semester or year if desired by the school principal, teachers and students. Possibilities included: continued interaction on Facebook with video clips; lectures and recorded video lectures created by the researcher; class projects or assignments to be completed by participants (e.g. essay, video, song, sculpture or painting, presentation) as part of required or optional coursework so that students gain credit through continued work with the coherence technique; and a mini course offered on spirituality by the researcher (i.e. five one-hour presentations throughout semester or year). Also, a potential donation to the school of the PC version of the heart math program upon which interested students could continue their biofeedback training as often as the school would permit was discussed. After a very encouraging focus group session at the

end of the program, the principal decided to purchase the software and earpieces from HeartMath so that any students and teachers interested in carrying on with the practice could do so in years to come.

As an aside, it should be noted that the emWave is not only measuring a person's pulse through the ear sensor, but is also picking up the heart rate variability (HRV) patterns which are created by measuring the space between each heartbeat. These patterns are then analyzed using spectrum analysis and, because specific patterns are associated with highly beneficial physiological functioning, the program aims to "congratulate" those who enter beneficial HRV patterns through rewards like sounds and visual cues that let the user know if they are in low, medium or high coherence. Thus, the more a person practices the quick coherence technique and is able to shift their HRV into healthier patterns, the more congratulatory will be the program.

Debriefing Process and Dissemination of Findings

Ninety days after completion of the study, the participants were invited to attend a de-briefing session. The participants were given the opportunity to choose between telephone or face-to-face sessions. According to Patton (2002), the de-briefing session serves four functions: to ensure ethical guidelines have been met, to discuss any educational benefits received, to review the methodological process for potential revisions, and to encourage a sense of satisfaction in contributing to scientific knowledge and society.

The findings from this study will be distributed and communicated to the public through academic and popular publications, professional development workshops, conference presentations and conversations between the author and other academics.

This research will contribute to the theoretical knowledge about how students, teachers, staff and a principal at an integral high school might experience a balancing of body-mind-spirit through the development of heart intelligence using biofeedback. On a practical level, it is hoped that the research findings of this study will provide useful information (i.e. best practices) on teaching students about the mind-heart connection, spirituality and biofeedback in school settings.

Summary

Overall, the research process was smooth and there were no participants who formally withdrew from the study (although a couple of participants did not continue with the practice part of this study - to be discussed in the next chapter). I was very attentive to the ethical guidelines when I was interacting with the students and teachers and I feel as though the study was conducted in an appropriate and healthy manner.

CHAPTER 4: FINDINGS – AN INTEGRAL THEMATIC OF PARTICIPANTS' STORIES AND EXPERIENCES

Meet the Participants

Out of a desire for coherence in this dissertation, I would like to present the "results" of this study in a narrative fashion. Over and above simply listing all of the participants and each of their responses and interactions with the project, I will embark on a journey through the evolution of the study as it unfolded through time.

BANG!

0.300 million years - First atoms appear

1.5 billion years - Galaxies and stars first emerge

3.00 billion years - The Milky Way forms

9.20 billion years - The earth is born in fire

9.80 billion years - The oceans form in great rain

9.90 billion years - The first cells appear, life begins

13.45 billion years - The continents move, life evolves

13.6997 billion years - Humanity emerges

13.699 8 billion years - The world's religions develop

13.699 9 billion years - Science and technology flourish

13.7 billion years - Global communication evolves

Today - The universe becomes conscious of itself through Marc W. Ross and those interested in learning the great story, the epic of evolution, our ancestry… Can the awareness of this history/directionality provide us with guidance as to how we might best be able to navigate into the future? This question is the one that quietly underlies my

entire research project and was what gave rise to the four principal research aims or questions of this investigation, namely:

1. **Investigate the on-going subjective impact of biofeedback on the participants' mental, emotional and spiritual being (e.g., how does it feel?)**

2. **Discover the impact coherence building has on participants' physicality and overall activities or actions in the world (e.g. what does it live like?)**

3. **Document how participants experience the development of heart intelligence and use of biofeedback in school (e.g. what does it look like with others, in the school culture?)**

4. **Describe/Interpret participants' experiences of practicing coherence within the pre-built structure of a high school (e.g. how does it fit into the school environment?)**

As should be apparent, it is difficult to state when these four questions were actually born. What can be said with more confidence, however, is that the questions that lie at the heart of this investigation were influenced by my evolutionary heritage, the culture in which I was raised, the people with whom I associated, the schools I attended, the thoughts I had, the emotions that flooded my system, the impact I had on other people, the systems of which I was and am a part, and innumerable other factors. These multiple influences led me to the Faculty of Education at the University of Calgary to conduct my PhD on the development of heart intelligence through biofeedback use in the classroom, and in the school system more generally. A similar list of influences has impacted each of the participants in this investigation, not to mention the impact of your own history as reader. So who exactly were these other people, these co-investigators, co-creators and participants, sidekicks in the development of what you are currently reading? What follows is a brief (painfully brief because these people are so much more than a few little words typed here) characterization of each participant. For the sake of symmetry, I

have grouped the participants into two cohorts: the students and the staff. Having met this band of unlikely heroes, I will present some of the important themes that emerged from our various conversations, digital exchanges, observations and group dialogues. These themes will be placed into the four quadrants of the integral model in order to continue the quest for coherence, elegance and integration that is this dissertation.

Before listing the participants, a quick note on the types of student who typically go to the Integral High School is appropriate. Generally, students at IHS have struggled in the regular school system. They have had interpersonal difficulties with peers or staff, they have found the curriculum to be too inflexible or have not been able to keep up with other students. They have had challenging home lives that have often left them without a lot of guidance in their attempts to graduate from high school. They have struggled with addictions, or they have been challenged with various types of disabilities. In essence, IHS is a refuge for that student who has not been able to get along in the regular school system. It is also a last stop. If students can't get things together at this alternative school with all of its flexibility and its support on a very personal level, most do not ever return to high school.

According to the website, as well as interviews with the staff, the students at Integral High come to complete their diplomas because of the specific environment that the school offers/fosters. With far smaller class sizes than a normal school, student time spent voting and getting involved in the school management, close relationships with mentors, and camping trips as a group to encourage a sense of belonging and community, IHS is tailored to opening up its doors and heart to the "outcast."

Here are what some of the students have said about "Alti." as it is called.

- If it wasn't for Alti, I would either have dropped out or been in rehab. (Grade 12 student).
- At my junior high, I was picked on all the time and would go home crying every day. Here, I have found a home. (Grade 12 student).
- At my other high school, I had no friends and was overwhelmed by how big it was. When I came to Alti the change was overnight – I want to come to school and my marks have gone up 20%. I like the small setting and the 1:1 with teachers. (Grade 12 student)

So it was into this environment, one filled with a band of marginalized youth and dedicated teachers and staff (not to mention the trusty dog), that I rolled in with my wheelchair, armed with ideas about spirituality, heart intelligence and the possibility for building coherence through the use of biofeedback. After the initial recruitment, I ended up in communication with the following list of participants (code names were either self-created or given by me):

*Note: transcripts and Facebook/e-mail communications were left **unedited** for the sake of authenticity and to let the data speak for itself.*

Figure 15. The 15 participants divided into student and teacher cohorts.

Ash: serene, regal and highly sensitive. She likes communicating on Facebook with emoticons like :-$ or :-0 and lots of :]. She smokes, is 18 years old and wants to go to art school after graduating. She is highly interested in spirituality and does some yoga. She wants to increase her heart intelligence so that she can "bring more of my true inner self into the outer world. To learn more about who I am as a person and to be able to communicate that through my actions."

THE guy: highly cognitively intelligent, funny, laid-back and tech savvy. Skeptical, very skeptical. He, like all of the students who participated, has had a challenging upbringing fraught with family problems and schooling issues. He has also

had some worries about his heart, so he was interested in participating for this reason as well as his interest in technology. Completely uninterested in spirituality. When asked what he finds most pleasing in life, THE guy answered, “Sex, life, computers, and destruction.”

August: deeply spiritual, patient and kind. She has lived in different homes and with different people throughout her life. Loves boys. Loves music. Has been in sweat lodges and engaged in native dancing. She has a very calm disposition and smiles easily. However, she has faced many challenges. When I asked why she chose to participate, she said, “I would like to get used to being able to automatically change the way my heart feels about different things, and get my emotions under control. I think it will really help with my anxiety.” The two things that bring her great joy are: “Friends with positive energies and extra sleep :D”

K: engaging, caring and musical. He is well-liked and socially nimble. He has done a lot of drugs in the past, but has stopped completely and is now focused on meditation and music. He is serious about his schoolwork and wants to graduate. He has a great girlfriend that he loves very much. K was very interested in the project, but had difficulty staying committed and proved hard to track down for communications!

Pi: cool, socially minded and empathic. This young man is very much in love with his girlfriend. Quite multi-directional (i.e. ADD) and physically strong, Pi has being interested in spirituality for quite some time. He does a lot of research on the subject and is particularly interested in Buddhism. He connects with his father on the subject. When I asked him why he was participating, he told me, “I'm a very spiritual person and I think that being able to listen to my heart as a second opinion over my brain will make the

decisions I make more influenced by what I really want. I would like to gain a lot more self-confidence as well."

A.W.E.: extroverted, strong and vivacious. The word "firecracker" comes to mind. She is very engaged in her schoolwork and more generally in the school culture. She is well connected to her family and loves to travel. She is conscientious – her initial e-mail response was very neat and tidy with a special font and indents etc. I asked her what her goals were for her participation and she told me that she wanted to relax her mind and soothe her emotions when they get too excited. She has big dreams of pursuing psychology or social work at NYU!

Moon: powerful, fun loving and rebellious. This young punk rocker has some serious excitement for life! She is a huge fan of mosh pits and of emo fashions. She likes to say "like" as do most participants (me included!). She is interested in yoga and is very excited about the idea of an intelligent heart. She feels very connected to her heart chakra. She, like most others, has been on medications. She also did some cutting of her wrists when she was upset several years ago. I asked her why she wanted to participate, and she responded: "I have seen your presentation before here, last year, and your story really inspired me. Recently I have been meditating and reading up a bit on energy healing. I think that working with the heart intelligence program could really help me get more in touch with my intuitive side. I am also what you would call an Indigo child, which are naturally very intuitive."

WildChild: feminine, intuitive, beautiful and strong willed. Instantly able to achieve high scores on the biofeedback device and very attuned to her own body, she has practiced yoga and other spiritual techniques for several years (this has been encouraged

by her mother). When I asked her why she was interested in the project, she responded, “Taking the time to practice and strengthen my heart’s thinking, so I may soon work into its full strength and be able to work on balancing myself - thinking fully with both my heart and my head. In a way I feel as if I've awakened a "superpower" within me I always knew I had, but I didn't know how to control or use on command, and just in everyday life. Turning that instinct that has always been there into my true self (and not just part of myself). Can you dig it?” WildChild, true to her name, was expelled from the school and participated with me through Facebook and meetings at coffee houses. (She is now back completing her studies.)

Certainly, this provides only a glimpse of their characters, but the descriptions give the minimum of background needed as we begin our journey... I have a tremendous amount of gratitude and humility, having had the chance to interact with such a wild and fascinating bunch of individuals. Next, a similar look at some of the adult participants, before we dive into the themes that emanated from our interactions and time together.

King: serious, dedicated, conscientious and busy. This man has a lot on his plate. His job creates a lot of stress that sometimes keeps him up at night, unable to sleep. He was hoping that participation in this study might provide him with some tools to handle his stress more effectively. He loves to walk his dog and he has a loving family that he cares about very much. When asked to explain why he was participating in the study, he told me, “Given that the school is founded on the Circle of Courage and that spirituality is part of the Circle, I am interested to see how spirituality and technology link. On a personal level, I am interested to see how biofeedback can serve to reduce stress and perhaps improve sleep.”

Wizzard: sharp, technologically inclined and very caring. Having led meditation groups at the school on and off over the past year, Wizzard is highly interested in meditation and spirituality. He is very familiar with the theoretical lens I am using for this dissertation and had a lot to say about the mind-body connection. He had heard about HeartMath previous to my presentation, and thought it would be very interesting to experiment with it. Having a background in computers and spirituality led him to believe that this study would be of value to him. He told me, "I have been interested in biofeedback for a while and wanted a chance to try it. I have also heard of HeartMath – and in fact am a member of a "discussion group" and we talked about HeartMath at one point – so wanted to try it out. I am also a regular meditator (meditate at least 1 hour a day), so wanted to compare with this."

Princess: loving, gentle and usually smiling. She is very mellow and most of the students love her. She is motherly (she has two sons and is divorced) and cares very much for her students and the people at the school. Very creative and artistic, she has a keen interest in helping people lead better lives. Why did she want to participate in the study? "The whole concept of it interests me and I want to learn more about the research that is being done and the medical discoveries they have made in regards to the heart functioning similar to the brain. I'd like to learn more about the scientific end for sure, but also how it could affect me personally or the students I work with. I want to use it for stress, for physical well being, and for increasing my creativity."

Guide: patient, kind, accommodating and helpful. He is very much into psychology and modern forms of spirituality. Eckhart Tolle is one of his favourite teachers at the moment and he deeply appreciates the emphasis on being present, being

aware and being open to the moment, the now. As with all of the staff and teachers, he has a stressful job that involves a lot of juggling. He loves working with students. He told me that he might be able to incorporate it into the work he does with his own students as well as perhaps benefit from it personally. He really felt that this program had a lot of potential to help students and the whole school culture, in general.

Giant: laid-back, imposing and fun to be with. He is well-versed in teaching and counselling and has worked with students for many years. He told me that he especially enjoys the challenge of working with students at IHS. A big fan of gardening and a big man, physically, he is also very much interested in the spiritual side of life… the mystery of it all. He was extremely excited after my presentation and came up to me afterward to tell me how great he thought the project was. He wanted to work on lowering his blood pressure and relaxing his physiology.

Mother: caring, diligent, hard-working and sensitive. She was excited to be part of the study as it fit nicely with her recent spike in interest in the world of spirituality and healthy living. She too is someone who has had her fair share of trials and tribulations including family issues, moves, deaths, and personal health issues. She explained to me why she wanted to learn about heart intelligence and biofeedback: "I am very interested in good health and positive changes in my life… this has been reflected in the books I choose to read, the TV shows I select to watch, the friends surrounding me. I also had three years filled with bad family news and stress and need, at this time, to learn to deal with my stress."

Pegasus: laughter, energy and movement characterize this woman. She has recently been through some very challenging times with her health and with her family.

She knows firsthand just how challenging students at the IHS can be, but she truly cares about them. She likes to ride motorcycles and is very good at math. She explained, “I would like to understand what I can do to influence my body's reactions. ie. Can I do something to influence my heart rate in different situations? To control my anxiety?”

As should be clear, I also have a tremendous amount of respect for these teachers and staff members who work diligently, tirelessly, to try and educate and improve the lives of students. They are working in a very challenging environment with minimal amounts of recognition and appreciation. I recognize and appreciate everything that they put into their jobs as well as their interest in my research study. So, with these two cohorts in mind, let us begin to look at the personal, collective and overall experience that unfolded over the course of this study on the development of heart intelligence through the use of biofeedback at IHS.

Integral Quadrant Thematic

Moving along in the evolution or story of this research endeavour, we reconnect at this point with the four quadrants of the integral model. In the upper left quadrant, are the stories, feelings, thoughts and perceptions of the participants as they experienced interviews, practices, presentations, communications and everything else related to the study. In this subjective space, there is a particular focus on the inner world of each person.

In the upper right quadrant, there is a shift as we begin paying closer attention to specific behaviours and the various physiological/mental/emotional conditions the participants experienced. We are interested here, for instance, in how many times participants actually sat down to practice with the biofeedback technology and what it felt

like physically when they entered the state of coherence, if they did it all. How did individual participants act during the course of this study?

Next, in the lower left quadrant, we attempt to get a sense of the school culture at Integral High School. For example, what might have influenced participation in the study? Could different teaching styles, particular expectations from students and teachers, more flexibility in completing assignments, talent shows, group cigarette smoking, and first name basis protocols have made their mark on this study? The focus here is on the inter-subjective domain and how it has inter-penetrated the process as well is the findings of the study.

And what about the lower right quadrant and its interest in the inter-objective space created at the school? The art on walls, location, structure of the school, computer set up, and even the colours in this space must certainly leave a mark on the story of this research project. Taken together, these four fundamental perspectives act as a container for what happened between me, the participants, the IHS, the U of C, the educational system, the techno-sphere, the eco-sphere and the noos-sphere AND... As co-creators in the possibility of evolving the heart of education, there were many questions that we all wrestled with and were challenged by over the course of several months. We tangled, battled and danced with questions like the ones shown in the Figure below:

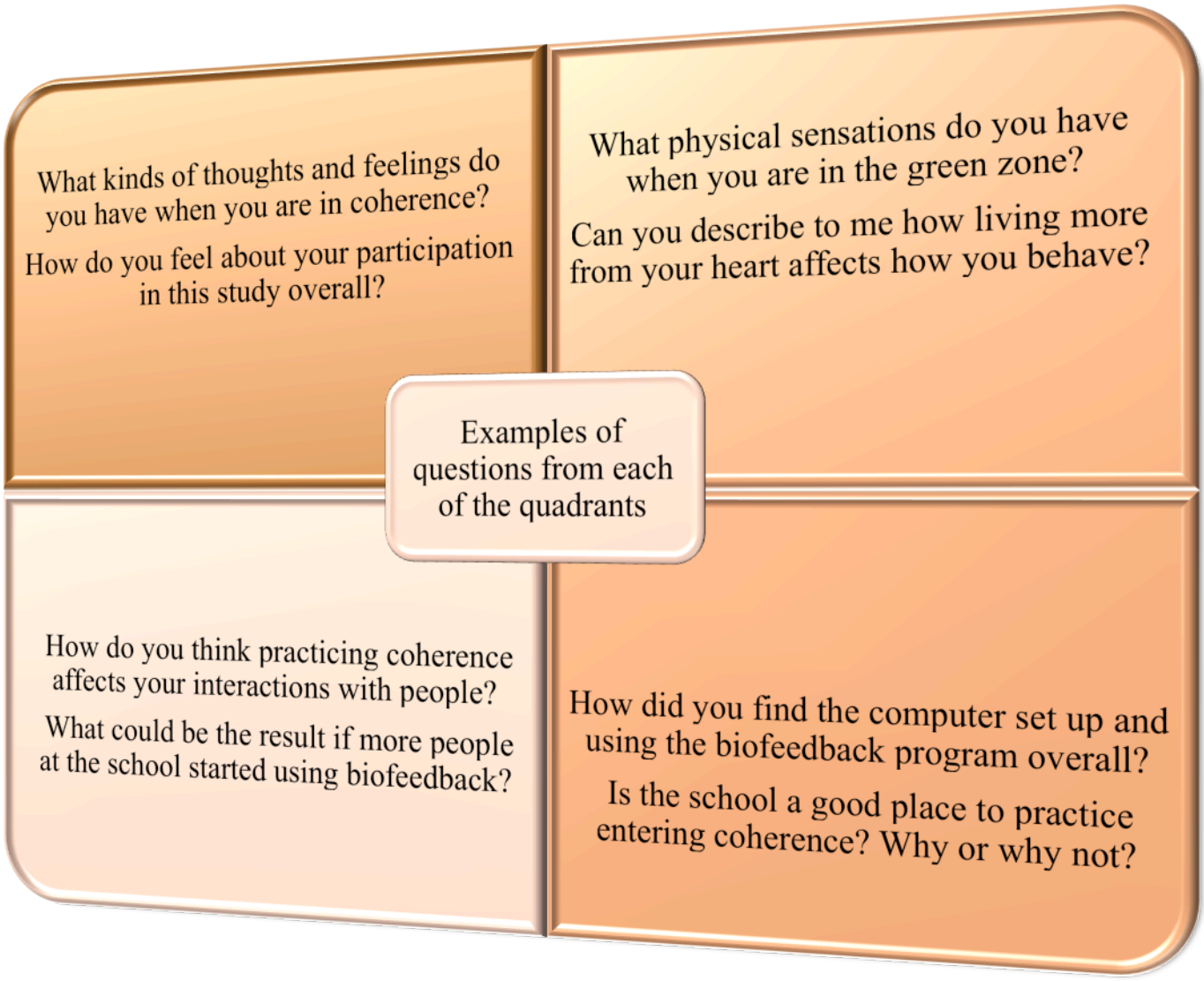

Figure 16. The questions of this study situated within the quadrants of the integral model.

After several months of journeying together, we generated a lot of data and information that has been synthesized and filtered through the strainer of parsimony in order to arrive at eight primary themes. By dividing the themes into the quadrants, we end up with two themes that match roughly with each of the four elements of the integral model: subjective, objective, inter-subjective and inter-objective. Again, I offer the gentle reminder that although this is an integral hermeneutic phenomenological investigation and is a Zone # 1 study (please refer to Chapter 3) that is taking place mainly in the two

left-hand quadrants - subjective and intersubjective or phenomenological and hermeneutic - the quadrant model can be a useful tool in trying to understand the individual and collective objective worlds as well. With this in mind, we turn first to the upper left quadrant.

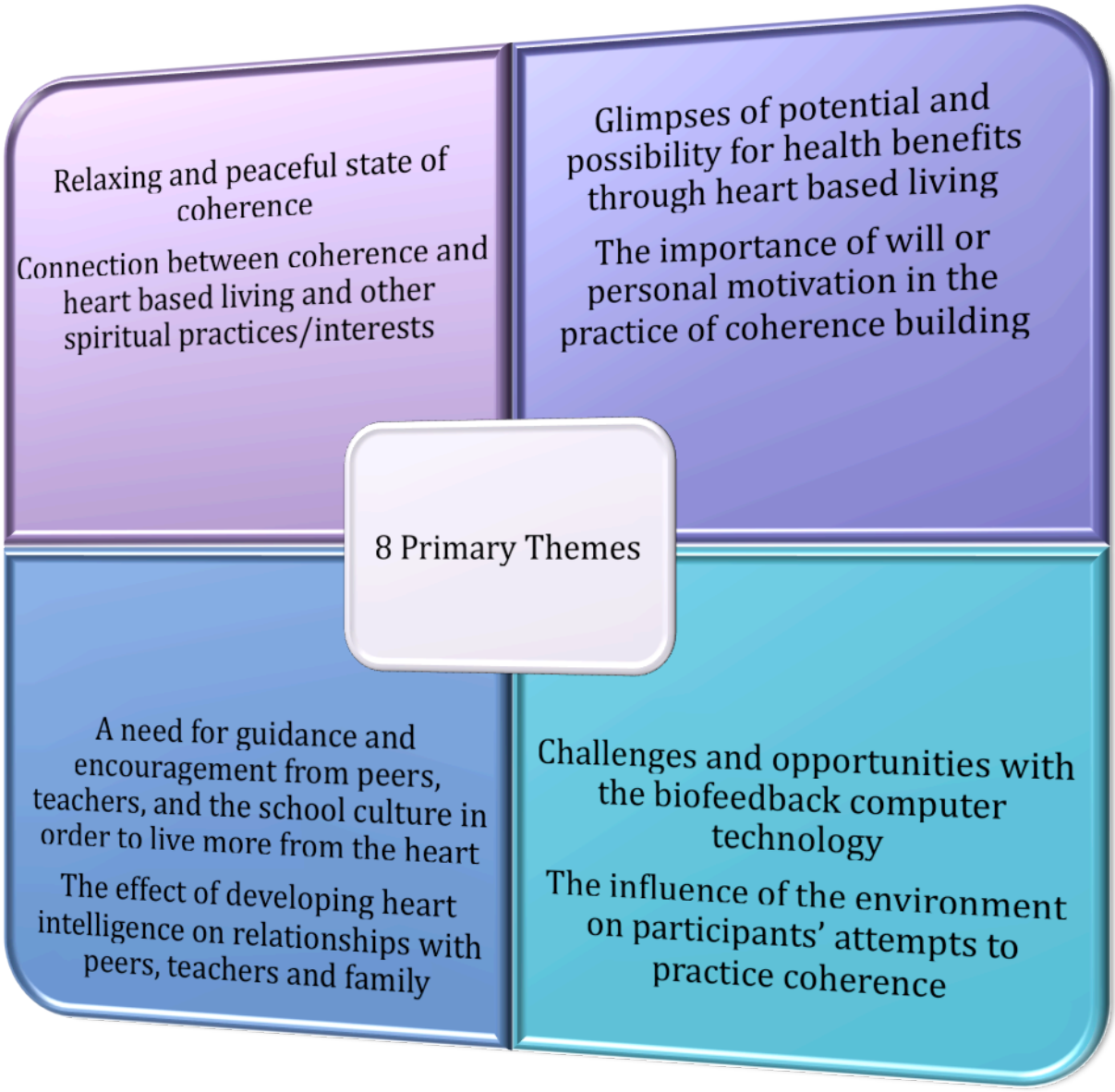

Figure 16. The eight primary themes within the quadrants.

Upper Left Quadrant

Relaxing and Peaceful State of Coherence

Before moving too quickly into a description of the state of coherence as it was reached by a majority of the participants (with high degrees of variability in the number of times practiced and the length of time sustained during each practice period), it is important to note that most of us spend most of our time out of coherence or in incoherence. During the initial sessions when I was first training participants and teaching them how to engage the quick coherence technique, I had everyone conduct a baseline measure and recorded their coherence scores as they were talking to me, without making any effort to relax or get into the state of coherence. According to McCraty (1999), this is where the majority of people spend the majority of their time. It would not be surprising if you had very similar results to the ones captured in the screen below if you were to be measured right now as you read. The wave pattern is choppy and sporadic and not very coherent. The red bar indicating 100% is the reading from this graph explaining that the individual who was monitored for this session spent all of the time in low coherence (aprox. 6 minutes).

