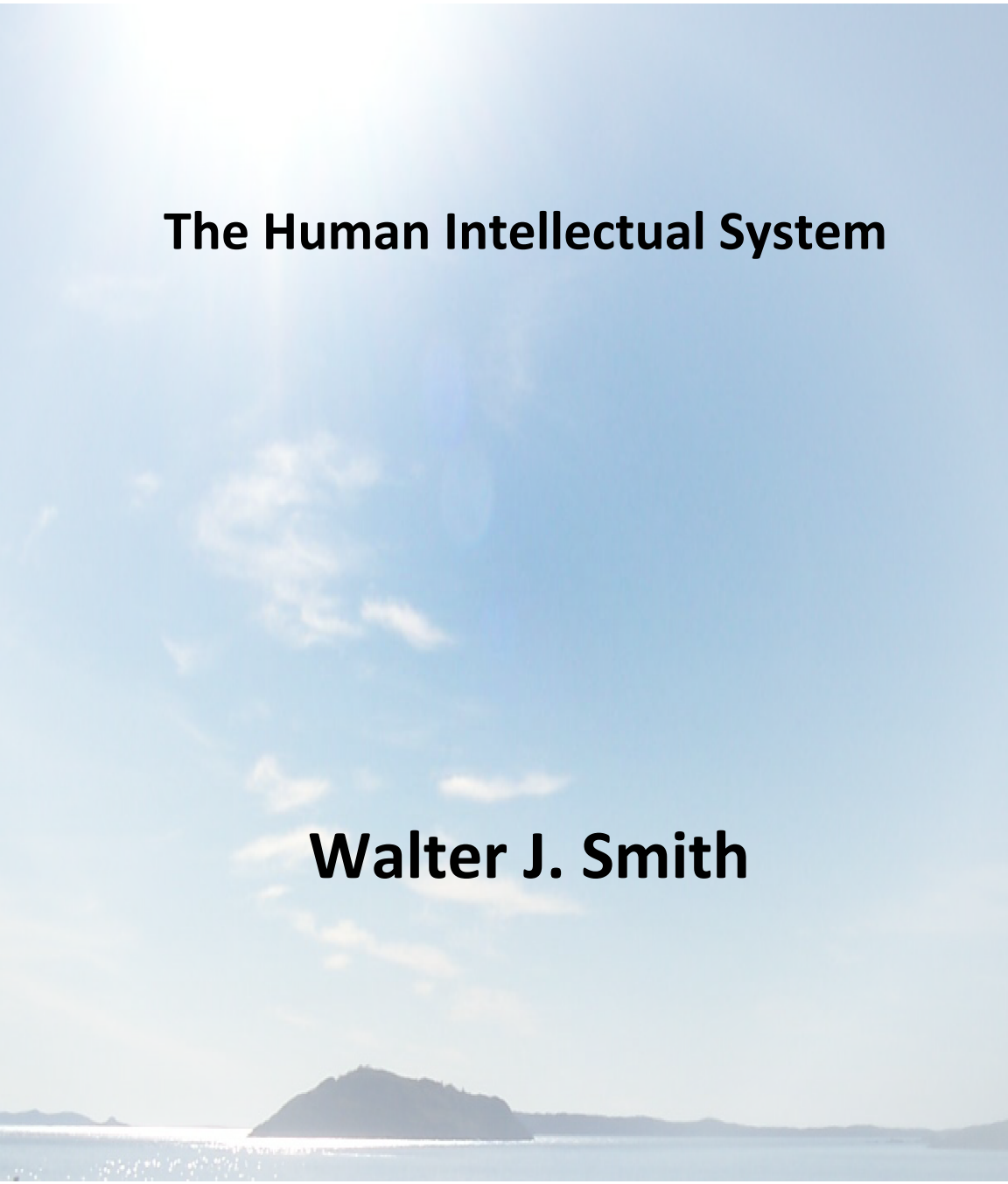
The Human Intellectual System

Walter J. Smith



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All areas of human endeavor

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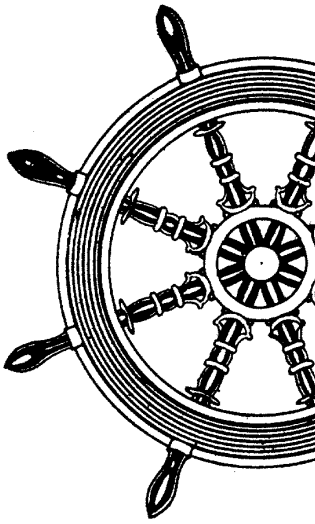
We are all different in what we know,
But we are all the same in how we know it.

Preface



How can we have high quality education and training in today's world? The old adage of train the best and ignore the rest is not acceptable in a society where survival depends on education.

We must start by defining the quality of teaching and learning and that comes down to understanding intelligence, a word we use profusely without objective meaning.

Intelligence is in our DNA. But how do we connect DNA to teaching and learning? We know that if we could link DNA to knowledge, we would have it. This has unwittingly been the quest of thinkers since the dawn of civilization, taking its original form in religion and then in philosophy and science.