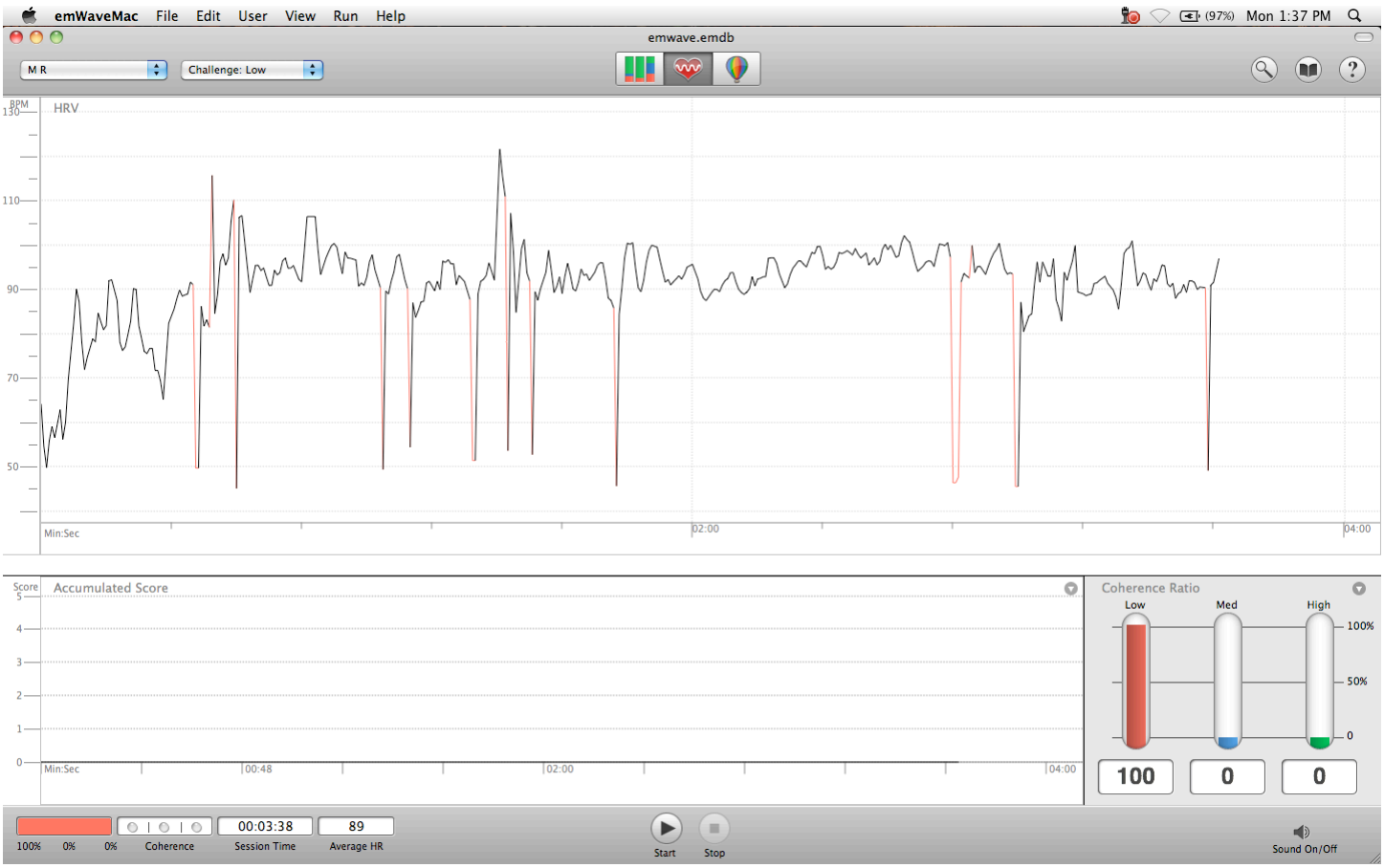

Figure 18. Low coherence on the emWave.

Fortunately, with some effort and the proper guidance, we are all capable of changing our inner physiological states as well as our emotions. This is precisely what the coherence technique is for and what the emWave was designed to measure. To my surprise, every single participant who I first coached was able to change their scores from the all-red zone or completely incoherent state to one that included moderate levels of medium or high coherence. Some were more skilled than others and had a particular knack for connecting with their hearts and altering their states. Others were easily discouraged and gave up quickly before any meaningful results were obtained. For instance Guide, when asked if he knew how to access the state of coherence at the three-week mark replied, "You know it just kind of went between the striving. Striving to find

the coherence, striving to find the way to influence that and a bit of frustration over, in general, not being able to find the key to the green."

Interestingly, it was the women participants who achieved the highest scores. The following screen shot was captured near the end of the study and shows a marked difference from the first image shown above. Here, the individual was able to spend the entire session in coherence and received 100% scores in the green (aprox. 5 minutes).

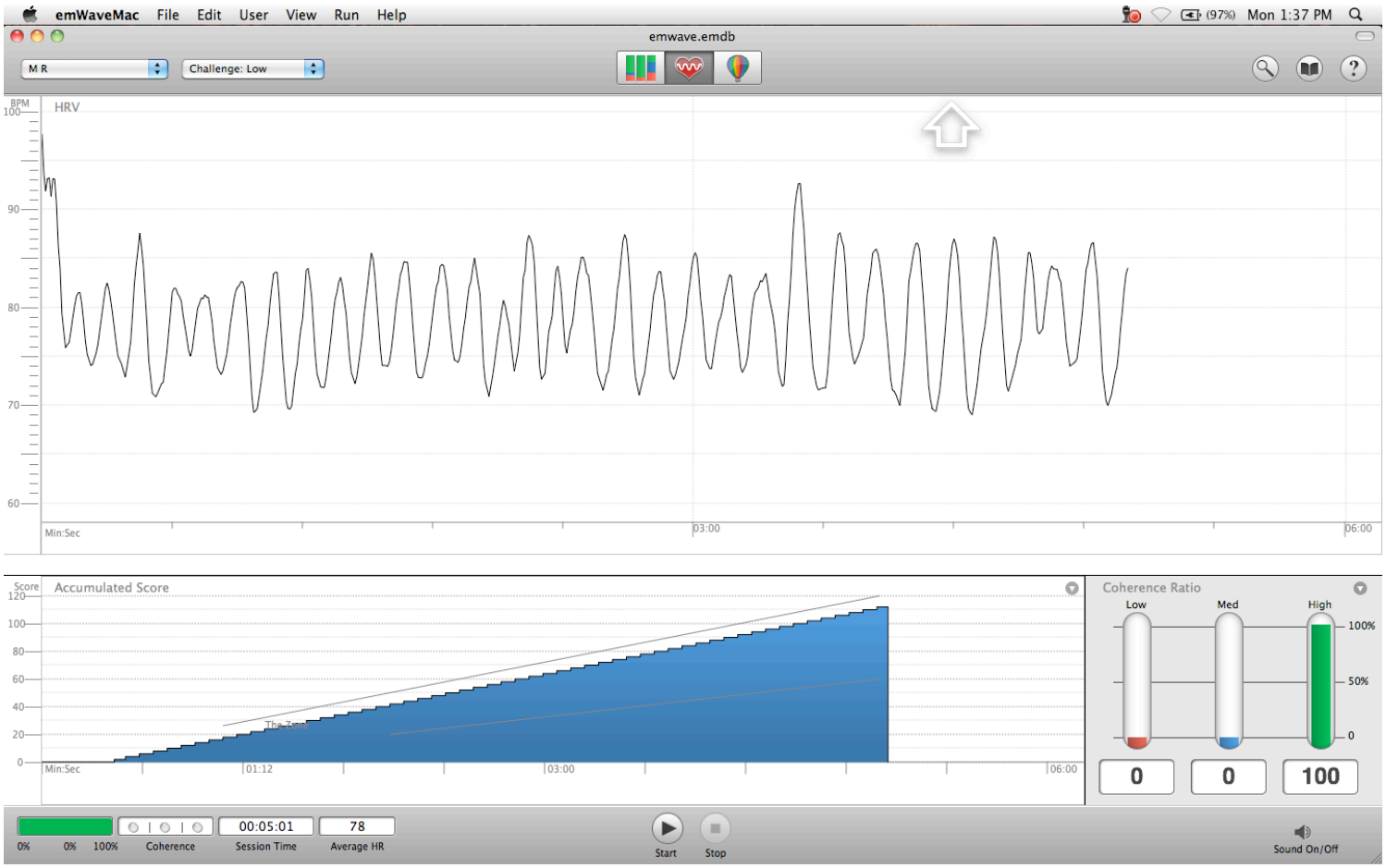

Figure 19. High coherence on the emWave.

So what is the subjective experience of coherence? What does it feel like and how do people describe this state when asked about it? Most participants said that it was a very peaceful place. They told me it was relaxing and calming. They could feel a lot of relief from daily pressures and some participants explained that if they spent enough time in coherence, this affected the rest of their day: how they saw things; how they felt overall; how they responded to challenges; how they communicated with people. One evening, while on Facebook, I had the following exchange with one of the teachers who tried to describe what coherence was like for her:

9:59pm

umm, i guess for me the whole coherence thing is like a positive frame of mind...

open and heart first…. that's my 'it' hahah

9:59pm Me

and you had mentioned that you felt energy, can you describe that more to me?

9:59pm

i think so….. it's like i kind of get out of my body just a little bit...like about a foot around my head and it's like an energy force that i can feel… ok that sounded really weird… hahah

10:00pm Me

Not at all not at all… it sounds almost spiritual.

10:01pm

oh yes it is ☺

10:01pm Me

how so?

10:02pm

well for me its what i would align with praying or feeling god's presence god or energy

10:02pm Me

Very cool, if you had to describe the emotion, what would you say?

10:02pm

peace

contentment

joy

happiness

open

gratitude

10:03pm Me

beautiful

10:03pm

that too!! Lol

Princess further explained that when she was entering a state of coherence and tuning into her heart, she would think of words like grateful, love and kindness. She actually thought about those words and then associated positive images in her mind that brought up pleasant emotions. Here is how she described one such image,

> My grandma's house is one of my happy places. And it's like you know the room with the breeze coming through and you can hear the poplars. Like it's kind of more than one sense, you know. Like it's auditory and olfactory. Yeah, it's kind

of everything. So it's definitely one of the places that I use. And then also, yeah, just like out on a motorcycle and the air and smells and everything too.

Some of the students found the state of coherence to be highly enjoyable. WildChild reported,

> Like it's kind of like an on/off switch and I'm starting to have control over it. I'm still kind of training myself to get into that state without like being pushed. So I just want to be able to like close my eyes and find my center immediately, instead of having to try for like ten, fifteen minutes to get there. So if I just remembered my heart, whenever I started to get angry, it would just all melt away and I would find my center again. It was a very very good feeling.

Because of some school issues, WildChild ended up being suspended and this only allowed her to practice with the technology a few times before leaving. However, she responded to my first e-mail asking about progress and her overall experience:

> Practiced - 3 times
>
> Experiences - Mellow and whole
>
> Benefits - Holy cow! Definitely, I'm really learning to control my anger in a positive manner by focusing on my heart when I am feeling stressed. It really wipes away the negativity and leaves me with a purple glow.
>
> Help? Thus far, no. Thank you for your support though

Subsequently we stayed in contact via Facebook. Here are some clips of conversations we had together surrounding the idea of heart intelligence and WildChild's personal experience with the practice of coherence building:

> I: What was your experience with the program like? And then without it?

P: It was very relaxing, I found just listening to music helped me get more green... my mind tended to wander too much without it.

I: So as you listened to music, this helps you generate a feeling?

P: mhm....of calm and centered.

I: So did those practices leak into the rest of your life in some way?

P: I find I can communicate with animals better.... using heart vibrations.... like they just don't run away as much, the wild ones I mean, they seem to wander close enough for me to watch them for a bit, it's neat.

I: so they come to you when you're in coherence?

P: well I seem to just be that way more and more often... it's instinct for my body to be that way

I: So coherence is a natural state you're telling me.

P: yeah... we just have to re-train our bodies... to pick up on these patterns/feelings, whatever you want to recognize it as.

I: So I guess this means that you are still using what you learned with the biofeedback device at school in your regular life outside of class?

P: yeah :)

I: And do you see this continuing into your future? Using your heart to enter coherence, I mean?

P: mhm, definitely

I: So besides with the animals, how do you use the coherence technique or your heart? Like with friends, by yourself etc.?

P: pretty much life in general.... it's hard to pinpoint how it's changed, cause it feels so natural.... like this is how it should have been all along.

I: can you give me some examples of what you might use it for?

P: like i think that's how it used to be everyone in tune with everything, anything with the essence of life... since humans seem to be the only ones who use Words, you had to use transfers of energy, emotions and such to communicate with nature.

I: Cool. So, if you had to tell me how the coherence technique will help you over the next week, what would you say?

P: perhaps with a problem I will come across.... my dreams have been more vivid, since I started doing this program…

I: So, do you mind if I ask you to keep practicing even though you're not at school and even though you don't have the computer program? I would love to be able to continue learning from you.

Another student who found the practice of building coherence useful responded to this question in the following way:

I: So do you think that you can say to me "I know what the state of coherence is?"

P: Yeah definitely. Like I think it is just being able to be aware of like all of your surroundings kind of and being like in a good state of mind. That's what I think it is for me. Peace.

THE guy suggested that for him, "It reminds me of like meditation. You're just trying to clear your mind and get everything like calm. I don't know. And it's funny, it's an odd state." For another student, Pi,

When I go into the coherence state, I notice like most of the time, I like have my hands on my chest, so I can feel it. And like if it's going really fast, I like think about all of the things that like make me happy, like my successes, like everything I'm doing well and where I'm trying to get to. And I notice like when I think about those things, if I'm worried about it, my heart will go faster. And if I'm not, like if I'm like oh yeah, I can do it you know, I'll like calm down and everything. And I'll be at like a neutral state and I won't like be worried or all kind of tense, you know. It's like kind of the energy around me. Like you know how everybody has kind of like energy all around them? Like I can feel that when it's like changing and stuff like that. It's much smoother… more balanced.

Breaking out of the mould in my efforts to understand what coherence is like from the subjective experience of participants, I decided to ask a series of questions that I felt might help get a much different perspective on what coherence is like from the inside out. Thus, drawing from the five senses of human awareness, I asked a series of what participants felt to be rather strange questions. Here is a collection of responses to the questions that might give some kind of intuitive, non-rational understanding of coherence from within. There were eight participants who were interested in answering the questions, therefore the question followed by the eight responses are what I present. It may be an interesting exercise for you to relax a bit into the state of coherence by gently focusing on your heart area, breathing rhythmically and bringing an open, authentic, peaceful easiness into your reading of these responses:

I: What colour would it be?

P: light blue

P: Well, I'm going to say blue.

P: Blue. I say blue because where I am always the calmest is in, on or around water. It's just me and so I'm thinking of appreciation and there is a lake and a boat and you know its all blue.

P: I think it would be in-between blue and green.

P: I would say yellow, green, and blue.

P: For me, I'm very connected to the earth, so it's more like earth tones and green and stuff like that.

P: I would say like again, if I'm really focusing on the heart first, its green and pink. But then white bright would be the overall. It's a heart shape like a cartoon kind of thing. And yeah, it's divided like green and pink... and then the white light comes through it.

P: Like it's a red/purple kind of a colour you know. Like the purple heart you know. Royal, regal kind of a purple. A blood kind of a purple.

I: What texture would it be?

P: Silk.

P: A freshly cut sheet of metal with a smooth surface. Smooth up and down.

P: Like a very soft, loving embrace from a mother or a grandmother or someone that you feel safe with. But is also very gentle and kind.

P: I think it would be like smooth kind of. Almost like soft. Like almost like you could smooch it, but you don't want to.

P: Well, it would be smooth.

P: Like smooth.

P: Well, it would be smooth, I guess.

P: It's certainly soft you know. It's a soft texture... it's soft like feathery pillows... it's soft and fluid you know, like a whipped cream I guess.

I: What shape would it be?

P: A circle.

P: It would be a ball.

P: Round.

P: Well, I'm thinking of this wave… ebbing and flowing.

P: It wasn't angular at all. So it didn't have sharp corners on it. It was rounded, so that it was fluid. It kind of ebbed back and forth for me you know. It was dynamic.

P: Well okay, when I'm doing my shapes, it's like geometric shapes. But when it's coming out it's just like light projecting kind of... no shape, just straight light.

P: Oh man! These are really going off into subjectivity. What shape would they be? Octagon.

P: I think that it's ever changing. It depends on where your state of mind is and I believe that with anything, you see it at that point in time. It always changes.

I: What would it taste like?

P: Cotton candy. Like something really sweet.

P: It would taste like sweet, like maybe like a really ripe strawberry.

P: Well, I guess I would say slightly sweet, but not overly sweet. Not sweet to the point of being annoying, but somewhat sweet. Yeah, it's a nice feeling.

P: Something pure… Water

P: Oh man! What would it taste like? I don't know; something like water. It tastes like water.

P: Something cool.

P: Like everything that's good for you. Bland (Laughs)

P: McDonald's French fries.

I: What would it sound like?

P: A pulse monitor. Just a high pitch beep sounding.

P: Probably like a medium pitch of just like constant sound, like a soothing sound.

P: You know it had a natural sound to it... Like I mean peaceful, quiet, natural sounds you know. The wind blowing, birds chirping, geese calling... those were the sounds in my head. And sort of natural body sounds, you know the swoosh of blood. The buzz of the energy along nerves, so those would be words I would use.

P: Maybe the sound of water. Like a stream, a mountain stream. That kind of a sound.

P: I don't know. Silence.

P: I don't think there is a sound... when I'm really, really into it, there's no sound. Yeah, it's quiet.

P: The Beetles. Probably the whole Sergeant Pepper album. Other than that I don't know. It's got a lot of good stuff on it.

P: Probably something like really epic melody that goes along with every scene of your life.

I: What would it smell like?

P: It would smell like forestry probably. Not a city smell.

P: Pine trees or grass.

P: Probably wet earth, so just after a rain. So it's just soaking up everything and releasing the smell of earth.

P: What would coherence smell like? I'm thinking like smells of nature... the natural world.

P: Like this, like spring. Fresh, new.

P: What would it smell like? Fresh flowers.

P: It was fresh. It didn't have a stale odour to it. So it was fresh and it was alive.

I: And if it were an animal, what would it be?

P: It would be like a butterfly.

P: For me it would be bird-like. And even more specific in terms of bird-like, it would be a migratory kind of a bird. So that's my spirit... it travels back and forth, so that's my animal spirit.

P: A chinchilla. Yeah. A mountain squirrel. They're really like fuzzy and warm and they have a huge, thick coat, but they're really small.

P: A cat, because they're very mysterious and calm.

P: It would be a really fluffy Persian kitten.

P: I'm going to say bear and I don't know why.

P: There's lots coming here too. If it was an animal, what would it be? It would be a bear sleeping on a log.

P: An animal? To me it's so like unearthly and then to bring it back to try to compare it to an animal, like I don't know if I could. I think its way beyond an animal you know?

Perhaps a little bizarre, perhaps very accurate, these various responses clearly had some similarities. Is worth noting that these were responses given to me on an individual basis, the participants did not feed off of each other in the focus groups for this line of questioning. By asking these types of questions, we do gain a novel perspective on what the state of coherence is all about. The sensory window on coherence proved to be a unique way of gathering data on this inner experience. Smooth, round, fresh, blue, earthy, sweet, pulsing and musical, and furry, mysterious and comfortable: this is roughly the state of coherence when felt through the senses.

Connection Between Coherence and Heart Based Living and other Spiritual Practices/Interests

The majority of participants were very interested in spirituality and ideas of transcendence or meditation. Most participants could see connections between their own personal spiritual journey and the development of heart intelligence. In fact, it was the spiritual aspect that drew the majority of the participants into taking part in this research. What follows is a collection of conversations and quotes from participants who shared a little bit about their personal spirituality as well as some the possible links between their own views of the divine and its relation to the heart. For example, in response to the question: what does spirituality mean to you? Ash responded,

> P: It's a huge part of my life. Huge. Like not a set religion mostly, but just like the spirit and the mind and the body obviously is just like really important to me.
>
> I: In what way?

P: Well, to find like happiness, like you need happiness within yourself and I think spirituality has helped me with that a lot. Like not relying on something else to make you happy, just like being happy with yourself....

I: Okay. And that kind of leads into my next question, which touches on meditation. So you've tried meditation; you do meditation?

P: Yes.

I: And what is that like and what is the process?

P: It's just really like calming your inner mind I guess and concentrate on the breathing. Just like letting - not really even thinking about letting your thoughts like flow out, so that you can just concentrate on like what's happening now. Like not worrying about anything.

I: Yeah. And so the experiences that you've had with it have been good, bad, neutral?

P: Most of them have been good. Like there have been bad times, but like you know after bad times comes good times. So it's just getting through all the negativity and stuff.

I: So when was the last time that you've sat down for meditation?

P: Last night.

I: How long do you go for?

P: Ten minutes to like half an hour or forty-five minutes.

This exchange occurred during our first interview, so when we spoke later on during the study I was curious to know whether the work she had done with the biofeedback program and the quick coherence technique had impacted her meditations in

any way. She found that it was a good complement to her yoga and especially to her meditation practice. She started incorporating her heart into her spiritual life, so to speak. Specifically, "I feel that using my heart to centre myself before meditation is a very effective way to make my meditations more powerful. It was a good primer." Furthermore, Ash also agreed when I asked if she had gained more awareness of her inner life through the practice of coherence building. She felt as though she were more aware of her subjective experience, "especially with respect to my heart."

Another student, K, also had a rich spiritual life before beginning the training program:

> I: Cool. You mentioned that you'd done a little bit of meditation and is that something that is regular for you?
>
> P: I've gone through periods where I'll do it like every day and twice a day. But right now it's about three or four times a week I try and get to it. In the summer I do it a lot more, like when I have free time and when I can go out and like just sit in the backyard and do it. But like a lot of the time recently, I'll try to meditate and I was like in my room when I'm like finally done with everything and I'm not falling asleep. Like halfway through---like I get to the half-way point where I'm just like kind of relaxed and things are starting to clear up and then I'm just out like a light for the rest of the night.
>
> I: So with that meditation, what do you do? Like is the heart playing any role at all?
>
> P: Oh yeah. Well, like usually for me its like sit in like a dark room. Usually it's like I sit down cross-legged and it's like close my eyes. Usually I start to like

focus on my breathing and then like my heart usually goes in tune with my breathing. And then it just feels like I'm relaxing, just like feel the rhythm of things. And then after that it's just kind of about like your thoughts. Like not like not thinking, but letting them just go. Yeah, as opposed to just like focusing on certain things. And usually after about - say like 45 minutes or so, then its like pretty like free flowing thoughts. And it usually helps me like take a new perspective on things. Yeah. Like basically I figure like the things that are really important, they'll start to come up and when I actually like listen to my heart and see a lot of solutions in life you know.

I: So that's an example of like a spiritual practice. Have you ever had any other spiritual practices?

P: I do praying. Not necessarily as a religious rite of praying. Just more of a - it's kind of a meditation, but like - asking for help. It's just a way to disconnect myself from the situation. Like seeing what I'm really struggling with and all the symptoms and problems that I would have. And meditation is like the best thing. And like meditation is when the answer is going to come clearer and where I can really get a handle on stuff.

Pi, with respect to spirituality and religion, said that he is very spiritual. He spends a lot of time studying different philosophers and spiritual teachers. He told me,

I'm not necessarily religious. But there's something out there. Like when I pray, it's not to a God or to Jesus or to whatever. It's to the universe, because say there is a God and say there is Jesus. If I'm going to everything in the universe, like everything that is out there could potentially hear me. Whereas if I'm just saying

like Dear God, its only going to be God listening because like anything else is going to be happening. Well, I've been following a lot of Hinduism and that's like the main spirituality that I follow.

A related expression of this sentiment came from August who told me:

I don't really believe in God or whatever, but I do believe that there is somebody who created everything. I believe that everything created by mother Earth has a spirit and that we are all connected one way or another. It's not like a big thing but it's there.... I can feel it in my chest... if like I see somebody vandalizing property or the ground... cutting down trees... it just kind of makes me sad because I know that everything the earth gives us is a gift and that's heartbreaking that people have to go and destroy these beautiful things to make their own things. I'm mostly in touch with mother Earth and the creator.

When I asked if she had any spiritual practices, per se, she responded,

Yeah. I haven't been to any spiritual gatherings in so long though. But it's like really awesome, because we like go into a sweat lodge and we do like four rounds. And like every round, we come out and we get some water and everything. But basically, after like the whole four rounds are done, you just feel like totally cleansed and you just feel like clean and like everything. It's a really good feeling. Kind of like HeartMath. There's something sort of the same I guess…

Princess's spiritual practice includes,

I pray or meditate or give thanks every day, like before I get out of bed. That's the first thing I do, just kind of centre and just go through all the good stuff. I've done

> that for a long, long time... And I guess yeah, for sure at times where it is like stress or whatever. You know you always want to reconnect... the spiritual tank drops and so you get back and fill it up, right? So learning about my heart intelligence and all of this stuff is definitely going to help… It is helping already I guess.

Not everyone who participated in the study had a clear spiritual interest or connection. Perhaps the most vocal and anti-spiritual participant was one of the students, THE guy. Here is what he told me during our first interview, "Yeah. I don't believe in spirits, religion, anything like that. It can't be known really. But I don't think anything about spirituality. I'm pretty skeptical about everything, but yeah, I don't believe any of that crap... I don't care for any of those things."

Upper Right Quadrant

Glimpses of Potential and Possibility for Health Benefits through Heart Based Living

Many of the participants stated that using the quick coherence technique by focusing on the area of the heart, breathing rhythmically through the heart and then entertaining and uplifting emotion was a great way to reduce stress. Stress seems to be a big issue in most of our lives and the IHS was no exception. Here is what one of the students told me early on in the process,

> If there was something that could be like taught to like chill people out, especially like during times of stress, like exams, then I think people would have a better mindset kind of going into those kind of things like exams and have a better way of handling and dealing with like the stress that comes with it." HeartMath was

meant to be one of these some-things. For some, it was effective, as is evidenced in the following conversation with Giant:

I: Are there certain situations that bring up a lot of stress?

P: Certainly there's things at home that are stressful you know. Kids can stress you out; the wife can stress you out. There's certain stresses here at school you know, but again, you just have to be persistent and work through it. You have to understand that things work themselves out.

I: And how do you know when you're experiencing stress?

P: I can feel it. You can feel it in your head, in your body and in your heart.

I: So is there an area in your body that you sense it the most?

P: Here in the head and in the heart. Right in the heart.

I: Okay.

P: Yeah, and I grind my teeth, right? I clench, yeah. Stress makes me clench.

I: So did your practice help with any of this?

P: I tried to from the heart, you know, produce a lot of energy through nerves to see if it could go right out to the fingers and the tips, you know. And just kind of push out energy through the nerve endings, eh? That seemed to work. It required a great amount of detailed focus to do that, but it was extremely relaxing. It has taught me a way to reduce my stress and lower my blood pressure. My heart rate came down especially when I did long sessions of like 20 or 30 min."

Other participants reported physical relaxation responses and the loosening of muscles when they applied themselves to entering their hearts and changing their emotional states. According to August:

> Yeah. I noticed like before I started this program, like my body used to be like so like tight and - I don't know how to explain it. Like there always used to be aches and pains everywhere and stuff. And that was because I was like stressed out all the time and I was always worried, because worry is like a huge trait in the women's side of my family. So I was always like just like dreading everything and everything was bad. But I noticed once I started getting into the coherence and everything, like my body has loosened up so much. Like even in like the stressful situations, like now I'm kind of behind in my social and everything. But it's like I'm going to get it done, right? And my body doesn't like it doesn't tighten up anymore and there's like - it doesn't feel - like I get cramps easy too, like in my feet and stuff. So it doesn't do that anymore either.

One of the adult participants, Mother, has been dealing with lupus for many years and has struggled a lot with nervous tics related to stress and anxiety. She experienced many benefits from using the program and reported:

> I am trying to practice once a day…I think I missed two days so far. It is sooooo good to stop and relax even if it is only for 10 minutes. I am quite intrigued with how fast I can bring it to the green side. Within 10 minutes I achieved around 75% on the green side. My goal is to get to 100% if it is possible. I find that even only 10 minutes makes a bit of difference in how relaxed I become. I noticed that my nervous tics disappear when I do it for a few minutes. They stay gone for a good 15 or 20 minutes afterward. It's really great. I also wish I could practice more. There are times when I'm just too busy and I don't have the time. Even though I really want to, sometimes it's just not possible. With the work and

everything... Late last Friday, you know, is a really good time for me to practice because all the students are gone. But I had to go to an appointment early so I had to leave work without practicing. I really wanted to and I felt like I missed a good opportunity.

King, who had struggled with the technology, was very diligent with his practice and had one of the more powerful experiences during the course of this study when he went for an MRI scan at the hospital. He was fairly anxious about going into the tube and was pleasantly surprised when, through engaging the coherence technique, he actually dozed off in the machine. This was evidence to him that using his heart to rebalance his nervous system can be effective. In his words:

> So the three steps themselves, I find in the last few weeks, I've got into a habit here that when I go to bed at night where I just do that. And like my wife was you're like light and I just get to that part three where you're actually imagining the sun setting and it happened over a lake and I'm gone you know. And I was telling people this morning I had an MRI on my spine and shoulder for an ongoing issue and I've never been in one of those things before. And going into the tube, there were two tests. One was the thing for the back and then put me back in for the shoulder scan. And honestly, if I hadn't done the HeartMath, I think I would have hit - because I'm claustrophobic anyway and to be in that tube and the incessant noise. And I remember laying there and I just started to focus on the heart and focus on the breathing and thinking some nice thoughts. And it saved me… and then they pulled me out and reset it for the shoulder thing and put me back in. And the shoulder scan is a longer scan, but less of the incessant

noise. There's sort of breaks in-between. And I just kept focusing on the heart and actually started to fall asleep, which I thought was pretty good for being in a tube. But I could feel myself just fading away, right? So hugely beneficial for this morning. I thought it's the timing of it, because you're coming at noon and here's this huge benefit to having done this because I was able to relax under pretty adverse conditions, right? Because if you haven't gone, the noise is unbelievable. Even with plugs in it was like bang, bang. You know just bombarding you, so it's brutal. And I got through it, so that was kind of neat way to show a benefit of that whole project for me.

One of the more energetically sensitive participants, Princess, had some interesting physiological experiences while entering the state of coherence and tapping into her heart intelligence. She explained that she sensed energetic sensations that were very unique to the coherent state:

P: It was a noticeably different feeling around me. And sometimes too, it's almost like a lifting up too. Like a foot or two above me. And really, like I can get really overall relaxed. And then sometimes too, it's like different shapes above me too. Like really defined shapes, like squares... Because if you ask me to describe what it looks like, it's kind of like a white eraser taking different shapes.

I: A white eraser?

P: I can kind of see it. Yeah, like it's white for sure and it's kind of like a blocky, but not heavy set, like weight. But it's blocky and like it has defined edges usually.

I: Okay. And that shifts when you're moving into coherence?

P: It does it quite rapidly. Like I think I'm in coherence and it just kind of - yeah, like every two seconds it kind of - yeah, shifts around a little bit.

I: But when you're not in coherence, you don't notice that? Or what is the difference?

P: Yeah. It's really just when I'm in one of the higher points of it. Yeah. And it can kind of go in and out. Like I can be sensing it and then it kind of drops off. And I like it, so then I'll like pull myself back into it and then it will kind of fade. So it's kind of like - it's a dreaming - this is new the shape thing...

The Importance of Will or Personal Motivation in the Practice of Coherence Building

Why do we accomplish the things we set out to accomplish? Part of the reason must surely be because we are motivated to achieve our goals: we act in the world in a way that brings about the desired result. With this training program it was emphasized early on and throughout the course of the study that practice was important; that it was necessary for participants to sit down regularly and engage in the three steps of the quick coherence technique. Unsurprisingly, not everyone was able to stay committed to the process and most participants reported drifting from their stated intention to practice regularly over the course of the six weeks. What follows are excerpts from the interviews that highlight the ambivalence (i.e. I want to take part in your study, I don't have time to do what was asked) and some of the reasons that it was challenging to follow through with dedicated, concerted action. (Note: I wish to make clear that I am not passing judgment in this section. I am simply reporting the difficulties that most participants faced in keeping up with what they had signed up for. I am completely sympathetic to the challenge of what I was asking people to do.)

K suggested that the biggest thing that was missing for him, and the principal reason he did not dedicate himself consistently to the practice, was lack of a concrete goal. He asked himself, "Why am I doing this?" and had no good answer. "I didn't really know what the point was. Like, what am I trying to achieve here?"

Perhaps because he did not see my initial presentation (or because I failed to communicate the reasons and personal benefits of participation), he was not quite sure about the actual results that could be obtained. He suggested that in future efforts, I or other people facilitating the training, should really help people understand the benefits and the reason why engaging one's heart intelligence through coherence building might be a good idea. This would get people more excited about what could happen with practice. With respect to the future, he said that, "The program does have a potential place in the school, but that it would mostly be a matter of personal interest. People would have to be motivated to take action and be personally wanting to get into it."

WildChild also had some advice for people that were interested in starting with the computer software:

> Trust yourself and be patient. Don't get frustrated because it just gives you more red... Yeah, it's kind of hard to realize that you're not going to get very much green on when you first try it. Unless you've practiced meditation for a very long time before that. But as long as you don't get frustrated and you know best how you're increasing and how you are being more coherent, it's just a matter of trusting yourself.

In a similar vein, Pi explained,

So like I was trying to meditate, but I just think way too much. I think like way too quickly and way too much to be able to like just sit there and just kind of be like one with my breath. So I try, but it doesn't work all that well. I persevere obviously. But I'd rather be alone. I don't like being in groups. I like to just be alone when I meditate. I don't know, I just don't like hearing other people breathe, because then it distracts me and I think about it too much. But really I just had to sit down and do it, you know? Like they say, practice makes perfect or whatever.

Moon, shared with me her lack of commitment in this way:

Any drawbacks? I think the only drawback of it is when like I'm too down in a mood that I don't want to do it. Like it always come up in my head when I'm in a negative mood. I'm like well, I'll use coherence, you know. Its automatic and sometimes I'm just so pissed off that I just don't want to do it. And it's like a part of me just wants to stay in like the negative energy. It just wants to be there, but I usually do just you know, get myself to feel better because I just don't like being negative all the time. Yeah, I think that's the only drawback. Like I haven't been using the program that much. So because of that, I think that I haven't had like a lot of practice to do it. So because I haven't had a lot of practice, it's like not imprinted in my brain to use it when I'm like getting angry or something. So I don't really use it that much, but I really want to. I'm busy most of the time, so it's hard to find time to do it.

Teachers also experienced difficulty with personal motivation and several of the adult participants reported that they experienced frustrations with their own level of

commitment and participation. This frustration reached a climax with Pegasus who wrote me the following e-mail:

> Hi Marc,
>
> I just thought that I should let you know that I have officially given up. When I tried from home I needed the registration password again which of course I did not have - frustrating. Soooo as far as your research project is concerned I am officially non-compliant. It seems that I have had enough on my plate with medical appointments, etc. so adding one more thing, as good an idea as it is, was too much.

In our final interview, the same participant exclaimed, "So, what did you want to talk about? My failure to complete my commitment?" Although she said this in jest, I did, at times, feel badly for placing another burden upon her and upon the other participants. It is part of the difficulty of doing action-oriented research and of trying to recruit volunteer participation that requires a fairly high level of commitment. In a few instances I had participants who had not been able to dedicate themselves to the practice quickly walk in the opposite direction as I rolled through the hallway. Now, this could be an erroneous assessment on my part, but I certainly felt like the voice of conscience when I asked participants about how they were doing with their commitment.

The tendency was for participants to be very excited at the beginning and to slowly taper off as the weeks proceeded. For instance, Guide, excited by the possibilities of working with the biofeedback technology, told me about his intentions during our first interview: "I would like to see improvement and would like to see myself find some of

those keys to getting in that heart space. And then, taking that space beyond the program and into my every day. That to me is where my goal is at."

In our final interview, when I asked if he felt like he knew how to access the state of coherence through his participation, the reply was, "I would have to say no. No, I don't think I have. And I guess again, that subjective part I feel like I haven't been a great participant. As in I haven't been consistent; I haven't been - you know sometimes I haven't been motivated, but sometimes I just haven't found the time and different stuff. I don't think I've been a good participant to allow me to get the most from the program. So personally, I feel there's potential. Personally, I feel I have a chance to develop the abilities, develop the coherence, but have I yet? I can't say I have a good knowledge or a good way to access that coherence in myself."

Lower Left Quadrant

A Need for Guidance and Encouragement from Peers, Teachers, and the School Culture in order to Live More from the Heart

Another theme that sprang out of the data was the need for some kind of school culture around the heart and the practice of coherence. Most of the students and teachers at one time or another alluded to the difficulty of trying to do it on their own without much help." What became clear as the weeks wore on was that there was not a lot of social support for the practice I was asking participants to engage in. Although I did try to connect participants with each other, there was an obvious lack of support from a group of like-minded or like-hearted individuals. Most of the participants felt that having others to practice and communicate with would have been very beneficial. Also, having teachers

that were skilled in how to use the program and the technique would have been a big plus for students.

Moon, when emailed as to whether she needed help or assistance responded:

> I think the best way for you to contact me is either through text message or facebook messages. I have been attempting to use the emWave software in the Quiet study, but it hasn't actually been working for me at all. I have successfully used the equipment once in Kelly's room. The unfortunate part about using Kelly's room is that, there are always so many people in Kelly's room so it's hard to concentrate. And he doesn't really know much about the program. I have been meaning to talk to Princess about using the Emwave program in the art room, but unfortunately it has slipped my mind. I will be heading into school today, and I will try to either use the art room or Kelly's room. I want you to know that I am pretty excited to be doing this, if only the equipment would have worked in the quiet study all those times I've tried I would have actually been able to provide you with some feedback. My one experience that I have had was very relaxing, although I had a hard time not getting displeased when I would go into Low coherence. I did remember what you told me, to not get upset about being in low, cause it will only make your coherence lower. So I tried a couple different things like turning the sound off and listening to some happy music on my ipod. At the moment I don't think I really need any help, I understand how to use the program, all I need to do is use it in Kelly's room.

A.W.E., bemoaning her participation and the lack of support or incentive in the school, told me,

> I think if I knew that more about where all the stuff was located, because they told us nothing. Yeah, like where all the stuff was located and like if I could have like a designated time away. If my mentor had helped me out a little bit more or like my teacher. It's like every fourth period, yeah, go for ten minutes, go for ten minutes. Like every fourth period for every day. I think I could be more into that. It would have motivated me to do it more or do it. So if my teachers had pulled me aside and said like go do it, go do it, go take a break, I would have been okay.

When I asked her what I could have done specifically to encourage more participation from students, she suggested, "I would have had more contact with the teachers a little bit and have the teachers be involved in it as well. Like what you did with us, like when we first started. Have one for just the teachers and kind of push them towards pushing us to do it." In other words, she thought some external motivation, from teachers and fellow students, would be helpful to guide her into more serious practice.

Similarily, August wrote me the following: "Hey Marc I honestly have not practiced at all yet. I have tried to log onto the program but it keeps telling me the program has not been registered, and to enter a registry number. How do I get that? I've asked Howard and King but they don't seem to know. So if you could help me out that would be great! Thanks :)"

In our final interview, Wizzard suggested that the whole program and the entire notion of coherence building and heart intelligence needed to be incorporated into the school culture. He said that teachers and students needed to have the language to be able to discuss these things and to begin taking them seriously.

I was just thinking about how this aspect of spirituality in our school, how is it manifested in different ways? And I mean one thing that I could see would be with the Circle of Courage and with that there are different aspects, spirituality being one of them. I mean often it's just to inform people of our culture, but it's also a coming together and using the language. So I could see it (HeartMath) becoming part of our language. Not only there, but in other ways and like you mentioned, just meeting somebody and having a group meeting or whatever. But in those meeting times, to just take a minute and say focus on the heart and breathe with the heart and have - even if you used those words, like as an attitude of gratitude. Even if you did just that and had a minute, you know it might - I could see that being a good part of what we do here.

In one of the focus group discussions, a couple of the teachers carried this idea further,

And I kind of like the idea of like what you were saying, which isn't dependent actually having the software device. But is maybe just trying to use that - like trying to use that language. Like I can imagine say a camp-out. You know you're just sitting around a fire and okay, now everybody just - just before we start our discussion of the day, everybody just focus on your heart. Like just some sort of language that is a language that people understand what it means and it's just a kind of connecting within in a certain way. It would be awesome I think.

Another teacher shared,

I mean I guess I did think it would be kind of neat to do it like more at a time and maybe in a room with a quiet setting or something. In a space where people who

wanted to do it - like so I guess if you set up a time during the day where those who wanted to do it, actually as a part of the school day would go to this place and everybody would do it together, in a group. I think it would be cool to do it like together more, rather than individually.

Although there were glimpses of conversations around the biofeedback program and the notion of heart-based living between some of the teachers and students, nothing really took off with any major power. In Guide's words describing the potential for group dynamics being a supportive container for the development of heart intelligence at IHS, "We did a little bit…like Giant and I or Princess were walking down the hall and we might mention it. And there again, I think those exchanges and reminders are good. Like you can tap into your heart in an unstructured way. We're on the same page…. We get it."

The Effect of Developing Heart Intelligence on Relationships with Peers, Teachers and Family

This section highlights some of the exchanges I had with participants around how the practice of coherence building related to their connections with others. For those who had a solid sense of what coherence was all about and how to enter the state, the information is more detailed and more pertinent than for those who did not have success with the program. For example, THE guy told me that he noticed, "If I'm talking to people, like a casual conversation when I'm hooked up to the monitor, I usually get into the green anyway, just talking with somebody. It's kind of neat I guess that way…"

Similarly, WildChild answered my question in the following way:

I: So do you think that you increased your heart intelligence over the last while?

P: Yes. I do think I'm more comfortable talking to different kinds of people. I'm not as shy... And it's just helped me a lot with my relationships with my father. We've found common ground; we don't yell as much. It's just more calm throughout the house.

And with August the following Facebook exchange took place:

P: Hello :) how are you?

I: I'm doing well, just wondering how things are going with you. Have you had a chance to practice?

P: yes, on friday i had time.... i did better than usual

I: In what sense?

P: my good coherence was in the high 70's :)

I: How did it feel?

P: really good =] i was able to keep up with it all day which was pretty cool

I: So did that help you?

P: yeah, gave me the momentum to keep that really good feeling up all day =)

I: And so did that change things with friends or other relationships?

P: yeah, me and my boyfriend ended up having a really good day with no conflict what so ever. i also noticed i didn't have much trouble communicating with people i don't usually communicate with

I: Very cool. And so has that carried on in some way over the weekend?

P: yeah the weekend was good.. i tried to keep the good coherence up. it worked for the most part =) sorry Marc I have to go. my aunty needs help... nice talking to you :)

This conversation was continued in a later interview with August when she gave me a detailed example of how coherence can be used in the day-to-day experience with others. Here was the story she shared,

> Well, I guess for example, this past weekend, I drove down south to my mom's reserve with my mom and in the past three years, my uncle, my auntie and my great-grandmother have passed away. And they all used to live in this one house, right? And we went to go pick up my cousin and she actually doesn't live too far from my house. And when I seen it, like it just like - I just felt sad. Like just instantly and I felt it in my heart. Like I felt my heart drop and I just felt like really depressed. But like I actually said something to my mom and I was like every time I look at that house, I always get sad. Because I always think of my grandma and Aunt and Uncle. Like it's depressing and my mom is like yeah, that is depressing. And then we just like kept driving and we didn't really say anything and then I told her, well, we can't - like grandma lived a good life and you know its probably better for Uncle and Auntie to not be here, right? And like I was like just trying to like redefine it as not being such a sad situation. And just kind of using the coherence to like realize that they're not here anymore for a reason and that I can't like hold onto the past and be like all sad over what happened like years ago or whatever. So with my heart, it made me a little bit more happy and I noticed that I didn't feel so heavy anymore. I didn't feel so like dreadful.

Wizzard, explained to me that entering coherence "translates to like a much greater capacity to be present to someone else... to sense what they're feeling. Because I think about what's going on for them... just be more present to enjoy more others." And,

it’s hugely different. Like it’s a completely different way of being and relating to other people inside. Like I don’t know how much - I don’t know how big a difference it means to other people, but for me, how I am experiencing it and how I’m experiencing others its like night and day. It’s completely different and certainly do you know go in and out of those two modes throughout the day.

During one of the focus groups, I asked if people were sharing what they were learning through their participation in this study with others outside of the school. Here are a couple of those responses: “There’s a lot of people that I’ve talked about it outside of school, like my friend Dillon. He’s big into like spiritual living and that kind of stuff. Like the spiritual ways like with crystals and like inner healing and meditating and all that stuff.” Or another, “I want to bring some of my friends in outside of school to try it out. I’ve got some friends that are interested and I’ve got some friends that are travelling around Canada right now delivering blessings to other people. I’ve told them about it.”

More tangibly, Princess brought the program home on her laptop and encouraged her boys to try the quick coherence technique. Here is what she shared with me:

P: i had my boys try it... the program... after the youngest stopped laughing... he actually got it the older one didn't get it right away so he wouldn't continue. i'm going to try and get him to do it again, guide him a little bit

I: so, when your younger son got into the green, were you right beside him?

P: yes

I: What did you notice?

P: well, i was trying to transfer energy to him for sure... don't know if it relates but kind of like the reiki thing... i really like it! and i have also already talked to a student in my group who i think would really benefit from it.

Further to this discussion, Princess described her efforts at trying to focus on her heart and enter the state of coherence in the following example with a student:

As soon as she gets a new assignment, she gets all worked up and actually will go to tears. She'll get the assignment; she gets all worked up about it and starts to cry. And then, you know, the reaction for me is like frustration because I know she can do it. It's not that hard, but this is her own behaviour that just takes over, right? And so, just really trying to just sit there and take a minute or whatever, a few seconds to get into that frame of mind before going any further. So it's just like try to really change the atmosphere, the environment of what's going on through like positive heart energy.

When I asked her if this was effective, she suggested "It definitely helps me, which will help her in the end, right? So anything that can keep me from getting frustrated and snapping is a good thing on its own. I don't know whether they can sense it or not, you know. Like if they can kind of feel that."

King, discussing how being in the coherent state might affect his interactions with students in particular explained, "Yeah, I guess being more calm, then your interaction would be more balanced. It would be more pleasant interaction. As opposed to wearing the weight of the world on your shoulders, you know or one could be abrupt or whatever."

Lower Right Quadrant

Challenges and Opportunities with the Biofeedback Computer Technology

Although the information age is upon us and technology is now an integral part of our lives, we still, at times, struggle with how to use it and how to understand it. Despite my best efforts to demonstrate how the program worked, teach participants what steps needed to be taken in order to practice effectively with the emWave, and my consistent offer of support throughout the course of the study, there were many glitches that hindered the smooth and effective participation of some of the students and teachers. The program had to be installed on all of the computers and one of the teachers kept the ear sensors in his room which seemed like a good solution to the problem of where to practice, but even these precautions and measures did not eliminate all of the problems. For example, one of the students, K, expressed to me, "So I've tried doing the heart thing, but I can't get the program to work, it starts up fine but I can't get anything to register, I know a few people have had the same problem… I tried it a few times and every time I did it, it was like hell to try and get the actual sensors to work. Yeah, it took me like 20 minutes just to get a sensor working."

Pegasus, whose struggles with the technology were reason enough for her to give up with participation entirely, wrote me the following e-mail when I asked her about her progress and if there was anything I could do to be of support:

> Hi Marc,
>
> Sorry for the slow response - I did get the email. I have only done emWave once - on Thursday because I have not been able to get mine to work so I used Kelly's.

Unfortunately David and I are on opposite schedules so I haven't been able to get his help…

When I did use it, I got freaked out as it was logging a very fast pulse rate which only served to speed mine up. I tried to turn that part off but no luck. Afterwards I thought that it might not have been on my ear properly so I will be trying again this week. I've got it on my laptop. But I get home and I'm like oh, I've got it on my laptop and I still have the thing and I don't have the code to get into it. So I just - it's frustrating.

King, during one of the interviews, expressed a similar frustration and his mixed relationship with technology. Here is part of our dialogue around the topic:

I: What's your relationship to technology like?

P: We have a tumultuous relationship. Laughter

I: Yeah. In what sense?

P: I mean at some times I love it and at times it drives me wingy. So having just dealt with, a few months ago, a major virus on our computer at home and then our computer at home crashed. Like it died two weeks ago. So now I'm trying to get a new computer up and running and some things work and some don't. And trying to retrieve files off the old hard drive... we have a tumultuous relationship.

This tumultuous relationship was reflected in his training with the HeartMath technology as the red scores and the dinging bells continued to irritate him. It was only when I encouraged him to turn off the sound and avoid even watching the screen while he practiced the coherence technique that he started to regain a sense of positive development. Alas, at this point the technology had made a dent in his view of the

usefulness of the coherence technique and this was expressed at the two focus group sessions we had. It was simply too much frustration and not enough alignment between what he thought was coherence and what the computer was telling him.

> If I did this long-term, I think I'd start to have nightmares about the ding. And I actually turned down the volume to nothing and maybe it's my musician's ears, but I still hear it. And it's annoying actually. I'm not that tech savvy to know what a mute button is. So that audible is not very nice. And I find myself actually getting anxious about watching the levels. I find myself getting anxious in the course of a ten-minute session around the red moving to green and then it starts to move back to red.

Similarly, Wizzard complained about the technology not accurately measuring his subjective experience. This was his biggest problem and he felt that even though he was in coherence, the computer did not agree with him. He explained,

> I find it interesting that my percentage coherence varies a great deal from session to session - and I cannot say it corresponds to how I am feeling. In other words, it seems like sometimes I am feeling OK - and my coherence is exceptionally high, and other times I am feeling GOOD and my coherence is comparatively low!

There is a distinction to be made between, for example, having a problem getting the ear sensor to measure one's heart rate variability and feeling anxiety over what the biofeedback program is displaying on the screen. Nevertheless, these two parallel but distinct technological issues played a role in dampening some of the participants' drive and motivation to continue practicing.

Paradoxically, many of the teachers and most of the students were drawn to participate in the study partly because of the technology. Most participants thought it was very cool when I demonstrated how the program worked. Further, despite some of the challenges identified with operating the emWave, several participants thought that it was the technology side of the training that would entice other students to participate. For instance, Giant told me, "And you know the kids love this stuff. They're all in to the technology and they're just naturally good at it. So really I think they'd be drawn to this more than we would, if you know what I mean?"

Another solution to the frustration with the technology was to abandon the biofeedback program entirely and just focus more on using and practicing the quick coherence technique.

> I think yeah, it will help students. Like I don't know. They have to want to do it. And it really - I think it really depends on like whether their technology helps them or not. Because I notice like when I do it and I look at it and then look at the way my heart is going and everything, like focusing on my technology, I can't really like do it. I'm always looking at the red, because I'm so worried about the red. So like I noticed I can do it better when I'm like not looking at the program. Like just having it minimized and stuff and I'm just like listening to music or something and thinking. Like it helps when you can see like your record and everything, but I personally don't know when you're looking at it and trying to practice it. I like to do the heart breathing without the program actually.

Lastly, four of the students expressed to me how they wished they could use the program on their cell phones. They said that if they could just use it on their own terms,

in their own way, it would have been a much better experience. They would have been much more likely to practice and engage the technique. For example, THE guy told me, "If I could just plug it into my iPod and just go with it, like if I could see it wherever I go that would be really nice."

The Influence of the Environment on Participant's Attempts to Practice Coherence

"People always walking in and out of that room. So I did have a lot of people talk to me and I didn't like it." This is what one of the students reported when I asked him about what it was like to practice in the school. IHS, although it is small, has a lot of hustle and bustle and there is a lot of freedom for students to walk around and enter and exit rooms at will. There is a dog who roams the school, there are announcements over the loudspeaker, there are bells and whistles like in all schools, and many of the participants told me that all of this environmental noise/activity made it difficult for them to spend long, focused time building their coherence scores.