Of course defining intelligence is a complex puzzle. We have to look at the structure of the brain, not as much from a physical perspective, but more from an energy processing perspective. This book puts forward a reasonable, albeit complex, explanation of intelligence, from a systems perspective to enable understanding. It defines four levels of intelligence that are reflective of objective thought and shows how we apply them to all walks of life.

Human intelligence is a body system like all the other body systems - cardiovascular, endocrine, etc. It is an "optological" system which employs DNA in processing the light we sense from our environments enabling us to learn. It turns optics into logic.

Optologics not only has implications for education, it will impact other professions such as psychology, sociology and neurology.

For individuals, optological metrics means understanding yourself and your potential. It will give you the confidence to build a productive career and a comfortable lifestyle.

For employers it means self-managed adaptive dynamic creative workers that contribute not only their labor but also their thinking to the benefit of the organization.

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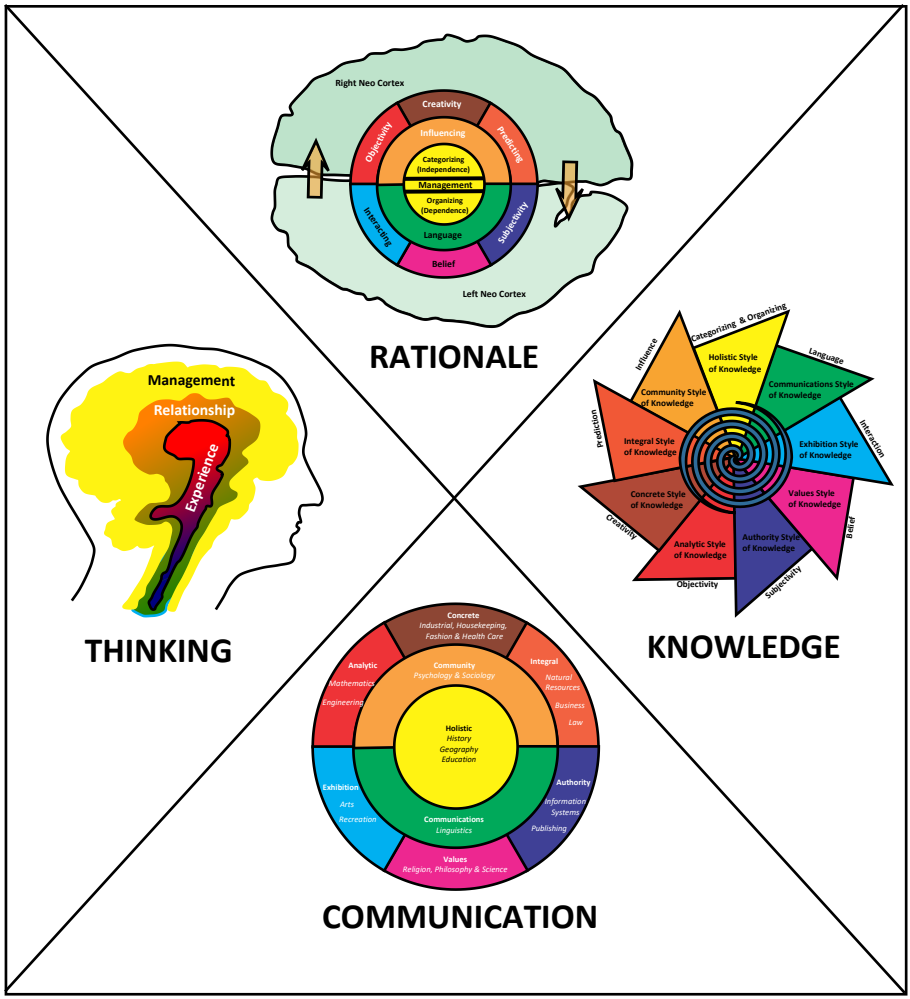
The Four Pillars of Intelligence