THE guy continued his explanation:

> Things have been going good. It's been hard to keep in track with this emWave program, I need to be able to bring it home. I'd be able to do it more often this way than at school, its like when I walk into that building I'm focused on what I need to get done in my classes rather than what I need to get done otherwise. Just wondering though, how are the other students keeping up with the emwave? Like are they having less interruptions and stuff?

Further, Moon suggested,

> Yeah. Or at what time of day. It's like any given time of day there's like always people running in and out of classrooms. I just felt like to avoid all that; I'm just

like trying to focus and plugging my music in. So then the location isn't like really a big deal. That's what I do… I like try and listen to music to kind of just like block it out. But I've lost my iPod, so I don't have music anymore. So I tried to do it like when a bunch of people are out for smokes or like when its not lunch, because there's like everybody in the hallway and stuff. They're just like running around the school.

In a related conversation, Pi and I discussed the importance of different environments and the whole idea of being in coherence. He was curious to know what his coherence scores would be like in different places. According to him,

I don't know, just like different settings because different places give off different vibes. Like when at school, I'm never in really a too great a mood, because its school. I'd rather be sleeping or something... It's like just before I fall asleep, I'd try to see how different it is from like going to school or seeing my girlfriend or going to a family function or whatever. So different settings give people a different mindset almost. Like when I go to a Flames game, everybody has the exact same ones. Like this is awesome, it's a Flames game. It's like just the environment there is really positive and just like loud music and good sports and all that kind of stuff. So I think environment has a lot of things to do with it, especially in motivating you to do it. Because I know when I was here it was easy, because I just cut class and I'm like screw it, I want to do this, so I'll do this. It would be just kind of getting out of school too.

A couple of participants explained that not only do physical environments impact their ability to enter the coherent state, but so do weather patterns. In an e-mail from Giant, he told me,

> Things are going reasonably well! I have been getting on the machine about four times per week. While I enjoy the relaxation it provides my numbers look more like the stock market; some days are good; other days are down. I am personally affected by the weather and when the high pressure rolls in, like it did on Monday, Tuesday and Wednesday of last week I really struggle with headaches and such. As a consequence my coherence numbers were awful on those days but the heart rate looks good. I am enjoying the project and I will persist with the project. Until next time!

Guide, along with several other participants who were teachers, took advantage of being able to take the program home with them. Or, if they did not actually take the steps necessary to do this, mused about how things might be different at the home environment as opposed to the school environment. For example, Princess noted,

> I really think it's a great tool and a great thing to bring in. But we need some kind of plan on how to bring it in and time to do it. Because like I had really good intentions, but there's like no time to sit down with your mentees. Like even when we say Fridays, Fridays are a gong show. Like in terms of all the stuff we've got to get them doing and then the kids are coming and going. Like you kind of need some blocked out time, where you can really focus and just with one or two kids to start with I think. I found doing it at home was way better… Way easier.

Although the school environment was a distraction, some people like Mother were able to, through the power of focus and intention, block out all of the distractions and spend 10 or 15 min. working on the emWave despite the chaotic goings-on. This is significant because this particular woman worked in the main office and reported very high coherence scores, so it seems clear that with enough focus and desire, it is possible to achieve coherence even when there is much distraction and movement happening in one's environment. She exclaimed,

> When the students see me working on the program with my earpiece, they just leave me alone! That's a very good sign around here. It shows respect, and usually I get interrupted even when I'm on the phone etc. so the fact that they are not disturbing me when I'm doing this is really good. I can deal with all kinds of people around. It's like I'm able to block everything out. I usually get in the 70s and I get there pretty fast. I'm surprised. Just a few seconds and the wave has smoothed out and I am in green. It really feels good. So relaxing. It's like I get a chance to just be with myself and be good to myself. I really need that Marc.

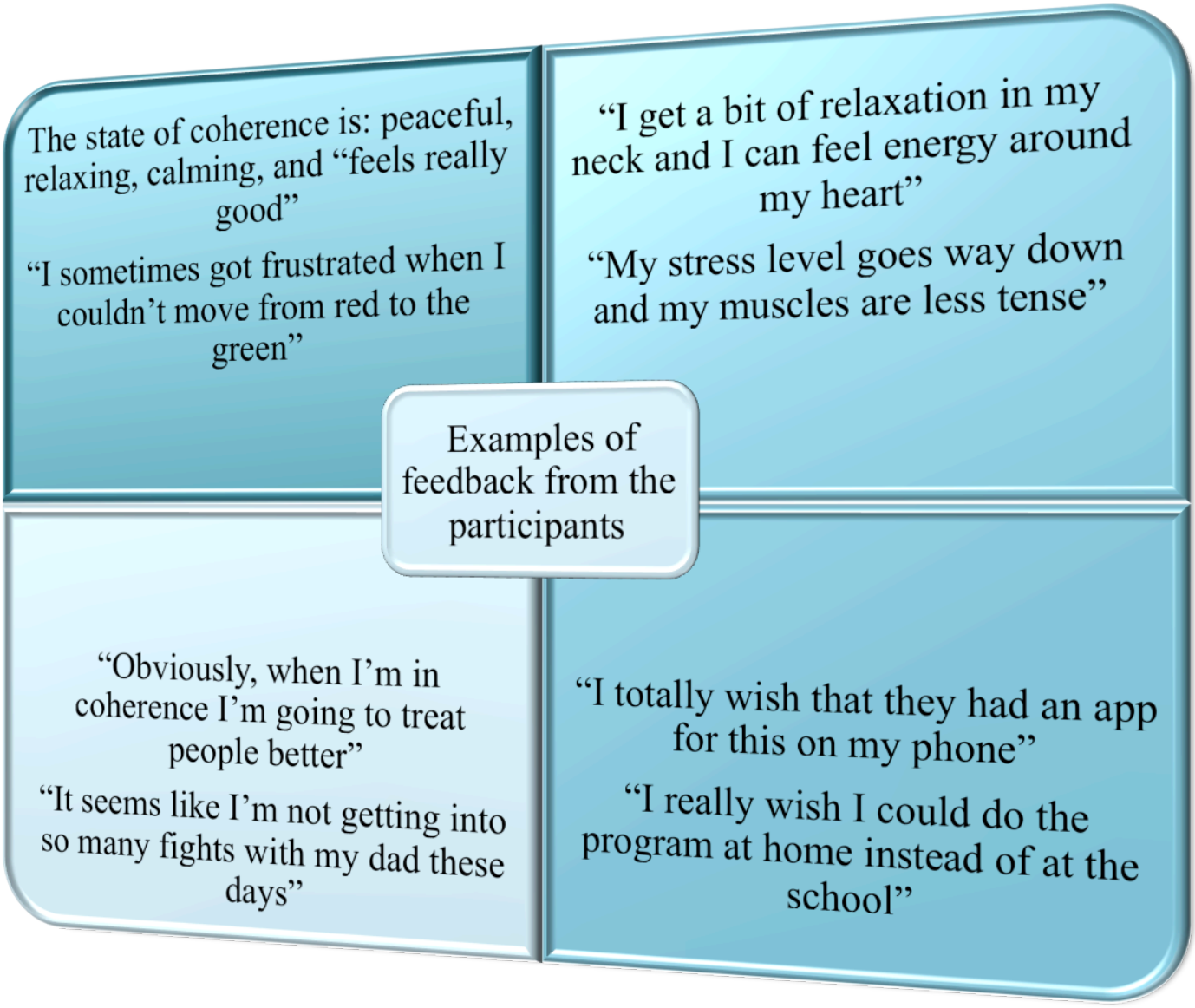

Figure 20. Examples of the feedback given from participants placed within the quadrants.

In summary, the many conversations, interviews, dialogues over e-mail and Facebook, informal meetings and focus group discussions yielded eight principal themes. Because I set out to answer questions from each quadrant of the integral model, it should come as no surprise that the answers to these questions fit seamlessly within the quadrants. Not only is this way of understanding the themes visually and spatially elegant, but it is also comprehensive. By co-investigating the experience of developing

heart intelligence through coherence building and the use of biofeedback on a personal, interpersonal, objective and inter-objective level, it is possible gain a much greater sense of how this type of training fits within the overall structure and culture, both individual and collective, of a school like IHS. In the next chapter, we turn to the other four elements of the integral model to see how the data fit within its embrace, as well as to a glimpse of what the future might hold for biofeedback training at IHS and in the school system more generally.

CHAPTER 5: INTERPRETING AND UNDERSTANDING THE FINDINGS THROUGH THE INTEGRAL MODEL

I would now like to push my data interpretation further into the other four elements of AQAL, namely the levels of development, the various lines of development, the states humans experience and finally the types that characterize people. I hasten to note that this level of interpretation involves a "diagnosis" or "felt sense" on my part, even though I have attempted to support what I say with direct references to exchanges, observations and conversations I had with participants: it is exploratory in nature.

Levels of Development

The first aspect of the integral model I would like to delve into is the stage component. It is now widely understood in the field of developmental psychology as well as cultural value studies that individuals as well as whole groups of individuals move through various stages in life. From egocentric, to ethnocentric, to worldcentric, to cosmocentric, there are changes in worldview that accompany developmental shifts.

Further, although addressed more specifically with the data in the next section, there are different lines of development that move through the stages. Because my study was primarily interested in the development of the line of heart intelligence, I would like to focus on whether participants felt as though they had "moved up" or "matured" or "evolved" in this particular area.

I begin by making a few observations about the differences between my two main cohorts: the students and the teachers. According to developmental psychologists, it would be expected that the adults be more developed in certain areas than the students simply because they have lived longer and have had more experience, plus more

opportunity to mature and grow their skills, knowledge and overall worldview (Kegan, 1982). This was the case within the domain of compliance and commitment to engaging in conversing with me, the researcher. I found throughout the course of the study that the teachers were much more reliable when it came to setting up interviews, contacting me for assistance, and responding to my e-mails and inquiries about the process. Their overall social etiquette was much more evolved than most of the students. They were grateful, they were thankful, and they observed the social niceties that keep our society afloat.

Even though teachers may have been struggling or may have wavered with the practice of coherence building throughout the six-week training, they were nonetheless ready to exchange with me more frequently and more consistently. For example, King, even though he agonized terribly with his coherence scores and his ability to make the software work for him, continued to practice day in and day out. Contrast this to Pi, one of the students, who had a couple of difficulties early on in the process and then quickly gave up (I assumed that this was the case, although I did not find out until many weeks later despite having sent many e-mail and Facebook requests offering help and trying to understand what was going on for him). In addition, the teachers demonstrated an ability to tell me directly that they were giving up on their participation as opposed to a couple of the students who simply faded from view without any notice. It seems clear to me that at least with respect to their commitment to engage and stay in communication with the researcher, the adult cohort was much more developed and evolved than the student cohort which is reasonable in general, and for IHS students in particular.

Interestingly, and I believe this is very interesting, the students were equally if not more capable than the adults with respect to reaching high coherence scores. Although they practiced less as a group overall, many of them were able to achieve high scores fairly swiftly and automatically. Certainly, there were many variables and much variance among all of the participants and between the cohorts, but some of the students who did not do so well with their commitment to practicing were easily able to attain coherence scores of 70% or 80%, whereas some of the most diligent teachers could barely get above the 50% mark. What does this mean?

One interpretation that the integral model helps make from these findings is the important difference between stages of development and lines of development. Instead of simply saying, "Oh well, some people are just better at some things than others," we can begin to tease apart where people might be stronger or more developed in certain areas than in others. Taking the two lines alluded to above - let's call them "social intelligence" and "heart intelligence" for simplicity, and a developmental scale that ranges from 1 (beginning) to 4 (advanced), we can get a rough sense of how a student might score a 1 in the domain of social intelligence, but a 3 or 4 in that of heart intelligence. We then get a clearer vision of strengths and weaknesses. The implications of this for integral education are straightforward: the possibility exists of tailoring educational goals and pursuits to the individual in a more specific, helpful way – a primary goal at IHS.

So what does the data I collected have to say about the development of heart intelligence? Asking participants for a subjective sense of whether or not people can become more heart intelligent and, perhaps more pertinently, whether participants felt as though they had developed their own heart intelligence, WildChild remarked :

IF they wanted to try. If they're willing to expand their mind and like let their heart grow with them as a person and watching the change of how you were last year and this year. We all have grown and sometimes we just don't realize where it's all coming from. Like it comes from the mind and from the body and it comes from the heart. So it's happening all around; its just we haven't really been able to pinpoint where the source is and now that we have this heart intelligence that we've been talking about, it seems that we have uncovered another piece of information that we had lost. So yeah, I'm more heart intelligent now.

Another student, August, when asked whether she felt she had increased her heart intelligence as a result of participation in this study also said yes. Specifically,

I think so, yeah. Like you know when say like somebody passes away or something bad happens and like in your heart, you feel it. Like you can feel your heart tighten and everything. Like I noticed when I get into a negative situation I start like paying more attention on the way my heart feels now. Like I notice that some situations I'm just like really calm and like I don't feel like burdened or anything you know. Like it's just kind of calm sense and I don't have to worry about anything. But as soon as like some situation comes up, like somebody is like feeling angry or one of my friends are down, I can like feel it in my heart. And it's like pressure and I never noticed that before. But ever since I started using like this program and like doing coherence and everything, I notice I have a lot more feeling like in my heart. And like every situation that I go through. So I think yeah, there's heart intelligence.

Similarly, Moon told me that things had gotten a lot easier for her over time and that she felt it was an example of progress or development. She told me,

> Well, every time I do it, like for the most part lately I mean, I've like always gotten like green and that was probably because it was a low challenge. But still like a high level. Like high coherence and like I always listen to this one silly song. It's got a really awesome beat and makes me really happy, so I just put it on repeat and I'm like - and my coherence goes to like 80. I had it go to like 80 probably the highest was 88. But I'm way better at it now.

With Princess, a teacher, I had the following conversation:

> I: Do you think that you developed a little bit of heart intelligence over the past couple of months?
>
> P: I do; I do think I developed or became more aware.
>
> I: Yeah?
>
> P: Yeah. Yeah, both. So raised the awareness and then I kept thinking about it and trying to use it. And so, yeah, I think I developed it.

Not everyone felt the same way. Obviously, but perhaps worth stating, participants who did not practice much and demonstrated a weak level of commitment to the training program said they did not feel they had developed their heart intelligence. However, even those who practiced diligently were not always convinced that a) there is such a thing as heart intelligence and b) that they had developed their own. King, among these, explained,

> I think there's something to it. I don't know that I understand it particularly well at this point, but the idea of coherence... Yeah, I think there is something to that...

> I guess the reason why I'm hesitating is there's sort of a meditative quality to trying to achieve the coherence that I think is very important and there's certainly something to that. I guess where my hesitation is around do I know enough about what I think heart intelligence is to articulate the experience I've had around heart intelligence. Because for me, the nature of this thing - the challenge has been to sort of stop having my head spinning with different thoughts. And just kind of focus on the breathing and focus on my heart. So that experience has been important and I do use that, even now a while after doing the last thing with the software. But is that more of a benefit sort of meditatively or is there actually a heart intelligence that I understand that I would say yeah, I'm experiencing heart intelligence? I don't know that I can answer that. Like I don't know that I could say my heart is sort of taking over you know. It's more being a matter of getting my brain to quiet down, right? And I guess the thought goes through my mind would I be as successful if I focused on that fan for twenty minutes or ten minutes, you know just to kind of let my mind calm down and not be thinking about 15 other things. As opposed to focusing on my heart and my breathing. I don't know.

Giant, answering a similar question talked about a link between stages of development and lines of development. Specifically, he felt that some people are just more naturally spiritual than others or have practiced more and become more in touch with their spiritual side. In his words,

> There are people that are a way more in touch with their spirituality, their emotional level than I am. How do you get to that level? How do you just keep

improving yourself? Will I ever be a Dalai Lama or a Mother Theresa? No, because not everybody can get there - it's like in the sport world. Where are most of the people? In the stands. Your intelligent people are out on the field and that's the same with everything we're doing.

Lines of Development

One of the big assumptions I made at the beginning of my research project was that heart intelligence exists and is a concept worth pursuing. Although I am not completely alone in my belief that such a thing is real (the term itself comes from researchers from the Institute of HeartMath) I was very curious to know if my co-investigators could understand the term and, further, help me see it from their perspective. Thus, I asked all participants the following two questions: Is there such thing as heart intelligence? How would you know if someone had heart intelligence i.e. how would they act, how would they be in the world? What seemed to emerge from the response to these questions was a heart intelligence that served as an umbrella or mix between the emotional, moral, and spiritual intelligences I described in the literature review. What follows is a collection of quotes from students and teachers.

WildChild said, "Strength and passion and inner freedom." And when I asked her a follow-up question about comparing two people, one with a lot of heart intelligence and the other with not much, she said,

> One of them would just do what he's told without even thinking of the consequences and what he was doing to everyone else. The other one would think of every aspect of it, and not just himself. Like who it's affecting; what it's affecting and how it affects... Like you could definitely tell because he would

probably be happy and not just face smiling. The one with more heart intelligence would probably be more open and loving towards people. They would interact with others first, instead of waiting for people to approach them. I think that's what the other one would do, just kind of stand there waiting for someone to know them or introduce themselves.

A.W.E. thought that heart intelligence does exist. She answered my question in the following way:

I definitely think that is exists. I think that if everyone could tune into their heart, they would be much happier people, because they would be listening to all of their needs, instead of just a stereotypical way of living. So if they just took the time to listen to themselves and find that inner voice that is very powerful, I think that the world would be a much better place. I've met people who have like a pure, clean heart and that's what I think if someone has a lot of heart intelligence. Is someone who has a lot of love I would say. But has a lot of feeling for other people and be sympathetic towards other people. Whether it be happy or sad and just I think a person with good heart intelligence feels someone else's pain and wants to be there to help the person and to comfort the person and to do like a difference in the world. And I think that their actions would be good. Like have the right intentions and go through with those intentions.

August described someone with a lot of heart intelligence:

They would be really intelligent. They know how to control with their feelings, not really control, but they would know how to get themselves to feel better. I would probably say they are a really smart person all around. Someone like this

would be really positive and quite upbeat with everyone. I kind of think that people who really know their heart and have heart intelligence would be a lot happier. With their life and everything. They would know how to make negative situations more positive. They would be able to see the brighter side of things.

A couple of the students thought that it sounded like a good idea, but that they didn't know for sure if it was really something real. The most skeptical of the group, THE guy, when asked about the possibility of heart intelligence, said "If you said something like that, I'd be like what the hell are you talking about? Because I don't know how to define it really. I don't know how to measure heart intelligence. If you're emotionally stable and not having a heart attack? I don't know. I don't know how to put it."

Pegasus, a teacher, thought someone with heart intelligence might be empathetic. Very able to - like good intuition - able to sense things about others, I think. That's how I see it. You mean like what role would they play? Like would they be the leader, the fighter, that kind of thing? To me they would be a person who, like I said, is very intuitive, their goal or focus in life would probably be like a mediation role... putting yourself between people. They might be a leader, but they wouldn't be an authoritarian leader. They'd be very empathetic, caring, but not a soft touch. Do you know what I mean? Like they'd really have a grip on boundaries.

Giant added to the discussion by saying, "What do I think of heart intelligence? It's connected; it's connected to certain things. Like emotions, like right here (points to chest). This is where I feel emotion. I feel it here. That's what heart is, right? So it's a powerful organ. That's what is interesting about your heart project too. Whether its

spirituality or whether its emotion or what it's tied to. The whole concept is interesting." And when I asked him to attempt a definition of heart intelligence and to describe someone who had a lot of it, he replied, "I mean you just think these people are smart, they're polite, they're courteous, they're empathic. They understand, they can see, they're not so self-centered, which is tough for kids, but they're more generous and understanding."

Wizzard told me,

> Well, I think that's interesting that you're putting the two words together, because if you said demonstrating a lot of heart, I might say something different than a lot of heart intelligence. So intelligence and heart? I guess a number of things do come to mind. You know like it's sort of that whole thing of the last number of years emotional intelligence. So emotional intelligence, heart intelligence. Maybe they are similar. Intuitiveness, tuning in with what's going on with the group maybe. A certain charismatic nature to someone who has a high EQ is possible there too. So they're sort of - the group is attracted to them and what they're saying and what they're doing. And they tend to be somehow intuitive. You know there's vibrations, there's energies, there's momentum of certain things that are going on in the world that some people are more attuned to than others.

Mother contributed by stating,

> For me, it's to keep the emotions in balance and to keep your health in balance. Now, for me, both need strong balance - In me there is a very strong fighting, very strong war, because I have to apply myself to do it. I have to apply myself to not listen to my heart, but once in a while to go up there (points to head). And I

have to apply myself to go for exercise.... so one who has heart intelligence is someone who knows how to balance things. Whatever is the stress, very emotional. And so, heart intelligence is someone that can - that is able to balance things.

My skeptical participant, THE guy, questioned the construct of intelligence itself:

If you can give me an accurate measurement scale to compare to, then I'll believe you. Because I don't actually believe IQ tests. It's like look, I've read puzzles. Oh, you must be smart. I don't think that's how it is. If you're not the kind of people who can't solve the Rubik's cube... doesn't mean like you're stupid or anything. So I don't really believe IQ tests. But I do like personality tests. They're fun, but I don't believe half of them obviously.

A possible follow-up question to the one THE guy asks is: What if there is no such thing as heart intelligence either? Overall, however, there was a high degree of correlation between the participants' perceptions of heart intelligence and an understanding that the emotional, intuitive, and spiritual aspects of life seem to be connected in the heart.

States of Consciousness

The integral model postulates a fourth domain, that of states of consciousness. I have been specifically focussed on the state of coherence in this study and it has been a primary target during interviews. Because I described the theme of coherence during the quadrant thematic, I will not repeat myself here, but for a few exceptions that I find illustrate the state of coherence in a unique and interesting way. Furthermore, I will identify how participants referred to various states of consciousness during our

interviews. Specifically, I will highlight excerpts of conversations pertaining to states of stress and anxiety, meditation, coherence, relaxation, and the possibility of switching states of consciousness through intention.

Before moving into this discussion, I thought I would share a piece of artwork that was created by one of the students. Titled "Listen to Your Heart," the painting below was created as an attempt to depict the transition state between coherence and incoherence.

Figure 21. "Listen to Your Heart" the transition from one state to another.

One of the more obvious states the student participants exhibited was that of stress. This, along with others like distraction and inability to stay focused, were mentioned as the biggest impediments to practicing the state of coherence with the

emWave. During our interviews, many of the students had bouncing legs (Moon and K for example) and were very fidgety and nervous, fingering phones, looking around the room, and moving their bodies frequently. I grimaced internally when one of the participants came for his initial coaching session after a "smoke break." Stimulating the nervous system with nicotine creates a physiological state that is contrary to that of coherence which fosters wholeness and integration (the smooth operation between the sympathetic and parasympathetic systems), rather than stimulation and anxiety repression (excitement of the sympathetic branch of the ANS). His coherence scores were very low.

However, as a researcher, I had to acknowledge that we are living in a state dependent society in which most people (me included) are striving to feel good. This is the crown jewel: feeling happy and positive. One of the reasons most of the students tried to feel good by using music, talking with friends, or whatever their favourite personal technique was for inducing the positive feeling state arises from the fact that most of them feel a lot of stress. Although I described this a little bit in my quadrant thematic, I would like to include the topic of stress in this section because it is, in fact, a state of consciousness. For example, students as well as teachers felt a lot of pressure to complete assignments, work or other responsibilities and there was a lot of resulting stress. Some participants reported poor sleep as a side effect of stress.

A.W.E. explained to me,

> I get like really hyper, but like sometimes I get super-hyper. But I don't - like I just have to sit down and like calm myself down and kind of let it all out. Like if I can't sit still, I have to go and walk around and like my tutors understand that, but usually I try and throw it into my work. But the thing that overwhelms me the

most is the work. I make things a lot more complicated than they should be. Like I always feel like I'm missing something or this could be done another way. And I complicate it so much in my head that it turns out wrong and then someone shows me the right way and I'm like wow, that was much simpler than I was making it.

When I asked August about stress in her life, she told me

School mostly. Some things I don't understand so I have to go back and forth to the teacher and so it stresses me out... I don't go for help and then I don't know what I'm doing.... so that causes stress. Plus the relationship with my boyfriend can get a little bit rocky and the stress on top of that with schoolwork can be a bit much... So I can get a little bit of anxiety because I worry that I'm not going to get things done. I start worrying that everyone is going to notice that my world is not that stable.

Another state experience shared by several of the participants was that of meditation. Ash, August, WildChild, K, Princess and Wizzard were all fairly serious meditators and when we were conversing about the state of coherence, many of these participants mentioned to me that they could relate to the feeling of coherence because of their state experiences in meditation, states of peacefulness, calm, transcendence and sometimes the sense of being an observer or witness.

K talked to me about his confusion between the state of coherence and that of meditation, "When I did it, I did like pretty well. I think I got it up to like 50% green a couple of times. But I didn't find it a whole lot different than like the meditation stuff that I already do. So I was just kind of like - just kind of felt like an unnecessary add-on if you know what I mean." In essence, K thought that it would be more fruitful for him to

simply meditate rather than spend time trying to do "meditation" in front of the computer with biofeedback. Giant referred to altered states of consciousness when trying to describe his experience after 20 min. sessions practicing coherence.

> What I recognized was the longer I stayed with it, you know, the more I could get into coherence. So I wouldn't start getting this gradual rise. I mean some people can just go and they can be there. And for me, so I mean towards the end, I was doing it longer because at home I had more time to do it. And I could go 15, 20 minutes and then after that 15 or 20 minutes, you could see more green. But after a while, you know when you're in that zone, you're almost in a trance-like or even like a pre-sleep-like state you know. And again, your defences are down, you know. And you're just letting things flow free… you're relaxed.