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Introduction

We do not know what human intelligence is so we define it subjectively. Then we use those subjective definitions to explain behavior and make decisions about others that profoundly affects their lives. This is particularly true in education, psychology and neurology, but also applies to all aspects of life in general.

What is intelligence? How is it possible that such an important aspect of humanity had never been objectively described? IQ tests are subjective because they can take many different forms of knowledge, and when we standardize a form, it only measures a subjective relationship to that knowledge. Types of intelligence are subjective as well if they are not ascribed to a particular function of the brain.

Can we have an objective definition of intelligence? Where would we start? Although we cannot know the full extent of human creation, it is very unlikely that we were created as we are today. Humans evolved like all other species on earth. Most likely it was in the form of a single cell that was guided to our present status.

Humans are special in the animal kingdom. We have an extremely well developed intellect. But if we came from a single cell, what was the sequence of events that made us what we are today. How it came about physically is the mystery of life, but how it developed into human beings is the mystery of DNA.

Within a cell there is a DNA molecule. That molecule controls everything that happens with respect to the cell including its evolution. On the physical side, there are the physical needs of the cell. On the proliferation side, there are the survival options of the cell as dictated by the environment. As the cell evolved and multiplied and formed living creatures, those two functions of DNA created the objective and subjective development of intelligence.

The vehicle of development of the brain was the evolution of senses in the order of taste, touch, smell, hearing and sight. As each sense developed it took on both objective and subjective aspects causing the brain to have two sides to accommodate the separate focuses. The right side focused on short term objective survival. The left side focused on long term subjective survival. This evolution of the brain probably has more to do with quality of life than longevity.

While objectivity dominates the brain of non human animals, at some point in the evolution of the human brain, subjectivity began to dominate objectivity. The quality of life evolved from the need to survive. This gave rise to groups of people with common goals of quality which led to competition for resources. Subjectivity then took on the role of rationalizing competition as the various groups fought over those resources.

Power among and within those groups was achieved by managing both objectivity and subjectivity. The power of the sword notwithstanding, objective thinking had to be controlled by subjective thinking and the concept of intelligence began to take form. Objective thinkers were trained to do the physical work and subjective thinkers ruled with intellectual rhetoric. Intelligence became associated with powerful subjective thinking. The free world is created on the basis of subjective thinking. This new power has come to rival military and divine power and give rise to democracy and freedom. But it has a down side. Uncontrolled subjective power can be just as abusive as objective power and that is the new dilemma of humanity perpetrated by the Internet.

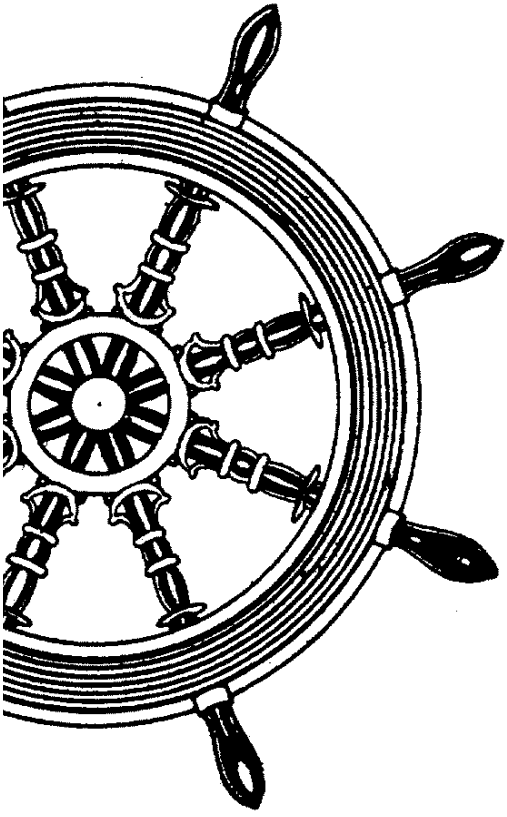
With the use of today's media, anyone can abuse subjectivity by catering to those groups in society that feel disenfranchised by it. This is epitomized by a new breed of politicians who create illusionary subjectivity confrontations so that they can be empowered by the disenfranchised, leaving those who advocate responsible subjectivity struggling to maintain their credibility.

So the new need is to expose subjective power so that it cannot be abused. This has to be accomplished thru education. However there

is a dilemma there as well. Education is the epitome of subjective power and predisposed to proliferate itself.
Consequently we need to go beyond education to find a universal exposure system for subjectivity that education will be subject to like all other groups in society. We need to have a supreme authority on the human intellect that can be used to explain human learning relationships. This is the purpose of the idea of optologics as described in this book. It defines the human intellectual system and how we learn through our relationships.

The purpose of this book to show how we can create education systems based on management of human relationships.

It also shows how we can use knowledge of the intellectual system to manage the subjective side of our lifestyles and careers and keep it in tune with the objective side.



Optologics

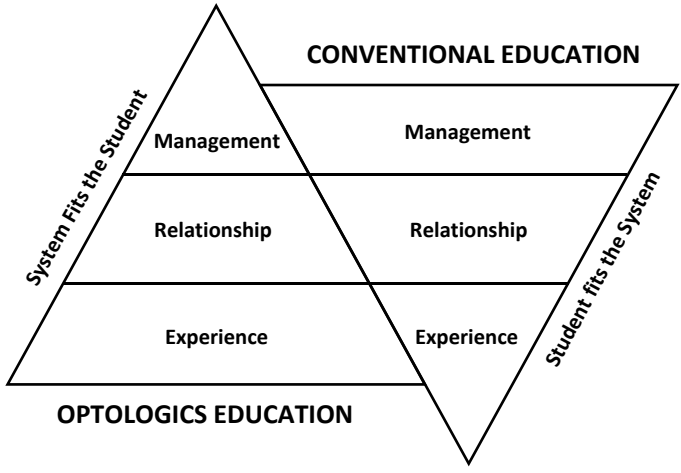
Transforming Perspective

The focus of education since its inception has been on testing and measuring intelligence directly, and indirectly thru tests of knowledge. Since we only understand intelligence subjectively, this is a very precarious way of judging human ability because subjectivity assumes relativity.

Even though we have no way of objectively judging it, we continue to grade intelligence and certify human potential with diplomas and awards that become the brands of people's lives. This is intellectual discrimination and society in general is guilty of perpetuating it.

Human intelligence is a body system like all the other body systems - cardiovascular, endocrine, etc. It is an optological system which employs DNA in processing the light we sense from our environments enabling us to learn. It turns optics into logic.