Furthermore, Giant felt that when people are in certain states, they attract particular experiences. Musing on the state of coherence and the natural environment, he shared with me the following:

> I think coherence or these other states of mind might have an effect on a larger scale. I mean the way things happen around you... every little bird that flies by or whatever happens in your environment... is it by chance or is it drawn to the energy? So I mean do they - do other things seek out the high coherence? But certainly you know, it's very nice to be in states where things are happening that you know, you've been provided an opportunity to see things that you might not. Whether it's a deer or whatever you know. Do they sense it, then they're not afraid of it?

Another aspect of the state experience that emerged out of the data was the benefit of learning how to switch states of consciousness through intention. Several participants felt that this was one of the benefits of the training program. They learned that they had more control over their emotional states than previously understood. August explained,

> Sometimes it's a little bit more difficult than others, because of the situation, but I still like try you know. So like last Thursday for example, I was like in a really bad mood. And I tried to use the coherence to get out of it, but it didn't really help out that much. So I ended up going home and then I was still in a really bad mood, but I did it there. Like I went into my room and I just like had time by myself and just kind of like did the whole coherence thing, where like I think about things that make me feel better and like listened to music and that kind of calms me down. And it really worked out and then I had a better day after that.

During one of the focus groups, she shared,

> I don't know, but basically, it just has been helping me like stay a lot more positive and like before, because I used to attract a lot of negative energy. But I notice like since I've been using the program more often and everything, its actually - I don't have like a lot of negative encounters anymore like I used to and when I do, I notice like it's really easy for me to change the way I feel really quickly now. Like I can change from a negative energy to a positive before it gets really bad.

Echoing this, Ash said, "It's like what [August] was saying. Because it's almost like manipulating, so instead of accepting what is, it's changing what is. But so, I did find

it's sort of a neat way of just yeah, getting into a more positive space by connecting with my heart. And in the context of relationship too."

Wizzard, also expressed similar feelings: "The one thing I like (in contrast to my meditation practice) is just the idea of actively choosing to change my attitude/state as opposed to just bringing awareness and equanimity to the present moment. I would say I am seeing this as more of a benefit in terms of a change in mindset." Along the same lines,

Mother stated,

> We have some frustration and I'm not talking only about students. And so, at that time, I would go plug myself and it would calm me down. So it did help. Very much so. And now I'm learning that even at home when the frustrating things go on, like taxes going up, not going through the, blah, blah. It's almost like automatically I will breathe from here (points to your chest). You know and I see the reaction immediately.

She could, through choice, become, "Calmer. Much calmer. Much more Zenish. Much more - I would say open to changes too. Because this way when change is happening and I go directly in that mode, it helps me calm down. It grounds me."

Although several of the participants were excited about their newfound ability to shift their emotional states, many also said that this requires practice. Switching from one state to another is a skill that needs to be trained and practiced. For example, August, told the group that she was experiencing more benefits after having incorporated the practice into a kind of routine, "You say oh, I've got to do that; I've got to get on that. So for me, it's become a bit more of a regular thing. Not that I can get into the green zone all the

time, but you know what I'm doing seems good. I like monitoring the heart rhythms, so that's cool for me. Yeah, it's just become the routine."

A couple of the participants confused the state of coherence with that of relaxation. Others, like K (mentioned above), could not understand the difference between coherence and meditation. In addition, King was confused about what the state of coherence actually is: How it is measured? What does it mean? One of the adult participants told me, "I just don't get how this is so different from like relaxing or something. You know? I just feel like I'm relaxing in front of a computer."

All of this helped me to see that I could have done a better job of ensuring that people understood coherence as a state that differs from those like relaxation and meditation. Certainly, there are similarities, but the state of coherence is an active one in which the individual is focused, deliberately engaging positive emotions and creating an energetic field that radiates from the heart. Looking over the data, I also feel I should have made it much more clear that participants could practice coherence anywhere – on the bus, on the train, in the car, at the park, in the middle of class, during an assembly, right before bed – and that the biofeedback was just a means of checking in to see how skilled they were at initiating the coherent state. One of the participants who had a difficult time understanding what the heart rate variability patterns were measuring and how these related to the state of coherence is an example:

> P: My question is - and I know I e-mailed about this one too, but if it's measuring heart rate variability, then am I right in my understanding that if your heart rate was consistently at 60, you would score very high because there's no variability, right?

I: No. There is variability, even though a heart rate will be at a specific level.

P: What's the variability?

I: Well, the space in time happening between beats. So I'll sit down with you if you like and try to clarify, because I know you've been fuzzy about this and you want to try and nail it down.

P: There's always a time difference. Slight variations in time difference?

I: Yeah.

P: So even though it's showing a steady heart rate, there's still variability?

I: You got it.

Unfortunately, this exchange was during the last interview; meaning that this participant did not have enough knowledge of what was occurring in the program and in his physiology when he was practicing coherence.

Personality Types

The fifth and final element of the integral model is that of personality types. Introverted, extroverted, masculine, feminine, perfectionist, all of these refer to types of individuals and the integral approach to life includes an array of typologies in its purview. Although it is hard for me to lay claim to knowing what types the participants were without having administered any personality type indicators such as the Myers-Briggs or the Enneagram, I can give a couple of examples of how this element of the model came into play in my study because of a) participants' own comments as well as b) my observations during interviews, focus groups and meetings around the school and outside in the streets of Calgary. (Note: what follows are very loose interpretations that

would make any personality psychologist grimace, but I include them because the integral model calls for their consideration.)

Several of the participants were quite intuitive and connected to their feminine sides. Two females in particular seemed to share a similar typology. August explained to me, "Because I'm that type of person, right? I need to like do things a number of times and then it'll just get imprinted on my brain and I'll just like keep doing it intuitively."

Similarly, Princess shared with me, "I just feel very intuitively connected to my heart. I'm the type of woman who really just senses things around her. Does that make sense? You know I just like to enjoy time with my boys and relax into who I am. It's just very natural for me to connect with people on a different kind of level… like the deeper level."

Some of the participants were a bit more excitable and driven. Their personality types suggested more masculine traits and a more extroverted energy. For instance, one of the students, A.W.E., told me,

> Well, I talked to some people who did do it and like WildChild, for example. Like she tried it a couple of times and she was very successful with it. Yeah, so it works for some people. I just - I don't know how comfortable I am with myself being calm. I'm kind of all over the place usually. I'm really go go. I like it that way. I just get going on something and then I'm like super into it. Like type A.

Another participant, K, also referred to himself as being a type A personality. In his words,

> I'm one of those people who kind of need stress to do anything. Especially school and like work. So it's like if I'm not stressed out, I just kind of like - everything

kind of like flows and I'm just like okay, whatever. I don't really like care about anything. I need stress to motivate me. So like if I do it in the middle of the day, I'm like done for the rest of the day. And I don't do anything. But like you know - like I'm like such a super type A personality, right? So I like need it to go to sleep, right? I guess I can sleep better, but like it really helps me to like go from like 60 to zero.

Some of the participants were a bit more shy/introverted and when I was communicating with them in the interviews, I had to do a lot more probing. They seemed to have fewer friends, were less gregarious and were more involved in their own personal world. Conversely, others were more directed toward people rather than away from them. I met Moon as well as THE guy on a couple of occasions while I was out having coffee with friends, and they both ran over to me to say hello and to see what I was up to - this is typically extroverted behaviour.

King's perfectionist nature proved challenging with respect to the biofeedback program because when he was not scoring 100% green (which was not very often) he would get very upset. His frustration at not being able to get it right, to get it perfect, created a lot of tension.

Guide seemed to be a peacemaker. He was very good at keeping things pleasant and comfortable between people. I noticed that during our interviews, he was concerned about giving me the right answers and, in a sense, pleasing me in order to keep things smooth. He played the peacekeeper role in some of the focus group sessions as well.

Mother, true to her alias, was very caring about everyone and everything. She felt the need to say yes to students, teachers and even me, the researcher. She wanted to make

sure everyone was okay. The caregiver in her was starting to burn out a little bit I sensed, but she continued to be there for everyone, even when she herself was hurting.

THE guy, my trusted little skeptic, played a beautiful role as the suspicious one, the one who didn't quite want to trust what I was saying or what other people said about him. He doubted and distrusted a lot of the information he came across. "Is this really true" was a favourite question of his and an ally in his quest for his own understanding.

Any critical reader should definitely raise an eyebrow at these loose and painfully inadequate typology descriptions and I will be the first to admit that they are potentially completely wrong. However, the point I am trying to make is that there were many different personality types among the participants in my research project and that they are important to consider when learning/teaching is involved. Some were more introverted, some were more open to new experiences and others were more judgmental. For example, with King the perfectionist, if I had helped him understand how to reach the state of coherence first without the technology and then, only gradually with sound, then visuals, and then graphs, we might have had better success. In other words, foreknowledge of a person's type might make training with biofeedback easier for coaches, counsellors, teachers and whoever else might be facilitating the quick coherence technique.

In summary, the data as well as the entire training program and procedure can and should be viewed through not only the quadrants of the integral model, but all of its other dimensions as well. Although mine was an attempt to be an integral study, it should be clear from this more exploratory section that a truly integral research project would take

into account all of the five dimensions of AQAL in its design, implementation and overall process and analysis.

Does the Story have a Future?

So what happened at the end of all of this training and investigation? What's the rest of the story? How did things evolve after the last interviews were conducted and summer holidays started for the students as well as the teachers? My most sincere hope was that things would have continued and that the seed I had planted through the coherence technique and use of biofeedback would be integrated into the curriculum and school culture at IHS. It seemed possible that heart intelligence might develop into a more powerful force at this particular school because of the circle of courage and the support of some of the adult participants.

Fortunately, the story does continue past the official completion date of my study. Thirteen point seven billion years of evolution continues unperturbed. After the final focus group, the principal, thanks to positive feedback about the experiences and possibilities of the role of HeartMath at IHS, decided to purchase the license for all of the computers in the school so that each computer is capable of having the emWave installed. The school spent $1500 for this license which included the 12 ear sensors that the Institute of HeartMath lent me for this project. (These sensors are what translate the human pulse into heart rate variability patterns that are displayed on the screen and provide the means for biofeedback). This was exciting for me personally because I felt that what I had introduced the school might actually have a future over and above my study.

In conclusion, I have made (and continue to make) numerous visits and provided a few extra coaching sessions to the guidance counsellor and other teachers since the time the study officially ended. I have sent many e-mails to the participants as well as the new principal to explain that I am more than happy to do more coaching or provide any other help that I can with respect to HeartMath in the school. The fact is, most people are very busy and have enough on their plates just trying to get through the assignments and job descriptions facing them on a daily basis. However, the technology is at the school, a few of the teachers are still very interested in incorporating the program into some of the courses and I have vowed to continue contacting and communicating with participants (those who have not blocked me from their e-mail lists or dropped me as a friend on Facebook ☺) in an effort to offer my support, encouragement and expertise in watering the seed of heart intelligence that was planted at IHS in early 2010.

I received the following e-mail from Guide on March 7, 2011 (9 months after study official conclusion):

> Hi Marc,
>
> It is a bit synchronous that this week I announced at DGM (Democratic General Meeting – occurs every Friday and is meant to encourage student participation in the overall functioning of the school) that we will have an open session available to students who want to try the heart math in the computer lab on Wednesday at noon. Again, I am just trying to introduce the monitor and use of HeartMath to our student population. So far I am waiting for students to also take the lead. I have to let you know that last week I put on the monitor and scored an 84% green.

It was very cool. I stayed in a peaceful presence mode. I think that is what will work for me, but I want to find ways for students to give the stuff a chance too.

CHAPTER 6: DISCUSSION, IMPLICATIONS AND CONCLUDING REMARKS

Summary of the Research Project

At this point in a dissertation, a couple of important questions arise. In general, how well do this study's findings address the research problem and its related assumptions? In particular, how useful was the integral AQAL theoretical approach for this study? And on the heels of these two questions: How does what transpired during this study impact the evolution of education and evolutionary spirituality more broadly? Put differently, how does what happened here fit within the big picture?

We start with how well the findings match with the initial research questions. Briefly, I intended to do four things:

1. **Investigate the on-going subjective impact of biofeedback on the participants' mental, emotional and spiritual being (e.g., how does it feel?)**

2. **Discover the impact coherence building has on participants' physicality and overall activities or actions in the world (e.g. what does it live like?)**

3. **Document how participants experience the development of heart intelligence and use of biofeedback in school (e.g. what does it look like with others, in the school culture?)**

4. **Describe/Interpret participants' experience of practicing coherence within the pre-built structure of a high school (e.g. how does it fit into the school environment?)**

Overall, I think these four aims were achieved. And, the astute reader will see how the four goals and their accompanying questions fit inside the AQAL quadrants: One, two, three, four = upper left, upper right, lower left, and lower right, respectively. First, I have described what training to build coherence with biofeedback feels like on a mental, emotional and spiritual level. The subjective experiences of participants helped to provide insight into what the process of developing one's heart intelligence through practice on

the emWave technology is like. For those who practiced most seriously and remained interested in the project, the overall experience was positive and evolutionary. However, when looking at the inner experience of all participants, it was a mix of positive, negative, challenging, peaceful, emotionally fulfilling, physically relaxing, mentally burdensome, spiritually liberating along with a whole host of other impressions. In the upper left quadrant, which is the subjective sphere of experience, the two themes that appeared to be most prominent were: the subjective experience of what it is like to be in coherence; and how the development of heart intelligence through biofeedback is linked to other personal spiritual practices.

Second, how a training program such as the one I facilitated is received by participants on a very practical, engaged level emerged, as well as how it may impact student and teacher actions in the world. (Clearly, some of the participants had minimal interest and developed minimally as a result of participation). Others, who practiced more diligently and showed more commitment experienced subtle as well as profound changes in their physiology and their behaviours in the world. For example, August who had been plagued with spirits haunting her basement found a way to dispel the negative energy; these were tangible, noticeable changes in a positive direction. Conversely, K found the training program to not really have much of a point. “Why am I doing this?” he asked. Interestingly, a few of the participants had some health benefits as a result of entering the state of coherence such as a loosening of muscles in the body and even a reduction in facial tics caused by stress. The themes in the upper right quadrant had to do with what the experience of developing heart intelligence is like physically – what the state of

coherence is like in the body – and also reflected the importance of motivation, action and practice when engaging this type of training program.

Third, through the many interviews, conversations, dialogues and technologically facilitated interactions, it was possible to get a sense of what using biofeedback in a high school setting looks like in the interpersonal sphere. The lack of social support and group culture around heart-based living was strongly felt by most participants. The success of future efforts for this type of education will necessitate incorporating the language as well as communities of practice (both student and teacher) in order to foster the rhythmic beating of the heart inside of a school. Finding ways to incorporate biofeedback training into some of the classes and school activities would be an added bonus. The themes in the lower left quadrant had to do specifically with the importance of creating a school culture around heart-based living and also the impact that coherence building can have on interpersonal interactions. For example, it was found that practicing coherence facilitated smoother and more coherent interactions with others, be they friends, family, students or teachers.

Last, the data revealed that the physical structure of the school itself, as well as its technology and overall layout, impacted the development of heart intelligence. Many of the student participants explained that practice would have been much easier and more effective if they had been able to engage at home or somewhere more convenient through the use of cell phones or other portable devices. Other participants were frustrated by interruptions and technological glitches that seemed to block their intention to build coherence. The themes emanating from the lower right quadrant were primarily the

promise and challenge of the actual biofeedback technology as well as the "pre-built" school environment and its impact on coherence training.

A Tour through the Four Chambers of a Coherent Heart

Before leaving the quadrants, I would like to describe how the heart seemed to manifest in broad strokes for the participants. It seems worthwhile to at least have a sense of what THE HEART is like in each of the four "chambers". Let us circulate, then, and propel our way through these aspects or vessels of our Self.

In the upper left quadrant (left atrium), participants experienced the heart as being something felt through actual emotional and psychological arousal. Strong emotions were reported as being felt in the area around the heart. Participants also said that when they are heartbroken or filled with joy, they can feel the area around their hearts more intensely. So, in the upper left, subjective domain, the heart is something that people experience and are connected to on an intimate, personal level. When practicing entering into a state of coherence, participants often reported feelings of warmth and positivity around the heart area. They felt good.

In the upper right quadrant (right atrium), we can see the heart from a different perspective: namely, as a pump or an intricate piece of human physiological machinery. This is the more standard and common view, at least in the medical field. From this vantage point, participants felt their hearts viscerally - physically. Sometimes there was pressure or a pain in the heart area when things were challenging. Conversely, a few participants reported a physiological feeling of expansion and opening up in the chest area when they were in coherence. Interestingly, there is a new field emerging called

"cardiac psychology" that is attempting an integration between the left-hand and right-hand quadrants or left and right atria of the heart (Guarneri, 2006).

In the lower left quadrant (left ventricle), it was observed that our cultural assumptions and societal norms shape our perceptions of the heart. Cities and the schools within cities have varying perspectives on the heart and its importance in our lives. In the Western world particularly, these are influenced by television, movies, conversations with friends and relatives and teachers and so on. We routinely transplant hearts from donor to recipient in our technological era, and these miraculous practices influence our relationship to the "pump" that lies in the centre of our chests keeping us alive. Viewed from this lens, the heart and the notion of heart intelligence were arrived at through a dialogue between me, the researcher, and the participants. The heart came alive through the fusion of our perspectives.

In the lower right quadrant (right ventricle), it is possible to view the heart as part of a system of hearts. An example of how the heart can be part of a system is found by looking at modern scientific investigations such as the one being conducted by the Global Coherence Initiative (GCI) who are attempting to understanding how cosmic, solar system and planetary events impact the human heart and vice versa. Viewed from this perspective, the heart of the human is connected to the heart of the planet and to the heart of the solar system and to the heart of the Milky Way galaxy and perhaps even to the heart of the universe. It is important to note that this is not just metaphor and poetry, but empirical scientific inquiry reaching into areas that take on decidedly spiritual flavours (Global Coherence Initiative, GCI). In this study, the hearts of my participants were connected to nature, to animals, to each other, electromagnetically and reciprocally,

between the computers, the transportation systems, the school structure and the design of the city all impacted the hearts of students and teachers at IHS.

The integral model was therefore very helpful from the perspective of referencing the quadrants and it also seemed useful in understanding the data when using its other four elements: stages, lines, states and types. There are different levels of development and certain lines of intelligence can "increase," sometimes by practice, sometimes by experience, sometimes by force and sometimes by just plain mystery. The line of heart intelligence was seen by most participants to be real and some of those who benefited most from the program felt that they actually developed their heart intelligence. The state of coherence seemed to be an important part in facilitating the development of heart intelligence. This state was contrasted to others such as stress, anxiety, meditation, and relaxation. Further, some participants appreciated learning techniques to help them switch states through intention and will. The influence of personality types helped shed some light on how certain types of people might respond to this kind of training. It was observed that future efforts of this kind might do well to incorporate a person's type into the design and implementation as well as all of the other aspects of the integral model.

Taken together, it is my personal sense that the AQAL framework lends a certain degree of depth and elegance to understanding phenomena, such as those I was pursuing through this research project. There is a comprehensiveness and breadth that the integral model encourages which is difficult to find with other models. That being said, it is clear that because the integral model integrates so many elements of the human experience, it is a very big job to try to include "everything." As I reflect back on the data and the way I presented it through the integral worldview, I see that it seems to some degree brief. The

model has great capacity for depth and complexity, thus leaving open the possibility (almost an imperative) that I could have delved yet deeper into the material and developed nuances that would have been even more insightful. Thus, paradoxically, because the integral map is so large, it is a challenge to delimit the amount of time spent in each element. This creates the effect of moving through a whirlwind of perspectives and views while still trying to understand the data through this multifaceted lens. Nevertheless, the underlying theme of this dissertation is evolution and therefore my attempt at an integral study, though necessarily limited, is a push toward a richer and more complete understanding of life.

Implications for Integral Education

> Life is a well of deep waters. One can come to it with small buckets and draw only a little water, or one can come with large vessels, drawing plentiful waters that will nourish and sustain. While one is young is the time to investigate, to experiment with everything. The school should help its young people to discover their vocations and responsibilities, and not merely cram their minds with facts and technical knowledge; it should be the soil in which they can grow without fear, happily and integrally (Krishnamurti, 1981, p. 44).

That sure sounds good to me and I wish that viewpoint had prevailed when I was going through my earlier schooling. Fortunately, today, there seem to be more educators who are interested in making education more holistic and integral.

Of these, Esbjorn-Hargens, Reams and Gunnlauson (2010), identify 10 primary commitments or foci of modern integral education which include: exploring multiple perspectives; including first, second, and third person methodologies of learning and

teaching; weaving together the domains of self, culture, and nature; combining critical thinking with experiential feeling; including the insights from constructive developmental psychology; engaging regular personal practices of transformation; including multiple ways of knowing; recognizing various types of learners and teachers; encouraging shadow work with learners and teachers; and honouring other approaches to education. By integrating all of these elements into the learning and teaching process, it is believed that students and teachers will experience a much deeper and richer growth.

Interestingly, I touched upon nine of these in my project (the only one I neglected being "shadow work") so hopefully that is a sign that my integral intentions were realized. Further, IHS is a place that attempts to foster many of these commitments as well. They encourage multiple ways of knowing, they explore multiple perspectives and honour various approaches to education. However, they could benefit from taking some of these commitments even more seriously in implementing the curriculum. By incorporating something like HeartMath into their school more fully, IHS students and teachers would be able to foster more experiential feeling and engage in a regular practice of personal transformation. By doing so, the school might be able to mitigate some of the stressors that students and teachers reported feeling in this study. Further, as other studies have already discovered (McCraty et al., 2006), using the heart to enter a state of coherence can be very beneficial when it comes to helping students cope with the anxiety that often accompanies test taking.

The emWave is a remarkable piece of technology that has the power to deeply transform one's own physiological state thereby transforming our emotional, cognitive and spiritual dimensions as well (Guarneri, 2006). And it is through this kind of mind-

body-emotion-spirit training that our students can thrive in the school environment (e.g. achieve higher test scores, remember the material being studied more accurately, see greater links between fields of study, balance their stress levels and so on). This has been demonstrated quantitatively by the Institute of HeartMath, and my study has lent further nuances to what the process is like from a student and teacher perspective.

The challenge remains to provide an integral education while also presenting the curriculum as set forth by governing educational bodies. Where would something like HeartMath fit best into a school curriculum? Physical Education class? Career And Life Management (CALM) class? Biology class? One of the mandates of all schools is to work with students around physical health and well-being. It is an underlying assumption that part of educating students involves helping them make healthy choices with respect to their bodies. In a very real sense, the school system is partly in charge of the overall health of our youngest citizens. Because biofeedback has direct applications for physical health in general, it is ideally suited to be a part of any integral education. Although I have not addressed this in great detail, it is clear now that the mind (subjective) and relationships (intersubjective) affect our physical health (objective). Teacher participants in my study suggested precisely this: that practicing coherence with biofeedback could fit in one of the physical challenges of the Democratic Learning and Living (DLL) course (as well as its emotional and mental components). More broadly, other schools would find no trouble blending this kind of training into phys ed classes and even career and life management courses.

Reinforcing this point, Guarneri (2006), a cardiologist and teacher, has been embracing integral ways of living in her practice and has seen clearly that patients who

take care of themselves emotionally, socially and spiritually, are much more likely to experience positive health outcomes. Better emotional health often equals better physical health. In our multifaceted existence, what we learn in school affects how we treat our bodies in the present and the future - physically, emotionally and even spiritually. Therefore, the educational system should promote health and well-being as well as provide concrete tools to reduce stress and manage emotions. Guarneri (2006) states,

> Yes. I think that what you're suggesting is something that we will learn more about in the future. We'll learn that people who are more loving, more compassionate and more thoughtful, more connected are less likely to have disease. There is some data that suggests that things like being angry, being depressed, even being lonely, particularly when in a couple the wife dies and the man continues to live, the mortality in that situation is higher. There is a social construct behind a lot of this. (p.156)

Integral Implementation

I asked the participants what they thought would be the best way to implement what they had learned about heart intelligence into the school. I wanted to know how to proceed the following year so that the purchased software and technology would get used. More importantly, I wanted to find out how the teachers and the school in general could support students in continuing their training or, alternatively, beginning it. In addition, I wanted to know what the students thought might induce future students to get interested and to get engaged in this kind of training.

Pegasus responded:

> I think it can so be a part of our challenges (these are independent study courses that are developed by students themselves and count for credit at IHS), our spiritual, mental, emotional, challenges. To get them to just sit there. It could be emotional, like oh my god, I'm so anxious about this. It could be spiritual. You know what, this is really working for me, this is my meditation time. Or it could be mental, like you could make a case for any of those. And so, if they did it for a certain amount of time – it's supposed to take six hours, so I would say if they committed to doing it for one month four times a week or something twenty-four times and then go about and journal during that time. You know something like that. So if you could connect, if you've got a few kids that you feel really got this, really were into it, ask them if they'd be willing to sort of be the peer support. For heart coherence. And that would mean they'd put things on the agenda and they'd help you to do presentations and take some of the load off of you. Because that way - if it's successful, Marc, then we don't have to do anything. Like that's what it's all about. That's what we try to do. That's the idea.

Finally, she suggested that a potential avenue for using the HeartMath technology and having it be spearheaded by students, would be in the Democratic Living and Learning (DLL) course that progresses through grade 10, 11 and 12. As students move up in levels, they could be asked to not just participate but take the lead on certain projects. She thought that perhaps having a student interested in HeartMath might provide a perfect opportunity for them to implement this kind of training. In her words, "You go beyond just participating. You initiate things. DLL 35 is you're the leader. You're doing

it. You're organizing. So a lot of our kids just do DLL 35 and it's a way for them to give back."

Some sort of structure seems to be necessary for continuity, suggested Giant. He thought that taking part in the project was a great way to keep focused and on track with the actual practicing. Unfortunately, the study being over, it was difficult to remain vigilant with practice, he explained. Relating his personal experience, he shared, "Because now that the project is stopped, I've just let it slide." This statement led to a conversation around how best to use the program moving forward into the next school year and I asked him:

I: What do you think the potential is for this in the school?