Optologics is an objective way of looking at intelligence. It gives us a better way of building education and training programs that looks for the creative potential in students rather than just trying to measure what they know. Optologics requires educators to take on a much greater responsibility for the development of student potential. There can be no more hiding behind the politics of comparison.



The implications of optologics for K-12 education will be quite profound. Because they do not have experience, children do not have well developed management skills. Such skills have to be developed in an experiential environment. The current system which is almost completely based on sharing knowledge penalizes children for not having management skills rather helping them develop those skills.
Those kinds of deficiencies need to be attended to immediately because our children are paying the greatest price for our lack of understanding of human learning. It is true that some children do successfully negotiate the system but most are under-educated or even marginalized by no fault of their own.

There is today a general realization that education is not effective in preparing all children for the future. The rhetoric around this is endless, and nothing is being done about it. I think that the power must be put in the hands of society to force change.

Optological metrics has two uses. Its primary use is to design education and training programs that are more efficient and effective with equal opportunity for all students. But the secondary purpose of management metrics is to give society the tools to challenge the current education systems on all levels and demand that their children be taught management skills so that they can all accomplish their educational needs equally well.

We have to eliminate intellectual discrimination from education because there is no foundation for it. We have to realize that the system is the problem, not the children. It is time to get on with it.

Optologics not only has implications for education, it will impact other professions such as psychology, sociology and neurology.

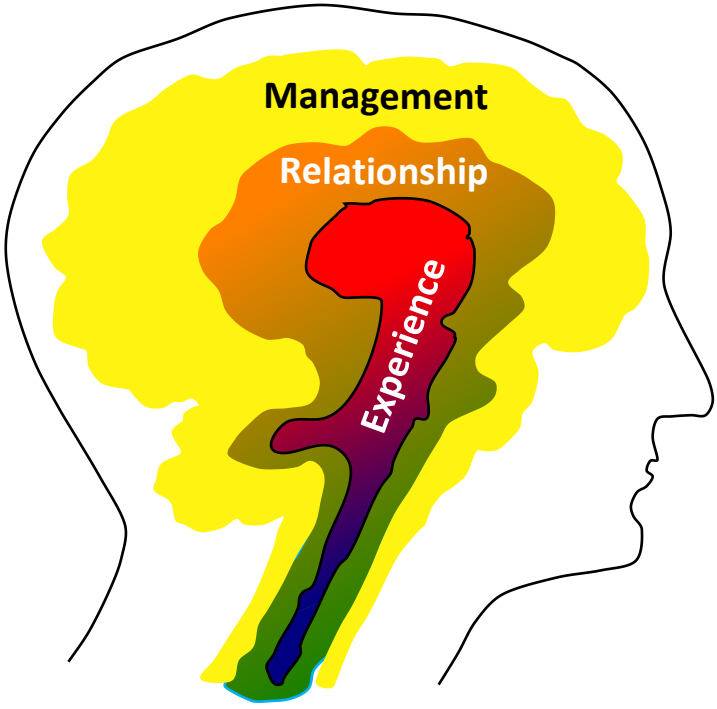
For individuals, optological metrics means understanding yourself and your potential. It will give you the confidence to build a productive career and a comfortable lifestyle.

For employers it means self-managed adaptive dynamic creative workers that contribute not only their labor but also their thinking to the benefit of the organization.

The idea for optologics came out of the quality management movement and Edwards Deming's work on managing variation. As a teacher, I thought that if we could define the process of learning and thinking, we could use that knowledge to be much more effective in the way we influence learning and facilitate the building of self-managing thinkers. I know it sounds a bit clinical, but self-management incorporates all human attributes and provides a comprehensive way of seeing ourselves both emotionally and cognitively in terms of our interactions with other people and the environment in general. Optologics can be used in every sector of human endeavor and provides the tools for managing mental processes as nine affinities which define the human intellectual system.