P: I mean it's mixed; it's mixed you know. Like if we don't push it or encourage it, then it will have very limited impact. If we can continue to push it and try and get kids to get on it, then maybe it will have some more worthiness. I think if Guide can utilize it in a guidance capacity, you know, even when he's talking with kids, just like come in, say clip this on, I want to try something. I want to show you something and then get them to talk and you know.

I: Great, anything else?

P: I mean certainly we have opportunities to incorporate this as one of our challenges here at the school. So that if they did this on a regular basis that they could get challenge hours out of it. So I mean there's an opportunity there to bring it and to infuse it right into the curriculum on a spiritual or emotional level. A spiritual level to see - if we wrote up a lesson about how can we use this and have

it there for them to go to whenever they needed it... and just making kids aware that they have some heart intelligence...

In a related conversation with Wizzard, he expressed,

I think meditative practices of some form or other is huge… whether it's HeartMath or whatever. And I think that they should be just a part of what we teach kids... And I know teachers who have gone quite far in terms of like using meditation for far more than just stress reduction, for example. So students have experienced first-hand where meditation can take them in terms of who they are, their sense of identity, their connection with the world, everything... so it's more just sort of exposing people to there's this world of different things that you can do to increase your sense of awareness and have greater choice. You now have greater choice in terms of your subjective experience. You can gain an incredible amount of freedom you know through some of these techniques. The trick is to get buy-in. You need the students, you need the teachers, and heck, wouldn't it be nice if the whole school system was more accommodating to this kind of stuff.

Students also had some things to say about the future possibilities of using the quick coherence technique and the biofeedback program. Reflecting on his experience and identifying what would have made things easier for him (and therefore what might facilitate the process for future students) Pi told me that it would have been really nice to have a one-page sheet giving him detailed instructions on how to practice. It would have been helpful if I had told him "to try this and this and this," he said. Being given more explicit instruction on what options are available with the program and with the breathing technique would have been very positive for him.

> Well for me anyway that would be perfect, because I just like being told what to do. Like I can lead and I can step up if I need to, but like if a teacher is like do these... cool. And I'm like tell me exactly what to do and then I'll do them. Like give me - I'll give you questions 2(b) to question like 3(r) or whatever. Just make it so I don't have to do any thinking. And then once I'm doing whatever, then I can start doing the thinking.

This quote reflects a mix of things I have written about with respect to motivation, the importance of culture and teacher involvement, and even personality types.

A couple of the students also mentioned making the training and the whole aura around heart intelligence "cool." In other words, it was felt by some of the younger participants that giving HeartMath some snazzy clothes and a fancy haircut might increase its chances of success among their peers. According to A.W.E.,

> You know you just have to find a way to sell it to us. Like we're more than willing to buy it if it's cool and it will make us look better and feel better. You know what I mean? It's like "why am I doing this if there's no payoff" kind of thing. Sounds kind of harsh, but it's kind of true. Like some of these kids around here just want to look good. So the trick might be like how can learning coherence or whatever actually help me deal with life better or handle my friendships better or something.

And K followed suit suggesting, "It's got to be hype man. Like some of this heart stuff sounds a bit cheesy for some people."

Integral Applications for Individuals

Conversations around the future of what was learned through this study with my co-investigators yielded some interesting possible applications in people's personal lives, outside the school. For example, WildChild, with respect to the future, said,

> I think that I'm going to expand the study in my own life to working with nature. Because I can talk to people all the time, but I can't necessarily talk to plants in the way that I can have a conversation with them. But if I'm just listening to my surroundings and taking in thoughts that necessarily are my own and opening my heart to those other visible things in the world, then perhaps I could expand my knowledge of what this world really is. And not just something that's here. And I think that would be good. Because I'd really like to be able to communicate with green things and animals. That would be awesome. For example right after I was in a forest and this was like after my first hour session, and I looked up and there was like three chipmunks standing like right there and they were eyeing like my bread and water. So I was like feeding them and they were like - they looked so scared, but they like knew that I was like - I was okay. But I had to tell them it's like not everyone is like me and they ran away. It was really cool. So I guess they were just like sitting there since I'd gone into a state of like positive vibrations that I was sending out all around me. So it was really cool.

August, a very spiritual student participant, repeatedly told me that she felt that having developed her heart intelligence offers her the ability to deal with negative energy. She told me the following very interesting and personal example when talking about how she might use what she learned in the future:

P: Yeah. So there is like - there's something in my house, right and it like, I don't know. It resides in the basement and my room is in the basement. And basically, I've always been in tune with kind of spirits and like stuff like that. So whatever is in my basement is really negative. It's like really negative energy and with like the whole spirituality thing, since I'm First Nations, I have a sage bowl and sweet grass. And I also have a turtle rattle that's made out of a turtle shell and stuff. And basically my - like I guess my animal spirit is a turtle, so like I lean towards that for protection because you know, the turtle was given to me by like elders and stuff. So I noticed when like I pray and everything, the negative energy just like totally leaves me alone and it just makes like my whole surroundings just positive. Like it just makes me like really happy. So sometimes like if I'm having a really bad day or I'm in a really down mood, whatever is in my basement tends to feed off it a bit? Feed off my energy more than anybody else's really. So because of that and it's one of the reasons why I really wanted to like learn how to use coherence, because personally, like I think if you can make your heart feel like more positive than negative, then it kind of reflects off of you, you know. And when it does that, I notice that like the negative spirits don't like bother me. So that's like basically the main point, because before I knew how to use like coherence and everything, like I used to like be bothered a lot. Like I'd have nightmares every night and they'd always be like something in my room and it's just like really bad. So now that I have coherence, it's like a lot more easier to keep them away from me and keep them out of my space.

Princess, because of her love of art, said that she often enters the state of coherence when she is painting. “I think like when I am painting, I am in coherence. Like for sure. You know if you’re a jogger and you get to that runner’s high and stuff like that... It’s similar - like when I’m really into painting and I’m like in it, because time is all weird and I think that’s absolute coherence.”

Integral Application for the Collective

Emphasizing the social aspect of change and evolution was something that several of the adult participants mentioned in my study. Several participants felt that if HeartMath and other such practices - which fit seamlessly into integral education - stand a chance, they have to be embraced by the school culture. A teacher commented, “You know in any school I guess the more it’s embedded into like a school psychology, you know, the more likely it is to get done. If it’s an integral part of our school society, let’s say, then it’s just that much deeper and less superficial.” In other words, we need to get the heart back into the heart of the school culture. As it stands, the heart is beating, but it is a little bit incoherent and sporadic. The circle of courage at IHS is a beautiful start to what will hopefully be a deepening of a truly integral education. And a truly integral education is important because it must certainly lead to a truly integral life.

All of this might sound nice, but hopefully one of you is wondering: So what? Thus, I would like to address the most practical aspects of this dissertation before moving into a macro perspective. If I had to boil everything down to the most practical elements and if a teacher were to come up to me (or even a student) and say, “So Marc, I heard you did this research project on heart intelligence and biofeedback stuff, I’m interested. I want to do it at my school. What would you suggest that I do? Like what’s the best way

to roll this out so it has a chance of success?" First, I would suggest that they read this dissertation to get a sense of the quadrants and the entire integral model as it applies to this kind of initiative. And then very practically and succinctly I would say they should keep these 3 very important points in mind:

1) Pick the right time

2) Show evidence that this works

3) Find champions

According to King, picking the right time to initiate a training program such as the one I facilitated is critical.

> School staff and principals are so busy. However, after Family Day and Teacher's Convention, like from that time till close to spring break, there is about a month-long window. And this is feedback coming from small schools and big schools. There's about a month window where things seem to kind of slow a little bit and I've seen that in junior high and on high school admin. That's exactly what happens. There's about a month there, where you actually can look at your school development plan and move some things forward. Where you're not dealing with, as I said, opening up the school, starting up the semester, doing your various required documents, Alberta Education and on, on and on. Or scheduling exams, conducting exams, semester interviews and on and on and on. So if it were timed correctly, to actually do some sort of a rollout presentation or whatever during those four to six weeks that would be strategically smart, because people are more receptive at that time.

Over and above the right timing, King felt that it would be critical to have someone who is engaging and highly knowledgeable in the area of biofeedback, and with the tools and techniques of HeartMath in particular. In his own words,

> I think the second piece would be around having someone like yourself come and teach me, because you are very engaging. So you do a good job at that. For high school principals, junior high principals, the evidence will be really important. The evidence, not just in terms of the data, not to minimize the importance of the data, but the feedback you get from teachers and students in your research is big. But if I can envision a presentation let's say at the end of February High School Principals' Meeting or Middle School Principals' Meeting or whatever where there would be a presentation, by you let's say, for a few minutes with some PowerPoint stuff. But then also, to have a couple of students or teachers come in who have actually done it and see the benefit of it. You know these are real people in our schools, who can talk about a turnaround for them because they've now done HeartMath, right?

Third, King advised that it would be best to find a "champion" (a staff person or teacher who is going to be the advocate and will move the project forward internally) for any HeartMath initiative within a school. Within the Calgary Board of Education, he explained, there is a move toward having some teacher or staff person embrace an initiative (like the international certificate program for example) and bring it to the forefront for any particular school. In his words,

> The other thing that seems to be used, I think, fairly successfully in the system right now is to pick a champion, right? Like we have a team for healthy learners

> in the system and they ask every school to pick a champion. And the first year, I was the champion. Well, if the principal is the champion and we're dealing with other things on our plate, then we sort of triage the work and find someone else. A champion can really change that and it takes the load off the principal, somebody who is like gung-ho to get it going. And best of all, if you can find a champion who really understands the benefits of something like this, then you've really got it made because you have someone on the inside who is going to help it bloom and flourish. It's really critical. Whether it's your guidance counsellor or resource teacher or the CALM teacher. And then to lay it out as we're not talking about hours and hours and hours of work, you know. We can help with the purchasing of the software, you know. We can come in and explain HeartMath to the kids that are interested. Like this is really a no-added work kind of a thing, other than to pick the kids to say this would work well for you. I would like you to try this. The more they feel supported, I think the more likely they would be to buy into something like this.

So, according to King (and these points were corroborated by the other teachers as well), those are the magic three pills to swallow for an initiative such as this to succeed in the Calgary Board of Education and likely any school or large system. The right time, the right reasons and the right people. It is my sincere hope that this approach is used in future efforts of this nature.

Significance of This Study

Why is this study significant? First, it is a much-needed qualitative complement to the quantitative research that has been conducted on heart-based living. Second, it is a

valuable contribution to the emerging field of integral research and an example of how all elements of the integral model can be used when researching phenomena. Third, it is an example of action-oriented research that has had an overall positive effect on those involved. Fourth, it is an example of what it has sought to understand. In other words, this very dissertation is potentially at the heart of the evolution of education, in the flesh, on paper, inside and outside the individual and the collective, it is pushing the edge of what is commonly done at the doctoral level. Finally, it is a milestone in that this entire document has been transcribed by voice activated technology – a relatively new technological invention that has helped me, a 30-year-old C-5 quadriplegic injured at the age of 17, complete a BA, a Masters of Science and now a PhD all by dictation into a machine. Pretty wild! For all of these reasons, this study is significant.

At this point, I would like to zoom out from my personal research project, which centred around a particular school in Calgary, and move into our broader culture and even the human condition itself. Again, I will use the lens of evolution and keep in mind the big picture.

The Human Condition

In the Pulitzer prize-winning book entitled "*The Denial of Death*," Ernest Becker (1973) invites the modern human being into the heroic life, such as might be exemplified by the Dalai Lama today. I referred to the participants in this study as heroes, not necessarily because I saw them act heroically, but more realistically, because it is my deep hope that they will see the heroic spark within them and decide to ignite its flame fully in order to be of service to a world in great need of such heroism.

> Man will lay down his life for his country, his society, his family. He will choose to throw himself on a grenade to save his comrades; he is capable of the highest generosity and self-sacrifice. But he has to feel and believe that what he is doing is truly heroic, timeless, and supremely meaningful. The crisis of modern society is precisely that people no longer feel heroic in the plan for action that their culture has set up. They don't believe it is empirically true to the problems of their lives and times. We are living a crisis of heroism that reaches into every aspect of our social life: the dropouts of university heroism, of business and career heroism, of political action heroism; the rise of antiheroes, those who would be heroic each in his own way, those whose tormented heroics lash out at the system that itself has ceased to represent agreed heroism. The great perplexity of our time, the churning of our age, is that the youth have sensed - for better or for worse - a great social historical truth: that just as there are useless self sacrifices and unjust wars, so too there is an ignoble heroics of whole societies: it can be the viciously destructive heroics of Hitler's Germany or the plain debasing and silly heroics of the acquisition and display of consumer goods, the piling up of money and privileges that now characterizes whole ways of life, capitalist and Soviet. (pp. 6-7)

Becker wrote these words believing that society and the youth around him were becoming ever more caught up in activities and life plans that were devoid of real depth and meaning. As postmodernism began to take hold, the culture lost any real sense of living in service of something larger and narcissism began to take hold of the young in a powerful way.

In their penetrating and, frankly, difficult to read book entitled the "*Narcissism Epidemic*" (difficult to read because it is so accurate a description of "generation me"), Twenge and Campbell (2010) demonstrate quite convincingly that narcissism is on the rise, especially in youth. They state that there is,

> …a relentless rise of narcissism in our culture. Not only are there more narcissists than ever, but non-narcissistic people are seduced by the increasing emphasis on material wealth, physical appearance, celebrity worship, and attention seeking. Standards have shifted, sucking otherwise humble people into the vortex of granite countertops, tricked out Facebook pages, and plastic surgery. A popular dance track repeats the words "money, success, fame, glamour" over and over, declaring that all other values have 'either been discredited or destroyed.' The United States is currently suffering from an epidemic of narcissism. (p. 2)

And, the epidemic is spreading right into the heart of our schools (Twenge & Campbell, 2010).

In the book, the authors warn that many of the childrearing practices currently held to be helpful and beneficial in building self-esteem, actually lead to narcissism. Trophies for all, telling kids they are special, self-worth programs that encourage people to write about themselves and talk about themselves through positive affirmations ad infinitum contribute to the rise in narcissism in our culture. "You can have, do and be everything you want!" we are told. While any of these approaches, taken separately and in the appropriate context, can help contribute to a healthy sense of self and efficacy, when used haphazardly, overzealously, and without a purposeful underlying framework - they lead to a pathologically self-centred world view.

I am an excellent case of this disease. I have injected myself into the text of this dissertation such as I am doing here, for example, and I am just as hyperaware of my appearance, my specialness, getting my needs met and on and on, as are most of the members of my generation and culture. When viewing myself with dispassionate clarity, without sounding too self-critical or self-centred, in some ways I make myself sick. And I am not alone, I see this all around me. I also saw it very clearly at Integral High. How do we draw the line between special education and "special education?" Are we really helping students when we give them more and more freedom to do things as they wish, when they wish, how they wish? What is lacking in this type of encouragement?

With so much complexity in our educational system, we need evermore integral ways of understanding students, schools and life in general. Spiral wizards (individuals who can morph and flow within the various levels of the developmental sequence as well as all of its accompanying lines, quadrants, states and types) are needed in a world that is filled with opposing worldviews. Schlitz and Amorok (2004) have, for example, developed a program that they call worldview literacy that is based on helping young people understand different worldviews and ways to appreciate these various viewpoints on life. Numerous programs, such as this, aimed at increasing students' capacity to embrace diversity and difference have arisen in response to the complexity each school faces.

In response to the multiple challenges happening on individual and interpersonal levels in the school system, new forms of education and learning/teaching are being born that suggest an evolution of education. For example, Bill Gates has recently given financial and personal support to the Khan Academy, a YouTube based tutoring system

that allows students to learn lessons and practice homework all online. These and many other types of alternative/technological initiatives are changing the face of education. However, considering our evolutionary heritage, we face millennia of ingrained habits and patterns that may make revolutionary changes in education or in other domains "tricky."

The Evolutionary Challenge of our Time

Invariably, as we move towards a greater symbiosis between people, the planet and the world of technology we bump up against our evolutionary heritage. Evolutionary biologist Stewart (2005), reflecting on our propensities as human beings suggests,

> In large part, our key desires and motivations are those fixed by our biological and social past… Although the means for satisfying our desires has changed enormously, we continue to pursue much the same proxies for evolutionary success as our ancestors. We spend our lives chasing the positive feelings produced by experiences such as popularity, self-esteem, sex, friendship, romantic love, power, eating, and social status, and strive to avoid the negative feelings that go with experiences such as stress, guilt, depression, loneliness, hunger, and shame. Computers, the internet, airplanes, cars, buildings, books and phones all exist because they serve the desires and motivations implanted in us by past evolution. They have been called into existence by stone-age desires.
>
> Although humans like to present themselves to the world and to themselves as rational beings, we do not choose our desires and emotions. No matter what our reason decides, we cannot turn the other cheek effortlessly or

resist temptation, and we find it difficult to act lovingly towards enemies we hate. (p. 17).

If he is correct, Stewart (2005) is saying something important about not only human life, but perhaps even the human system of education that has been created and upheld by human beings who have these innate drives. How do these newfound evolutionary sciences impact what we do in schools and how we do it? Can the epic of evolution transform our learning and teaching centres?

Echoing Stewart, DeRosnay (2000) writes about the future direction of humanity and also of education on planet Earth, explaining that some important changes will have to take place in order for us to meet the challenges,

> We are too egocentric, individualistic, possessive, hedonistic, and intelligent. Our education, our economy, our industrial growth, and our international competitiveness are entirely based on developing and encouraging personal intelligence, consumption, ownership, and the accumulation of goods. It is time we subsume some of this individualism into something greater. The mere suggestion is often enough to incite protesting voices, decrying the loss of individual freedom - a privilege raised to sacrosanct status undermining our collective well-being. How do we find a balance between individual freedom, respect for simple rules, and the exercise of collective intelligence (p. 89)?

Becker (1973) calls for heroism and a purpose that transcends one's own personal life, and DeRosnay (2000) and Stewart (2005), in their own way, are asking for the same thing. However, their heroism is one in which the individual surrenders to something greater… but to what exactly? To the evolution of life on this planet? To the evolutionary

impulse itself? To the super-mind or over-mind that might include billions of human cells interconnected like neurons? Could this be the cure for the narcissism epidemic? Rather than putting myself first, what would happen if I put myself at the disposal of the evolutionary drive towards the good, the true and the beautiful? Could this become a part of our educational systems? And how might we go about finding a higher meaning and purpose, assuming we were interested? What tools and practices could we engage to facilitate this movement? HeartMath is one possible tool, because it has the potential to open the heart to the wider world and context we are all a part of.

Implications for an Integral Life

> It may be that the later alienation of young adults from the redemptive tradition is, in some degree, due to this inability to communicate to the child a spirituality grounded more deeply in creation dynamics in accord with the modem way of experiencing the galactic emergence of the universe, the shaping of the earth, the appearance of life and of human consciousness, and the historical sequence in human development.
>
> In this sequence the child might learn that the earth has its intrinsic spiritual quality from the beginning, for this aspect of the creation story is what has been missing. This is what needs to be established if we are to have a functional spirituality. Just how to give the child an integral world - that is the issue. It is also the spiritual issue of the modern religious personality. Among our most immediate tasks is to establish this new sense of the earth and of the human as a function of the earth (Berry, 1988, p. 152).

Macy (2007) similarly observes,

> The development of an ecological self is essential to our survival at this point in history precisely because it can serve a new view of morality and because moralizing is ineffective. Sermons seldom hinder us from pursuing our self-interest, so we need to be a little more enlightened about what our self-interest is. It would not occur to me, for example, to exhort you to refrain from cutting off your leg. That would not occur to me or to you, because your leg is part of you. Well, so are the trees in the Amazon basin; they are our external lungs. We are just beginning to wake up to that. We are gradually discovering that we are our world (p. 79).

An integral life and education means not only exercising properly, eating right, spending time with friends and relatives, being of service to the community, engaging in meaningful work and being creative with one's talents and abilities, but it also means integrating oneself into the greater structures and systems and dynamics of our earth and its home: the universe. The universe story is such a majestic one, such an awe-inspiring epic. And for some who are not ready for this grandiose perspective, it can seem frightening. We can seem so small and so insignificant as human beings compared to the scale of Big History. But that is only for someone who is improperly educated (Christian, 2008). When a person begins to understand the evolutionary voyage we are all on (and I should add that we are all only beginning to understand it), there is a certain wonder and numinous quality that can pervade the consciousness. It is spiritual. It is unbelievable. It is magical. It is real. And the evolution of education involves the evolution of how the universe learns about itself and teaches itself. What a BEAUTIFUL thought. What a gorgeous TRUTH. What a compelling call to GOODNESS.

For those interested in pursuing and continuing to evolve our educational systems, I would say consider the big perspective as you consider the small. Take your time reflecting on the vast stretches of time and the arc of the future. How can you best serve the evolutionary cause through your work and your study? An integral approach can be very useful, but can also be a very big undertaking. How else might the integral model be used in the study such as this? Imagine if five doctoral students teamed up to do one major study each focusing on one element of the AQAL model. That would be very in depth and very interesting. Ask yourself challenging questions: Over and above my own selfish intentions to get a fancy PhD status and all the fame and fortune that comes with this title, how can I best use this time and energy to serve others? How can I be a vessel for the good, the true and the beautiful? And keep asking. Never stop asking questions.

Concluding Remarks

> Intentional evolutionaries are primarily interested in the capacity of spiritual practices to improve their ability to intervene in the world to advance the evolutionary process. It is not important to them that spiritual practices can provide experiences of oneness with all that there is. They can see how these experiences are a consequence of the way human psychology is organized, not of the nature of reality. They are more interested in understanding how spiritual practices can re-organize our psychology and then using this understanding to improve the practices. For intentional evolutionaries, spiritual practices and experiences are a means to an end, not an end in themselves… Increasingly, agency-orientated individuals will use, modify and improve the practices originally developed by spiritual traditions. The practices will undergo the same

> explosive development as other technologies. In the process they will be shorn of all religious and mystical associations. (Stewart, p. 23)

The quote above describes precisely my reason for using the coherence technique on a daily basis (with the emWave) as well as brainwave technology and other traditional mystical or spiritual technologies: To transform myself into a vessel for the evolutionary impulse. I am very serious about all of this and I am seriously attempting to live an integral life less and less for myself and more and more for something larger than me. A tall order and a very big deal. A very, very big deal. This entire research project is part of this mission of transformation and evolution, therefore it is no surprise that I brought a spiritual technology into a local high school. It is a reflection of my growing sense of awakening and ecstatic urgency. It is offered as a gift - it is the universe working itself through this young dude named Marc. And the universe surely smiled when it/Marc read the words of one of the young participants who took part in this adventure: "Yeah. I think that like now that I've used the coherence a lot; it's kind of like there, like imprinted in my heart. Like in every situation it just pops up, you know. It's like oh well, you know, use your heart coherence, your heart intelligence. You know like in this situation or something. Some situations are harder than others, like I said. But I mean yeah, it just comes automatically now. So I more than likely will be using it for the rest of my life…"

Over the course of this dissertation, the world has been going through tumultuous times. We have witnessed disaster after disaster striking almost every place on the globe. There was a brutal earthquake in Haiti that killed thousands of people. There were floods and droughts that rocked Australia. There was a massive oil spill as a rig exploded in the Gulf of Mexico destroying wildlife and causing innumerable problems for fishermen.

There were huge political shifts in the Middle East as leaders who were corrupt were gradually and sometimes rapidly overthrown by revolutions by young people hungry for change. There was a devastating earthquake that hit Japan causing a sickening amount of human tragedy and death as well as fears from nuclear reactors exploding. And the list goes on…

The reason this is important is because these events are not separate from you, from me or from this research project overall. As the Buddha said, life is suffering. That was said millennia ago and it is as true today as it was then. And what can we do about the suffering? As I sit here writing, there are huge numbers of people all around the world that are in tremendous pain and despair. How can I even conceive of myself as healthy and free from pain, when my brothers and sisters around the world cry out in misery? These are not cute considerations. This is real, serious and powerful reality. Again, what can we possibly do in the face of all of this suffering?

Answer: Open our hearts to it. Let it in. Just for a moment, or longer if possible, allow the depth of this pain to break our hearts wide open. Let that agony fracture any idea we have about ourselves. Let the suffering drop us to our knees in ecstatic sobbing and weeping. Let the unimaginable horror of what we as humans must endure light the flame of compassion in our hearts. I pray: Dear mystery, dear unknowable Creator, dear mystical force of evolution, I wish with my whole being to open myself to the suffering of my fellow human beings so that my heart is engulfed with waves of care and love. May I stop running from my own pain and the pain of others. May I stop, turn around and face the fear, the uncertainty, the tearful faces and all of that which I find repulsive and sad with an open heart. Grant me the strength to change the things that I feel need

changing. Allow me to evolve into the highest expression of a human being through my own powerful intention and motivation. But perhaps most of all, let me hold the hands of my fellow human beings and rush into the future of the Glorious Dawn that awaits us all…

References

Allan, R., & Scheidt, S. (1996). Empirical basis for cardiac psychology. *Heart and mind: The practice of cardiac psychology*, 63-123.

Annells, M. (1996). Hermeneutic phenomenology: Philosophical perspectives and current use in nursing research. *Journal of Advanced Nursing, 23*(4), 705-713.

Arguelles, L., McCraty, R., & Rees, R. (2003). The heart in holistic education. *Encounter: Education for Meaning and Social Justice, 16*(3), 13-21.

Armour, J., & Ardell, J. (2004). *Basic and clinical neurocardiology.* London: Oxford University Press.

Armstrong, K. (2006). *A short history of myth.* Edinburgh: Canongate.

Ball, P. (2008). Cellular memory hints at the origins of intelligence. *Nature, 451*(7177), 385.

Barnes, J. (1995). *The cambridge companion to Aristotle*. Cambridge: Cambridge Univ Pr.

Battaglini, C., & Peppercorn, J. (2007). Lessons from survivors: The role of recreation therapy in facilitating spirituality and well-being. *RT and Spirituality, 1*(1), 1-25.

Baum, S. D. (2009). Universalist ethics in extraterrestrial encounter. *Acta Astronautica, 66*(3-4), 617-623.

Bauwens, M. (1996). Spirituality and technology: Exploring the relationship. *First Monday, 1*(5).

Beck, D. (2009). Spiral dynamics global. Retrieved from http://spiraldynamicsglobal.com/Spiral_Dynamics.php

Beck, D. E., & Cowan, C. C. (1996). *Spiral dynamics: Mastering values, leadership, and change: exploring the new science of memetics.* Cambridge: Blackwell Publishing.

Becker, E. (1973). *The denial of death*. New York: Free Press.

Beckwith, M. B. (2008). *Spiritual Liberation: Fulfilling Your Soul's Potential.* Hillsboro: Atria Books/Beyond Words.

Benner, P. (1994). *Interpretive phenomenology: Embodiment, caring, and ethics in health and illness.* London: Sage Publications.

Berry, T. (1988). *The dream of the earth.* San Francisco: Sierra Club Books.

Blackmore, S. (2005). *Conversations on consciousness.* London: Oxford University Press.

Blake, N. (1996). Against spiritual education. *Oxford Review of Education, 22*(4), 443-456.

Bohac Clarke, V. (2002). In search of school spirit: The cloud of unknowing in public education. *International Electronic Journal for Leadership in Learning, 6*(10).

Bolte, A., Goschke, T., & Kuhl, J. (2003). Emotion and intuition: Effects of positive and negative mood on implicit judgments of semantic coherence. *Psychological Science*, 416-421.

Borg, M. (2003). *The heart of Christianity: Rediscovering a life of faith.* New York: HarperOne.

Boyatzis, R., Goleman, D., & Rhee, K. (1999). Clustering competence in emotional intelligence: Insights from the Emotional Competence Inventory (ECI). in Reuven

Bar-On,& James A. Parker (Eds) *Handbook of emotional intelligence (pp343-363).* San Francisco: Jossey-Bass.

Braden, G. (2007). *The divine matrix: Bridging time, space, miracles, and belief*: Carlsbad: Hay House.

Bradley, R. (2006). The psychophysiology of entrepreneurial intuition: A quantum-holographic theory. *Proceedings from the Third AGSE International Entrepreneurship Research Exchange*.

Bradley, R. T., McCraty, R., Atkinson, M., Arguelles, L., Rees, R. A., & Tomasino, D. (2007). *Reducing test anxiety and improving test performance in American schools: Summary of results from the test edge national demonstration study*. Boulder Creek: Institute of HeartMath.

Bruteau, B. (1974). *Evolution toward divinity: Teilhard de Chardin and the Hindu traditions*. Wheaton: Theosophical Pub. House.

Buzan, T. (2003). *The power of spiritual intelligence.* Jakarta: PT Gramedia Pustaka Utama.

Calgary Board of Education. (2009). School profiles: Alternative High School. 2009, retrieved from http://www.cbe.ab.ca/schools/view.asp?id=133

Carroll, J. B. (1997). Psychometrics, intelligence, and public perception. *Intelligence, 24*(1), 25-52.

Childre, D., Martin, H., & Childoe, D. (2000). *HeartMath solution: The Institute of HeartMath's revolutionary program for engaging the power of the heart's intelligence*. SanFrancisco: HarperOne.

Childre, D., & Rozman, D. (2003). *Transforming anger: The Heartmath solution for letting go of rage, frustration, and irritation.* Oakland: New Harbinger Publications.

Childre, D., & Rozman, D. (2007). *Transforming depression: The HeartMath solution to feeling overwhelmed, sad, and stressed.* Oakland: New Harbinger Publications.

Chittka, L., & Niven, J. (2009). Are bigger brains better? *Current Biology, 19*(21), 995-1008.

Chopra, D. (1990). *Quantum healing: Exploring the frontiers of mind/body medicine*. New York: Bantam.

Christian, D. (2008). *Big history: The big bang, life on earth, and the rise of humanity.* Chantilly: The Teaching Company.

Cohen, A. (2000). *Embracing heaven and earth*. Lenox: Moksha Press.

Cohen, A. (2002). *Living enlightenment: A call for evolution beyond ego.* Lenox: Moksha Press.

Cohen, M., Kahn, D., & Steeves, R. (2000). *Hermeneutic phenomenological research: A practical guide for nurse researchers*. Thousand Oaks: Sage Publications Inc.

Colom, R., & Juan-Espinosa, M. (1998). Generational IQ gains: Spanish data. *Personality and Individual Differences, 25*(5), 927-935.

Combs, A. (2009). *Consciousness explained better: Towards an integral understanding of the multifaceted nature of consciousness.* St. Paul: Paragon House.

Conrad, S., & Milburn, M. (2001). *Sexual intelligence.* New York: Three Rivers Press.

Cory, G. (2002). Reappraising MacLean's triune brain concept. *Convergences and Frontiers, 23*(4), 9-27.

Crawford, D., & Bohac-Clarke, V. (2006). Bringing character into focus. *Principal Leadership, 6*(5), 4.

Crick, F., & Koch, C. (1998). Consciousness and neuroscience. *Cerebral Cortex, 8*(2), 97-107.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process.* London: Sage Publications.

Damasio, A. (2000). *The feeling of what happens: Body and emotion in the making of consciousness.* Holbrook: Mariner Books.

Damasio, A., & Sutherland, S. (1996). *Descartes' error: Emotion, reason, and the human brain.* London: Papermac.

Daugherty, A. (2006). *Physiological, cognitive and psycho-social effects of emotional refocusing: A summative and formative analysis.* Claremont: Claremont Graduate University.

de Chardin, P. T. (1959). *The phenomenon of man.* London: Collins.

de Rosnay, J. (2000). *L'homme symbiotique: Regards sur le troiseme millenaire.* Paris: Editions du Seuil.

deGrasse Tyson, N. (2004). *Origins: Fourteen billion years of cosmic evolution.* New York: WW Norton & Company.

Denzin, N., & Lincoln, Y. (2008). *Collecting and interpreting qualitative materials.* Thousand Oaks: Sage Publications.

Dictionary of Eymology. (2001). Intelligence. Retrieved from http://www.etymonline.com/index.php?search=intelligence&searchmode=none

Disch, W. B., Harlow, L. L., Campbell, J. F. & Dougan, T. R. (2000). Student

functioning, concerns, and socio-personal well-being. *Social Indicators Research, 51(1*), 41-74,

Dossey, L. (2008). Transplants, cellular memory, and reincarnation. *Explore: The Journal of Science and Healing, 4*(5), 285-293.

Dossey, L. (2009). *The power of premonitions: How knowing the future can shape our lives.* New York: Dutton Juvenile.

Dowd, M. (2008). *Thank God for evolution: How the marriage of science and religion will transform your life and our world.* New York: Viking Press.

Durant, W. (1953). *The story of philosophy*. New York: Garden City Publishing.

Edwards, A. C. (2003). Response to the spiritual intelligence debate: Are some conceptual distinctions needed here? *International Journal for the Psychology of Religion, 13*(1), 49-52.

Eisler, R. T. (1988). *The chalice and the blade: Our history, our future.* New York: HarperOne.

Elgin, D. (2009). *The Living Universe: Where Are We? Who Are We? Where Are We Going?* San Francisco: Berrett-Koehler Publishers.

Emmons, R. A. (2000a). Is spirituality an intelligence? Motivation, cognition, and the psychology of ultimate concern. *International Journal for the Psychology of Religion, 10*(1), 3-26.

Emmons, R. A. (2000b). Spirituality and intelligence: Problems and prospects. *International Journal for the Psychology of Religion, 10*(1), 57-64.

Esbjörn-Hargens, S., Reams, J., & Gunnlauson, O. (2010). Integral education: Exploring multiple perspectives in the classroom. Albany, NY: SUNY Press.

Esbjörn-Hargens, S. (2009). An overview of integral theory: An all-inclusive framework for the 21st century. *Integral Institute, Resource Paper, 1*(1), 1-24.

Evans, B. (2003). Our brain: Promoting brain-friendly learning. Retreived from http://website.lineone.net/~bryn_evans/Intelligences/intelligences.htm

Eysenck, H. J. (1988). The concept of "intelligence": Useful or useless? *Intelligence, 12*(1), 1-16.

Fernandez-Berrocal, P., & Extremera, N. (2006). Emotional intelligence: A theoretical and empirical review of its first 15 years of history. *Psicothema, 18*, 7-12.

Flynn, J. (1999). Searching for justice: The discovery of IQ gains over time. *American Psychologist, 54*, 5-20.

Flynn, J. (2007). *What is intelligence?: Beyond the Flynn effect*. New York: Cambridge University Press.

Frantz, R. (2003). Artificial intelligence as a framework for understanding intuition. *Journal of Economic Psychology, 24*(2), 265-277.

Gadamer, H. (2004). *Truth and method.* New York: Continuum International Publishing Group.

Gadamer, H. (2007). *The Gadamer reader: A bouquet of the later writings*. Evanston: Northwestern University Press.

Gallup Poll. (2011). Four in 10 Americans believe in strict creationism. Retrieved from http://www.gallup.com/poll/145286/Four-Americans-Believe-Strict-Creationism.aspx

Gardner, H. (1983). *Frames of mind*. New York: Basic Books.

Gardner, H. (1999). *Intelligence reframed*. New York: Basic Books.

Gardner, H. (2000). A case against spiritual intelligence. *International Journal for the Psychology of Religion, 10*(1), 27-34.

Gardner, H. (2003). Multiple intelligences after twenty years. *American Educational Research Association, Chicago, Illinois, 24*.

Gardner, H. (2006). *Multiple intelligences: New horizons.* New York: Perseus Books Group.

Gebel, E. (2008). Heart Disease a Leading Cause of Death Worldwide: Global research projects seek to end preventable heart attacks, strokes. Retreived from http://www.america.gov/st/healthenglish/2008/July/20080724175631abretnuh0.9819757.html

Glazer, S., & Smith, H. (1999). *The heart of learning: Spirituality in education.* New York: JP Tarcher/Putnam.

Global Coherence Initiative. (2011). *About the global coherence monitoring system.* Retrieved from http://www.glcoherence.org/monitoring-system/about-system.html

Godwin, G. (2001). *Heart: A personal journey through its myths and meanings.* New York: William Morrow & Company.

Goertzel, B., & Jayne, G. (2007). *World wide brain: Self-organizing internet intelligence as the actualization of the collective unconscious.* Burlington: Academic Press.

Goleman, D. (1995). *Emotional intelligence*. New York: Bantam Books.

Goleman, D. (2006). *Social intelligence: The new science of human relationships.* New York: Bantam Books.

Goleman, D. (2009). *Ecological Intelligence.* New York: Broadway Books.

Goodall, J. (2010). *50 years of chimps and change.* Retrieved from http://www.ucalgary.ca/news/utoday/september13-2010/goodall

Gordon. (1999). *Dictionary of existentialism.* Westport: Greenwood Press.

Gottfredson, L. (1998). The general intelligence factor. *Scientific American Presents, 9*(4), 24-29.

Gould, S. (1996). *The mismeasure of man*. New York: Norton.

Guarneri, M. (2006). *The heart speaks: A cardiologist reveals the secret language of healing.* New York: Touchstone Books.

Hagen-Foley, D. (2005). Forget thinking, it is your heart rhythms, stupid. Review of Transforming Stress: The HeartMath Solution for Relieving Worry, Fatigue, and Tension. *PsycCRITIQUES*, 50(38), 34-45.

Hall, E., Hall, C., & Leech, A. (1990). *Scripted fantasy in the classroom.* London: Routledge.

Hamilton, C. (2010). Evolutionary spirituality: From vision to action. Retrieved from http://evolutionaryspirituality.com/audios/

Hammond, J., Hay, D., Moxon, J., Netto, B., Raban, K., Straugheir, G., et al. (1990). *New methods in RE teaching: An experiential approach*. London: Oliver & Boyd.

Hanson, R., & Mendius, R. (2009). *Buddha's brain: The practical neuroscience of happiness, love, and wisdom*. New York: New Harbinger Publications.

Hawking, S. (1996). *A brief history of time.* New York: Bantam Books.

Heidegger, M. (1962). *Being and time* (J. Macquarrie & E. Robinson, trans.): New York: Harper & Row.

Heidegger, M. (1977). *The question concerning technology.* New York: Harper Row.

Helminski, K. (2000). *The Rumi collection*. Boston: Shambala.

Holden, J. (2006). *Effects of heart-rate variability, biofeedback training and emotional regulation on music performance anxiety in university students.* Denton: University of North Texas Press.

Houlgate, S. (1998). *Hegel and the philosophy of nature.* New York: State University of New York Press.

Houston, J. (1997). *The possible human: A course in enhancing your physical, mental, and creative abilities.* New York: JP Tarcher/Putnam.

Hubbard, B. M. (1998). *Conscious evolution: Awakening the power of our social potential.* Novato: New World Library.

Huston, T. (2007). *A brief history of evolutionary spirituality.* Retrieved from http://www.enlightennext.org/magazine/j35/evo-spirituality.asp?page=2

Institute of HeartMath. (2011). *Heart-based education sponsorship fund.* Retrieved from http://www.heartmath.org/get-involved/caring-initiatives/education-sponsorship-fund.html

Integral Health Resources. (2011). *The four quadrants*. Retrieved from http://www.integralhealthresources.com/integral-health-2/the-four-quadrants/

Integral Research Center. (2011). *Vision: Integral research is*… Retrieved from http://www.integralresearchcenter.org/vision

Jahn, R. J. & Dunne, B. J. (2005). The PEAR Proposition. *Journal of Scientific Exploration*, 19(2), 195–245.

Jardine, D. (1990). Awakening from Descartes' nightmare: On the love of ambiguity in phenomenological approaches to education. *Studies in Philosophy and Education, 10*(3), 211-232.

Jardine, D. (1992). *Reflections on education, hermeneutics, and ambiguity: Hermeneutics as a restoring of life to its original difficulty.* New York: Teachers College Press.

Jardine, D. (1999). *To dwell with a boundless heart: Essays in curriculum theory, hermeneutics, and the ecological imagination.* New York: Peter Lang Publishers Inc.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illnes.* New York: Delta.

Kahneman, D., & Tversky, A. (1973). On the psychology of prediction. *Psychological Review, 80*(4), 237-251.

Kane, J. (2000). On education with meaning. *Encounter, 13*, 3-13.

Kegan, R. (1982). *The evolving self: Problem and process in human development*. Cambridge: Harvard Univ Press.

Khan, I. (1979). *Biography of Pir-o-Murshid Inayat Khan.* London: East-West Publications (UK) Ltd.

Kilbourn, B. (2006). The Qualitative Doctoral Dissertation Proposal. *The Teachers College Record, 108*(4), 529-576.

Klein, P. (1997). Multiplying the problems of intelligence by eight: A critique of Gardner's theory. *Canadian Journal of Education/Revue canadienne de l'Èducation, 22*(4), 377-394.

Koller, K. (2006). The data and methodologies of integral science. *Journal of Integral Theory and Practice, 1*(3), 158-183.

Krishnamurti, J. (1981). *Education and the Significance of Life.* New York: HarperOne.

Kurzweil, R. (2000). *The age of spiritual machines: When computers exceed human intelligence.* London: Penguin Group USA.

Kvernbekk, T. (2007). Truth and form. *Interchange: A Quarterly Review of Education, 38*(4), 301-315.

Lambert, K. (2003). The life and career of Paul MacLean-A journey toward neurobiological and social harmony. *Physiology and Behavior, 79*(3), 343-350.

Laverty, S. (2003). Hermeneutic phenomenology and phenomenology: A comparison of historical and methodological considerations. *International Journal of Qualitative Methods, 2*(3), 1-29.

Lennick, D., & Kiel, F. (2007). *Moral intelligence: Enhancing business performance and leadership success.* New Jersey: Wharton School Publishing.

Lewis, J. (2000). Spiritual education as the cultivation of qualities of the heart and mind. A reply to Blake and Carr. *Oxford Review of Education, 26*(2), 263-283.

Li, S. C., Schmiedek, F., Neil, J. S., & Paul, B. B. (2001). *Intelligence: Central conceptions and psychometric models*. Oxford: Pergamon.

Licht, R. H. (2004). *An interpretative study of the experience of relating science and spirituality for those who value both science and spirituality.* (Unpublished doctoral dissertation). University of Calgary, Canada.

Liebes, S., Sahtouris, E., Swimme, B., & Brynes, L. (1998). *A walk through time: From stardust to us: The evolution of life on earth.* New York: Wiley & Sons.

Lipton, B. (2008). *The biology of belief: Unleashing the power of consciousness, matter, & miracles.* New York: Hay House.

Locke, E. (2005). Why emotional intelligence is an invalid concept. *Journal of Organizational Behavior, 26*(4), 425-431.

Love, P. G. (2001). Spirituality and student development: Theoretical connections. *New Directions for Student Services, 2001*(95), 7-16.

Luhrmann, T. M. (2006). *On Spirituality*. Chicago: Open Court Publishing Co.

Macy, J. (2007). *World as lover, world as self: Courage for global justice and ecological renewal.* Berkeley: Parallax Press.

MacLean, P. (1990). *The triune brain in evolution: Role in paleocerebral functions.* New York: Plenum Pub Corp.

Marler, P., & Hadaway, C. (2002). " Being religious" or" being spiritual" in America: A zero-sum proposition? *Journal for the Scientific Study of Religion*, 289-300.

Mason, R. O., & Hossein, B. (2003). *Ethical issues in artificial intelligence*. New York: Elsevier.

Matzel, L. D., & Kolata, S. (2009). Selective attention, working memory, and animal intelligence. *Neuroscience & Biobehavioral Reviews, 34*(1), 23-30.

Mayer, J. (2000). Spiritual intelligence or spiritual consciousness? *The International Journal for the Psychology of Religion, 10*(1), 47-56.

Mayer, J., Caruso, D., & Salovey, P. (1999). *Emotional intelligence meets traditional standards for an intelligence.* New York: Dude Publishing.

Mayer, J., DiPaolo, M., & Salovey, P. (1990). Perceiving affective content in ambiguous visual stimuli: A component of emotional intelligence. *Journal of Personality Assessment, 54*(3&4), 772-781.

Mayer-Kress, G. (1995). Global brains as paradigm for a complex adaptive world. *Center for Complex Systems Research, University of Illinois, Technical Report CCSR-95-1, Urbana, IL*.

Mayhew, M. (2004). Exploring the essence of spirituality: A phenomenological study of eight students with eight different worldviews. *NASPA, 41*(4), 647.

McCormack, C. (2004). Storying stories: A narrative approach to in-depth interview conversations. *International Journal of Social Research Methodology, 7*(3), 219-236.

McCraty, R. (1999). *Impact of the HeartMath self-management skills program on physiological and psychological stress in police officers*. Boulder Creek: Institute of Heartmath Press.

McCraty, R., & Atkinson, M. (2003). *Psychophysiological coherence*. Boulder Creek: Institute of Heartmath Press.

McCraty, R., Atkinson, M., & Bradley, R. (2004a). Electrophysiological evidence of intuition: Part 1. The surprising role of the heart. *The Journal of Alternative & Complementary Medicine, 10*(1), 133-143.

McCraty, R., Atkinson, M., & Bradley, R. (2004b). Electrophysiological evidence of intuition: Part 2. A system-wide process? *The Journal of Alternative & Complementary Medicine, 10*(2), 325-336.

McCraty, R., Atkinson, M., & Tomasino, D. (2001). *Science of the heart: Exploring the role of the heart in human performance*. Boulder Creek: Institute of Heartmath Press.

McCraty, R., Atkinson, M., Tomasino, D., & Bradley, R. (2006). *The coherent heart: Heart-brain interactions, psychophysiological coherence, and the emergence of system-wide order*. Boulder Creek: Institute of Heartmath Press.

McCraty, R., Atkinson, M., Tomasino, D., & Stuppy, W. (2001). Analysis of twenty-four hour heart rate variability in patients with panic disorder. *Biological psychology, 56*(2), 131-150.

McCraty, R., Atkinson, M., Tomasino, D., & Tiller, W. (1997). *The electricity of touch: Detection and measurement of cardiac energy exchange between people*. Boulder Creek, Ca: Institute of HeartMath.

McCraty, R., & Tomasino, D. (2004). *Heart rhythm coherence feedback: A new tool for stress reduction, rehabilitation, and performance enhancement*. Boulder Creek: Institute of Heartmath Press.

McCraty, R., Tomasino, D., Atkinson, M., Aasen, P., & Thurik, S. (2000). *Improving test-taking skills and academic performance in high school students using HeartMath learning enhancement tools.* Boulder Creek: Institute of Heartmath Press.

McIntosh, S. (2007). *Integral consciousness and the future of evolution*. New York: Continuum.

McKay, P. (2008). *Journey toward knowing: A narrative inquiry into one teacher's experience with at-risk students.* Saskatoon: University of Saskatchewan Press.

Miksanek, T. (2007). *A history of the heart*. London: JAMA.

Murdock, M. (1987). *Spinning inward: Using guided imagery with children for learning, creativity, & relaxation*. Boston: Shambhala Publications.

Murphy, M. (2010). The Fundamental Urge of the Universe. Retrieved from http://www.enlightennext.org/magazine/j25/pulpit.asp

Nelson, R., Bradish, G., Dobyns, Y., Dunne, B., & Jahn, R. (1996). FieldREG anomalies in group situations. *Journal of Scientific Exploration, 10*(1), 111.

Noble, K. D. (2000). Spiritual intelligence: A new frame of mind. *Advanced Development, 9*, 1-29.

Nuthall, G. (2004). Relating classroom teaching to student learning: A critical analysis of why research has failed to bridge the theory-practice gap. *Harvard Educational Review, 74*(3), 273-306.

O'Donohue, J. (2007). *Benedictus: A book of blessings.* London: Bantam.

Olson, H. (1995). *Quantitative 'versus' qualitative research: The wrong question*. Edmonton: University of Alberta Pub.

Pallas, A. (2001). Preparing education doctoral students for epistemological diversity. *Educational Researcher, 30*(5), 1.

Palmer, P. (1993). *To know as we are known: Education as a spiritual journey.* HarperOne. needs city

Palmer, P. (1996). Leading from within. *Noetic Sciences Review, 40*, 32-34.

Palmer, P. (2003a). Education as spiritual formation. *Educational Horizons, 82*(1), 55-67.

Palmer, P. (2003b). Teaching with heart and soul: Reflections on spirituality in teacher education. *Journal of Teacher Education, 54*(5), 376.

Pascal, B. (1966). *Pensees*. Paris: Bordas.

Patton, M. (2002). *Qualitative research and evaluation methods*. Beverly Hills: Sage Publications.

Pearce, J. (2002). *The biology of transcendence: A blueprint of the human spirit.* New York: Park Street Press.

Pearsall, P. (1998). *The heart's code: Tapping the wisdom and power of our heart energy*. New York: Broadway Books.

Pearsall, P., Schwartz, G., & Russek, L. (2000). Changes in heart transplant recipients that parallel the personalities of their donors. *Integrative Medicine, 2*(2-3), 65-72.

Peto, J. (2007). *The heart*. London: Yale University Press.

Pretz, J. E., & Totz, K. S. (2007). Measuring individual differences in affective, heuristic, and holistic intuition. *Personality and Individual Differences, 43*(5), 1247-1257.

Primack, J. R., & Abrams, N. E. (2006). *The view from the center of the universe.* New York: Riverhead Books.

Radin, D. (1997). *The conscious universe: The scientific truth of psychic phenomena*. New York: HarperOne.

Radin, D. (2006). *Entangled minds: Extrasensory experiences in a quantum reality.* New York: Pocket Books.

Radin, D., & Borges, A. (2009). Intuition through time: What does the seer see? *Explore: The Journal of Science and Healing, 5*(4), 200-211.

Radin, D., & Nelson, R. (1989). Evidence for consciousness-related anomalies in random physical systems. *Foundations of Physics, 19*(12), 1499-1514.

Radin, D., & Schlitz, M. (2005). Gut feelings, intuition, and emotions: An exploratory study. *Journal of Alternative & Complementary Medicine, 11*(1), 85-91.

Ramberg, B., & Gjesdal, K. (Eds.). (2005) *Stanford encyclopedia of philosophy.* Stanford: The Metaphysics Research Lab Center for the Study of Language and Information

Randall, W. L. (1999). Narrative intelligence and the novelty of our lives. *Journal of Aging Studies, 13*(1), 11-28.

Rapp, B. (2000). *The handbook of cognitive neuropsychology: What deficits reveal about the human mind.* Philidelphia: Psychology Press.

Redies, C., & Puelles, L. (2001). Modularity in vertebrate brain development and evolution. *Bioessays, 23*(12), 1100-1111.

Rees, R. A. (2009). *The spiritual roots of heart-based living*. Boulder Creek: Institute of HeartMath Press.

Reijnen, G. C. M. (1990). Basic elements of an international terrestrial reply following the detection of a signal from extraterrestrial intelligence. *Acta Astronautica, 21*(2), 143-148.

Rein, G., Atkinson, M., & McCraty, R. (1995). The physiological and psychological effects of compassion and anger. *Journal of Advancement in Medicine, 8*(2), 87-105.

Reiner, A. (1990). The triune brain in evolution: Role in paleocerebral functions. *Science, 250*(4978), 303.

Research, P. E. A. (2009). Engineering and consciousness. Retrieved from http://www.princeton.edu/~pear/

Rich, M. (2004). *Wome's transformation in nothingness: A feminist-existential-transpersonal interpretive account of women's transformative experience of existential crisis.* University of Calgary: Calgary, Canada.

Robbins, A. (1991). *Awaken the giant within*. Simon & Schuster Audio.

Roberts, A. (1985). Biofeedback: Research, training, and clinical roles. *American Psychologist, 40*(8), 938-941.

Rodgers, J. (1998). A critique of the Flynn Effect: Massive IQ gains, methodological artifacts, or both? *Intelligence, 26*(4), 337-356.

Rogers, P., Qualter, P., Phelps, G., & Gardner, K. (2006). Belief in the paranormal, coping and emotional intelligence. *Personality and Individual Differences, 41*(6), 1089-1105.