The Contemporary Triune Brain

The learning brain has three fundamental parts - the brain stem which drives the nervous system and subsequently our experience, the Limbic System which drives our relationships, and the neo cortex which manages the overall brain and our lives in general. The experiential brain incorporates objectivity DNA, creative DNA, predictive DNA, interactive DNA, belief DNA and subjectivity DNA. The relationship brain incorporates influence DNA and language DNA. And the management brain which incorporates organizational and categorization DNA. The neo cortex subsumes the Limbic System and the brain stem in terms of learning and using knowledge. There is complete integration of all brain functions in terms of awareness so we just go on and sense and think and do. There is no need to know how the brain works in order to us it any more than there is a need to know how an automobile works in order to drive it.



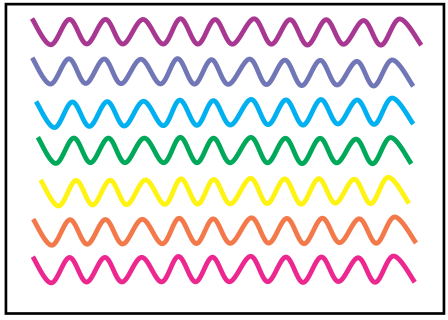
The Potential of the Brain

The number and variety of electromagnetic sequences that the brain can process are as infinite as the number of hues of light combinations that can exist. This is the reason why the brain has an infinite capacity to think, organize and reorganize thoughts. This translates into an infinite capacity of human potential. We can individually and collectively do anything that our physical power will allow. But each individual will develop a unique path. That path will see both failures and successes. The important thing is to remember that we can control our own thinking if we can understand how it works. This is the purpose of optologics. It does away with the phenomenological idea that we innately think differently and replaces it with a rational explanation of how we all think the same way. What we think and know is unique, but how we think and know is the same for everyone.

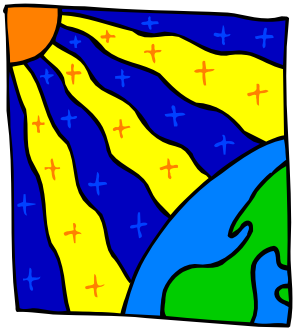
Evolution of the Human Intellectual System			
DNA Adaptation	**DNA Evolution from Survival on Nutrition**	**Integrated, Enabled and Evolved Individual**	**Integrated, Enabled and Evolved Community**
Experience (Brain Stem & Nervous System - Biological)	**to Taste (to assess quality of food), which generated a need to manipulate**	**Independence**	**Dependency**
	to Touch (to manipulate), which generated a need to predict	**Creativity**	**Belief**
	to Smell (to predict) which, generated a need to interact	**Prediction**	**Interaction**
Relationship (Limbic System - Chemical)	**to Hearing and speaking (to influence), which generated a need to distinguish**	**Influencing**	**Language**
Management (Cortex - Electromagnetic)	**to Sight (to distinguish), which generated a need to organize and create communities which led to the evolution of the subjective intellect**	**Categorizing (Right Neo Cortex)**	**Organization (Left Neo Cortex)**

The Learning Function of DNA

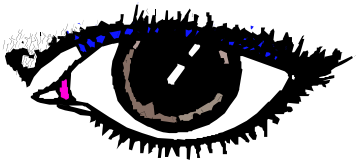
Brain Systems evolve according to the evolution of the senses to process the energy of the environment and limbs to manipulate the environment. The human brain has evolved as superior to other animals thru the evolution of a superior ability to process the entire visible spectrum of light which reflects the complex activity of the environment and our ability to manipulate this complexity. This ability to learn transcends physical differences and makes us all intellectually similar from a scientific perspective, a human perspective and a spiritual perspective.