Rosamond, W., Flegal, K., Furie, K., Go, A., Greenlund, K., Haase, N., et al. (2008). Heart disease and stroke statistics--2008 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation, 117*(4), e25.

Russek, L., & Schwartz, G. (1996). Energy cardiology: A dynamical energy systems approach for integrating conventional and alternative medicine. *Advances-Fetzer Institute, 12*, 4-24.

Sagan, C., & Steele, F. R. (1996). *The demon-haunted world: Science as a candle in the dark* (Vol. 304). New York: Random House

Sahtouris, E. (2000). The biology of globalization. *World Futures, 55*(2), 105-127.

Salovey, P., & Mayer, J. (1990). Emotional intelligence. *Imagination, cognition and personality, 9*(3).

Sandelowski, M. (1993). Rigor or rigor mortis: The problem of rigor in qualitative research revisited. *Advances in Nursing Science, 16*(2), 1.

Scarr, S. (1989). *Protecting general intelligence: Constructs and the consequences for interventions.* Urbana: University of Illinois Press.

Schlitz, M. & Amorok, T. (2004). *Consciousness & healing:Integral approaches to mind-body medicine.* New York: Churchill Livingstone.

Schwartz, G., & Russek, L. (1997). Dynamical energy systems and modern physics: Fostering the science and spirit of complementary and alternative medicine. *Alternative Therapies in Health and Medicine, 3*(3), 46.

Scott, D. (2004). *A Character Education Program: Moral development, self-esteem and at-risk youth.* Raleigh: North Carolina State University Pub.

Seaman, A. (2001). *Feeding minds and touching hearts: Spiritual developments in the primary school.* London: Church House Publishing.

Shahjahan, R. (2005). Spirituality in the academy: Reclaiming from the margins and evoking a transformative way of knowing the world. *International Journal of Qualitative Studies in Education, 18*(6), 685-711.

Siebert, C. (1990). The rehumanization of the heart. *Harper's Magazine, 280*(1677), 53-60.

Siebert, C. (2004). *A man after his own heart: a true story.* New York: Crown.

Simon, H. (1987). Making management decisions: The role of intuition and emotion. *The Academy of Management Executive (1987), 1*(1), 57-64.

Slattery, P. (1997). *Postmodern curriculum research and alternative forms of data presentation*. Ohio: Ashland University Pub.

Smith, H. (1991). *The world's religions: Our great wisdom traditions.* New York: HarperOne.

Song, L., Schwartz, G., & Russek, L. (1998). Heart-focused attention and heart-brain synchronization: Energetic and physiological mechanisms. *Alternative therapies in health and medicine, 4*(5), 44.

Sternberg, R. (1984). *Beyond IQ: A triarchic theory of human intelligence.* New York: Cambridge University Press.

Sternberg, R. (1988). *The triarchic mind: A new theory of human intelligence.* New York: Viking Adult.

Sternberg, R. J. (1999). Successful intelligence: Finding a balance. *Trends in Cognitive Sciences, 3*(11), 436-442.

Stewart, J. (2005). Evolution's arrow. *The direction of evolution and the future of humanity.* Canberra: The Chapman Press.

Storbeck, J., & Clore, G. (2007). On the interdependence of cognition and emotion. *Cognition & Emotion, 21*(6), 1212.

Swimme, B. (1996). *The hidden heart of the cosmos: Humanity and the new story.* New York: Orbis Books.

Swimme, B., & Berry, T. (1994). *The universe story: From the primordial flaring forth to the ecozoic era - a celebration of the unfolding of the cosmos.* New York: HarperOne.

Targ, R., & Katra, J. (1999). *Miracles of mind: Exploring nonlocal consciousness & spiritual healing.* San Rafael: New World Library.

Taylor, E. (2000). *Shadow culture:Psychology and spirituality in America.* Washington: Counterpoint LLC.

Thurstone, L. (1938). *Primary mental abilities.* Chicago: University of Chicago Press.

Tiller, W. (1993). What are subtle energies. *Journal of Scientific Exploration, 7*(3), 293.

Tomasino, D. (2007). The psychophysiological basis of creativity and intuition: Accessing'the zone'of entrepreneurship. *International Journal of Entrepreneurship and Small Business, 4*(5), 528-542.

Twenge, J. M., & Campbell, W. K. (2010). *The narcissism epidemic: Living in the age of entitlement.* New York: Free Press.

Umetani, K., Singer, D., McCraty, R., & Atkinson, M. (1998). Twenty-four hour time domain heart rate variability and heart rate: Relations to age and gender over nine decades. *Journal of the American College of Cardiology, 31*(3), 593-601.

Van Dyke, C. (2007). How forgiveness, purpose, and religiosity are related to the mental health and well-being of youth: A review of the literature. *Mental Health, Religion & Culture, 10*(4), 395-415.

Van Manen, M. (1997). *Researching lived experience: Human science for an action sensitive pedagog.* New York: State University of New York Press.

Van Matre, S. (1990). *Earth education: A new beginning.* Cedar Cove: Institute for Earth Education.

Varon, E. J. (1936). Alfred Binet's concept of intelligence. *Psychological Review, 43*(1), 32-58.

Vaughan, F. (2002). What is spiritual intelligence? *Journal of Humanistic Psychology, 42*(2), 16-33.

Vokey, D. (2003). Longing to connect. *Spirituality, Philosophy and Education*, 170.

Wallace, A., Wallace, B., & Hodle, B. (2008). *Embracing mind: the common ground of science and spirituality.* Boston: Shambhala Publications.

Wells, C. (2003). *Epiphanies of faith within the academy: A narrative study of the dynamics of faith with undergraduate students involved in intervarsity Christian fellowship.* Colombus: Ohio State University Pub.

Werbos, P. J. (2009). Intelligence in the brain: A theory of how it works and how to build it. *Neural Networks, 22*(3), 200-212.

White, J. (2005). *Howard Gardner: The myth of multiple intelligences*. London: University of London Pub.

Wikipedia. (2009). Energy. Retrieved from http://en.wikipedia.org/wiki/Energy

Wikipedia. (2011). Intelligence quotient. Retrieved from http://en.wikipedia.org/wiki/Intelligence_quotient

Wilber, K. (1981). *No boundary.* Boulder: Shambalha Publications.

Wilber, K. (1995). *Sex, ecology, spirituality: The spirit of evolution.* Boulder: Shambhala Publications.

Wilber, K. (2000a). *Integral psychology.* Boston: Shambahla Publications.

Wilber, K. (2000b). *A theory of everything.* Boston: Shambahla Publications.

Wilber, K. (2006). *Integral spirituality: A startling new role for religion in the modern and postmodern world.* Boulder: Shambhala Publications.

Wilber, K. (2007). *The integral vision: A very short introduction to the revolutionary integral approach to life, God, the universe, and everything.* Boulder: Shambhala Publications.

Wilber, K. (2011). *Kosmos trilogy: Kosmic Karma and Creativity.* Retrieved from http://wilber.shambhala.com/html/books/kosmos/excerptD/part1.cfm

Wilson, B., & Childre, D. (2006). *The HeartMath approach to managing hypertension: The proven, natural way to lower your blood pressure.* Oakland: New Harbinger Publications.

Wuthnow, R. (1998). *After heaven: Spirituality in America since the 1950s.* Berkeley: University of California Press.

Yob, I. (1995). Spiritul education: A public-school dialogue with religious interpretations. *Religious Education, 90*(1), 103-117.

Young, L. (2003). *The book of the heart.* New York: Doubleday Books.

Zaleski, J. (1997). *The soul of cyberspace: How new technology is changing our spiritual lives.* San Francisco, CA: Harper

Zeidner, M., Roberts, R. D., & Matthews, G. (2008). The science of emotional intelligence: Current Consensus and Controversies. *European Psychologist, 13*(1), 64-78.

Zohar, D., & Marshall, I. (2000). *SQ: Connecting with our spiritual intelligence*. New York: Bloomsbury.

APPENDIX A: Recruitment PowerPoint Slides Presented at IHS

1 **The heart intelligence study**

Marc Ross

2 **Overview**

+ Phases of this study

1. Introduction
2. Goal setting over e-mail (what do I want to change?)
3. One on one interview with me (sign up with me after this presentation)
4. practice, practice, practice
5. feedback, feedback, feedback
6. Marc here every Thursday from 12 to 1 for coaching

3 **continued…**

Halfway Point (four weeks from now)

1. Group feedback (either like this in about three weeks, or from you in classes or assemblies)
2. practice, practice, practice
3. feedback, feedback, feedback
4. Closing one-on-one interviews
5. Closing group presentation

4 **Practice?**

+ 10 minutes 3 times per week (schooldays)
+ More if you want
+ Quick Coherence Technique
  1. heart focus
  2. heart breathing
  3. heart feeling
+ Lets check it out!

5 **Feedback?**

+ To be determined…
+ Options include:
  + E-mail
  + Facebook (group for the study - Smart Hearts Crew)
  + YouTube videos
  + Journaling
  + Log
+ Style: artwork (drawing, painting, music, poetry etc.)

6 **Nutshell**

APPENDIX B: Letter from Principal Attached to Student Consent Form

Dear Parents,

As we continuously look for ways to improve and grow our learning community, we sometimes partner with researchers to look at specific aspects of our program. We have the opportunity at this time to work with Marc Ross, a doctoral student, and his supervisor Dr. Veronika Bohac-Clarke from the University of Calgary as part of our ongoing work in the areas of personal development, resiliency and character education. Marc Ross is a quadriplegic who has volunteered many hours helping teenagers manage risk and develop positive attitudes. Dr. Bohac Clarke developed and teaches the Character Education class offered by the University of Calgary in their graduate education program.

Marc would like the opportunity to interview your child, both in the near future and a few months down the road, in order to get perceptions of his/her experience here at IHS. The students' comments will all remain anonymous, and all other ethical aspects are described for you in the legal consent forms, which are attached to this letter. The findings of the research will be used to monitor and further enhance our school development plan and refine our goals in the area of student resiliency. It will also assist other schools and school leaders, as they move their schools' character education initiatives forward.

Both Marc and Dr. Veronika Bohac-Clarke have had all the security checks required for people who work with our students. I have no concerns about students participating in this study, and anticipate they will very much enjoy the chance to talk with someone about their beliefs and perceptions. Should you have any questions or concerns, please feel free to call me, or call either Marc or Veronika Bohac-Clarke for. If you are willing to have your child participate, please read and sign the attached form, and return it to me.

Thank you for your continued support of our program and your consideration of this request.

Yours sincerely

Principal

APPENDIX C: Explanatory and Informed Consent Letter for Students

Consent Form for Students and Parents

Name of Researcher, Faculty, Department, Telephone & Email:

Marc Ross, Researcher
Educational Contexts
(403) 282-8090 marcrosslovesyou@gmail.com

Dear Student/Parent:
Please read this form with your parent or guardian. Make sure you understand the information in this document. If you are interested in the project described here, please discuss it with your parent or guardian.

Title of Project:

The link between spirituality and technology: Use of biofeedback in developing heart intelligence in a high school setting

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

The Calgary Board of Education has approved this research study.

PURPOSE OF THE STUDY:

The purpose of this study is to examine the impact of biofeedback training on the development of heart intelligence in a high school setting. Selected volunteer students, teachers and the school principal will participate in this study. The two main aims of this research are to: 1) better understand how biofeedback helps people develop spiritually and; 2) learn how to most effectively implement biofeedback training in a school environment.

WHAT WILL I BE ASKED TO DO?

You will be asked to practice biofeedback on a school computer for 10 minutes a day, 5 times a week, for a period of six weeks. This will involve sitting in front of a computer with an ear sensor and consciously trying to change your heart rhythm patterns on the screen with the help of the quick coherence technique which you will be taught. You will then be asked to reflect on your experiences of learning biofeedback, and its effects on your body, mind, emotions and spirit. This is not an evaluation of your abilities and it will have no effect on your personal interactions or assessments in the school.

You will be involved in answering a short baseline and follow-up questionnaire, and participating in two one-on-one interviews, and one focus group. The interviews will be about 45 minutes long, with a number of weeks between each one. The interviews will be held at the school, arranged at a mutually convenient time and will be recorded for transcription purposes. Also, you will be encouraged to journal or e-mail any observations or reflections you might have about learning biofeedback. Once a transcription of data collected has been created, you will be asked to read over your contributions to ensure they are accurate and change any information you wish to have altered. Upon completion of this six-week training period and data collection, a final follow-up with participants will take place in which the researcher will debrief and thank everyone for participating.

WHAT TYPE OF PERSONAL INFORMATION WILL BE COLLECTED

No personal identifying information will be collected in this study, and the researcher will try to ensure all participants remain anonymous. However, absolute anonymity cannot be guaranteed due to the fact that the principal, two teachers and participating students will know of participation. Furthermore, others outside of the study participants may also be aware of an individual's participation. There are several options for you to consider if you decide to take part in this research. You can choose all or some of them. Please put a check mark on the corresponding line that grants us your permission to:

I grant permission to have my personal contributions to the study (transcripts and documents) archived:

Yes: ___ No: ___

I will remain anonymous, but you may refer to me by a pseudonym (made up name):

Yes: ___ No: ___

The pseudonym I choose for myself is: _____

ARE THERE RISKS OR BENEFITS IF I PARTICIPATE?

The benefits of participating will be: helping to discover the impact of biofeedback on the body, mind, emotions and spirit, finding out what you and others think works or doesn't in the training program, and discovering the impacts that the biofeedback training program has on members of the school community.

Overall the risks are no greater than those incurred during a normal day at the school.

WHAT HAPPENS TO THE INFORMATION I PROVIDE?

Participation is completely voluntary and confidential. **You are free to discontinue participation at any time** during the study. No one except the researchers will be allowed to see or hear any of the answers to the questionnaire or the interview tapes. There are no names on the questionnaire. Only group information and anonymous quotes will be used for any presentation or publication of results. The questionnaires are kept in

a locked cabinet only accessible by Marc and his supervisor. Interview data will be identified by pseudonyms. Interviews will be identified for the transcriber using pseudonyms. The anonymous data will be stored for three years on a computer disk, at which time, they will be permanently erased. Audio tapes will also be destroyed at the same time. We will be retaining an electronic dataset indefinitely, however, archival items and documents will otherwise be returned to participants. The researcher will also be masking the identity of the school in any final report. Finally, the collected data will be used to inform a doctoral degree project.

If you decide to discontinue your participation in the project, all your information, except the anonymous questionnaire response which is not traceable, **will be extracted and deleted from the researcher's records immediately**. Audio tape(s) will be destroyed immediately.

Your signature on this form indicates that you 1) understand to your satisfaction the information provided to you about your participation in this research project, and 2) agree to participate as a research subject.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. **You should feel free to ask for clarification** or new information throughout your participation.

I agree to let my child _____ participate in this study.

Parent/Guardian's Name: (please print):_____

Parent/Guardian's Signature: _____Date:_____

Student's Name: (please print) _____

Student's Signature _____Date: _____

Researcher's Name: (please print) _____

Researcher's Signature: _____Date: _____

QUESTIONS/CONCERNS

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

Supervisor: Dr. Veronika Bohac Clarke,
Graduate Division of Educational Research, Faculty of Education
(403) 220-3363 bohac@ucalgary.ca

Researcher: Marc Ross
Doctoral Student
(403) 282-8090 marcrosslovesyou@gmail.com

If you have any concerns about the way you've been treated as a participant, please contact Russell Burrows, Senior Ethics Resource Officer, rburrows@ucalgary.ca, 403-220-3782.

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

APPENDIX D: Explanatory and Informed Consent Letter for Teachers

Consent Form for Teachers/Administrators

Name of Researcher, Faculty, Department, Telephone & Email:

Marc Ross, Researcher
Educational Contexts
(403) 282-8090 marcrosslovesyou@gmail.com

Title of Project:

The link between spirituality and technology: Use of biofeedback in developing heart intelligence in a high school setting

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

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WHAT WILL I BE ASKED TO DO?

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You will be involved in answering a short baseline and follow-up questionnaire, and participating in two one-on-one interviews and one focus group. The interviews will be about 45 minutes long, with a number of weeks between each one. The interviews will be held at the school, arranged at a mutually convenient time and will be recorded for transcription purposes. Also, you will be encouraged to journal or e-mail any

observations or reflections you might have about learning biofeedback. Once a transcription of data collected has been created, you will be asked to read over your contributions to ensure they are accurate and change any information you wish to have altered. Upon completion of this six-week training period and data collection, a final follow-up with participants will take place in which the researcher will debrief and thank everyone for participating.

WHAT TYPE OF PERSONAL INFORMATION WILL BE COLLECTED

No personal identifying information will be collected in this study, and the researcher will try to ensure all participants remain anonymous. However, absolute anonymity cannot be guaranteed due to the fact that the principal, two teachers and participating students will know of participation. Furthermore, others outside of the study participants may also be aware of an individual's participation. There are several options for you to consider if you decide to take part in this research. You can choose all or some of them. Please put a check mark on the corresponding line that grants us your permission to:

I grant permission to have my personal contributions to the study (transcripts and documents) archived:

Yes: ___ No: ___

I will remain anonymous, but you may refer to me by a pseudonym (made up name):

Yes: ___ No: ___

The pseudonym I choose for myself is: _____

ARE THERE RISKS OR BENEFITS IF I PARTICIPATE?

The benefits of participating will be: helping to discover the impact of biofeedback on the body, mind, emotions and spirit, finding out what you and others think works or doesn't in the training program, and discovering the impacts that the biofeedback training program has on members of the school community.

Overall the risks are no greater than those incurred during a normal day at the school.

WHAT HAPPENS TO THE INFORMATION I PROVIDE?

Participation is completely voluntary and confidential. **You are free to discontinue participation at any time** during the study. No one except the researcher and his supervisor will be allowed to see or hear any of the answers to the questionnaire or the interview tapes. There are no names on the questionnaire. Only group information and anonymous quotes will be used for any presentation or publication of results. The questionnaires are kept in a locked cabinet only accessible by the researchers. Interview data will be identified by pseudonyms. Interviews will be identified for the transcriber using pseudonyms. The anonymous data will be stored for three years on a computer disk, at which time, they will be permanently erased. Audio tapes will also be destroyed at the same time. We will be retaining an electronic dataset indefinitely, however,

archival items and documents will otherwise be returned to participants. The researcher will also be masking the identity of the school in any final report. Finally, the collected data will be used to inform a doctoral degree project.

If you decide to discontinue your participation in the project, all your information, except the anonymous questionnaire response which is not traceable, **will be extracted and deleted from the researcher's records immediately**. Audio tape(s) will be destroyed immediately.

Your signature on this form indicates that you 1) understand to your satisfaction the information provided to you about your participation in this research project, and 2) agree to participate as a research subject.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. **You should feel free to ask for clarification** or new information throughout your participation.

Participant's Name: (please print) _____

Participant's Signature _____Date: _____

Researcher's Name: (please print) _____

Researcher's Signature: _____Date: _____

QUESTIONS/CONCERNS

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

Supervisor: Dr. Veronika Bohac Clarke,
Graduate Division of Educational Research, Faculty of Education
(403) 220-3363 bohac@ucalgary.ca

Researcher: Marc Ross
Doctoral Student
(403) 282-8090 marcrosslovesyou@gmail.com

If you have any concerns about the way you've been treated as a participant, please contact Russell Burrows, Senior Ethics Resource Officer, rburrows@ucalgary.ca, 403-220-3782

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

APPENDIX E: Baseline Questionaire Email

Thank you _____ for signing up to take part in this study!

Following are a few questions meant to help me (Marc, the researcher) gain an understanding of where you are at before beginning the study. Please realize that I will not be judging you at all on any of this. It is simply for you and for me to get a feel for how we can make this process of learning biofeedback interesting and fun.

What makes you want to participate in this study?

When you take on a new project, what keeps you motivated to stay on track?

Can you write down something that really makes you happy or brings up good feelings? For example, a great memory you have, a favorite place you've been to, or a person you really like.

Please identify a personal goal you have in each of the following areas (for example, in the body category, you might say something like I want to feel stronger or I want to lose weight or I want to feel more comfortable):

Body:

Mind:

Emotions:

Spirituality:

Friends and family:

School:

Community or World:

What do you want to do in life as a career? What's your dream job?

What do you need to do in order to achieve your dream career?

What is standing in the way of you doing those things right now?

If there is one thing you could change about yourself, what would that be?

APPENDIX F: The Questions from Semistructured Interviews

Beginning

How old are you?
Can you tell me about your life?
How did you end up at this school?
What is your relationship to your body like?
Are you sensitive to its Energies?
Where do you feel stress in your body?
How is your emotional life?
How is your mental life?
What do you normally do to lower your stress levels?
What situations cause the most stress In your life?
Have you ever thought much about spirituality?
What do you think about God? Life after death? Life beyond the body?
Have you ever tried meditation?
If yes, what have your experiences been?
If no, what has prevented you from doing so?
What is your relationship to technology like?
What kinds of technologies do you use?
Do you think there is a link between technology and spirituality?
What kinds of images come to mind when you think about the heart?
Have you ever thought much about your heart?
Is thinking from the head different from feeling from the heart?

Middle

How has your experience been so far?
How have your experiences with the program measured up to your expectations when you first signed on?
If you are struggling to practice regularly, what is keeping you from doing so?
If you are practicing regularly, are you noticing any changes over and above the sessions? Is it leaking into your life somehow?
Have you shared what you are learning with anyone in your life? Family, students, other teachers?
Are you blending what you have learned about the heart with any other practices you might engage in? Like meditation or yoga or relaxation?
Are you practicing the quick coherence technique away from the computer?

End

UL

Would you say that your participation in this study has helped you develop your heart intelligence? In what ways?

What mental experiences occur as a result of tapping into your heart intelligence?
What emotional experiences occur as a result of tapping into your heart intelligence?
What spiritual insights, if any, occur when you begin living more from the heart?
Do you experience benefits or drawbacks in your day-to-day life by entering the heart space using biofeedback? What are they?
Do your thoughts and feelings impact your ability to stay coherent? How?

UR

What physical experiences occur as a result of developing heart intelligence?
When in the state of coherence, what body sensations do you experience?
Does the state of coherence cause you to behave differently?
If you were to describe the state of coherence to me,
What color would it be?
What texture would it be?
What shape would it be?
What would it taste like?
What would it sound like?
What would it smell like?
If it were an animal, what would it be and why?
Do your physical sensations or behaviors impact your ability to stay coherent? How?

LL

How does being in the state of coherence impact the way you interact with others?
Would living more from the heart change the way you treat people? How?
How would someone with a lot of "heart intelligence" act like with a group of friends? With family? With strangers? With coworkers?
Do you notice any differences in your interactions when you are living more from your heart space?
How do you speak? How do you look at others?
What attitude do you have toward the other?
Do your relationships impact your ability to stay coherent? How?

LR

How did you find the process of learning to operate the biofeedback technology? For example, was it fun or annoying?
Is there value or usefulness in using biofeedback to improve students' / teachers connection to their hearts? What is it?
Does tapping into your heart intelligence cause you to relate to your environment differently? For example, do you feel more connected to the things around you?
How could the school environment help foster the development of heart intelligence? Besides more biofeedback technology, what could students and teachers do to help the process?
Does your environment impact your ability to stay coherent? How?

APPENDIX G: Ethics Approval from Calgary Board of Education

Calgary Board of Education

Research and Innovation

Education Centre Building
515 Macleod Trail SE, Calgary, Alberta T2G 2L9 Telephone: (403) 294-8763 Fax: (403) 294-8434

Tuesday, December 14, 2009

Marc Ross
1316 17A St. N.W.
Calgary, AB

Dear Marc,

I am pleased to confirm that the Calgary Board of Education has granted permission for you to conduct the research entitled "The Link Between Spirituality and Technology: Use of Biofeedback in Developing Heart Intelligence in a High School Setting."

This approval granted indicates that as a school jurisdiction we have no ethical concerns with your study. **The final decision of participation rests with the school administration, teachers, students and parents involved. This letter does not obligate participation by anyone associated with the Calgary Board of Education.**

Please present this letter to Calgary Board of Education personnel when requesting access to teachers and students. This approval does not include access to student, staff or school records.

I wish you success in your study and would appreciate a copy of any material that you subsequently publish.

Yours truly,

Diane Nowlan, B.Sc., B.Ed., M.Ed.
Specialist, Research and Innovation

APPENDIX E: Certification of Institutional Ethics Review

UNIVERSITY OF CALGARY

MEMO

CONJOINT FACULTIES RESEARCH ETHICS BOARD
c/o Research Services
Main Floor, Energy Resources Research Building
3512 - 33 Street N.W., Calgary, Alberta T2L 1Y7
Telephone: (403) 220-3782
Fax: (403) 289 0693
Email: rburrows@ucalgary.ca
Tuesday, November 03, 2009

To: **Marc Ross**
Graduate Division of Educational Research

From: Dr. Kathleen Oberle, Chair
Conjoint Faculties Research Ethics Board (CFREB)

Re: **Certification of Institutional Ethics Review:** The Link Between Spirituality and Technology: Use of Biofeedback in Developing Heart Intelligence in a High School Setting

The above named research protocol has been granted ethical approval by the Conjoint Faculties Research Ethics Board for the University of Calgary.

Enclosed are the original, and one copy, of a signed **Certification of Institutional Ethics Review**. Please make note of the conditions stated on the Certification. A copy has been sent to your supervisor as well as to the Chair of your Department/Faculty Research Ethics Committee. In the event the research is funded, you should notify the sponsor of the research and provide them with a copy for their records. The Conjoint Faculties Research Ethics Board will retain a copy of the clearance on your file.

Please note, an annual/progress/final report must be filed with the CFREB twelve months from the date on your ethics clearance. A form for this purpose has been created, and may be found on the "Ethics" website, http://www.ucalgary.ca/research/compliance/ethics/renewal

In closing let me take this opportunity to wish you the best of luck in your research endeavor.

Sincerely,

Russell Burrows
For:
Kathleen Oberle, PhD
Chair, Conjoint Faculties Research Ethics Board

Enclosures(2)
cc: Chair, Department/Faculty Research Ethics Committee
Supervisor: Veronica E. Bohac-Clarke