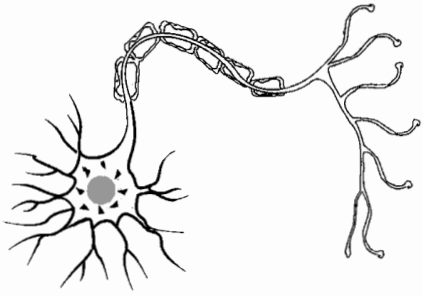
All life comes from the sun in the form of electromagnetic energy



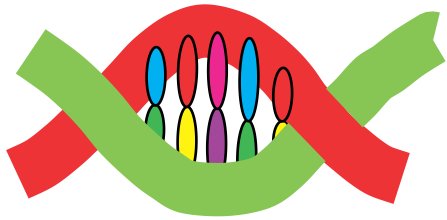
Electromagnetic energy is absorbed and reflected by the environment



Our eyes absorb and recognize Information through reflected electromagnetic energy (i.e., the visible spectrum)



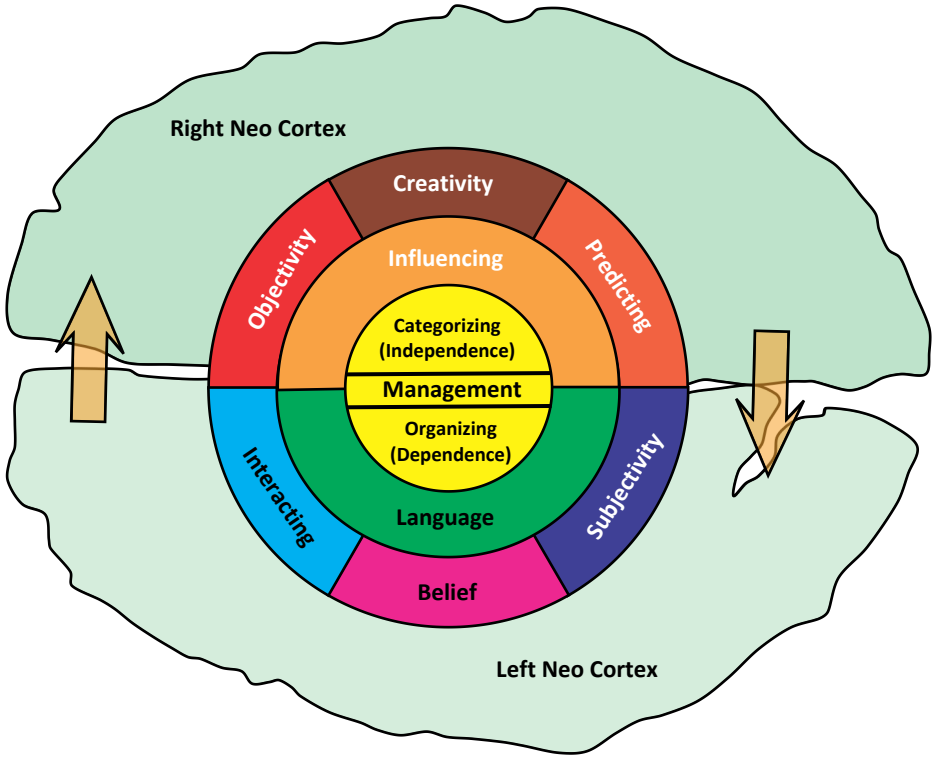
The visible spectrum sends information to brain cells through the optic nerve.



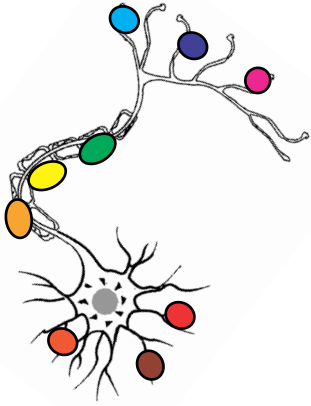
DNA

DNA in brain cells absorbs the Information carried by the colors and shapes and motions of the light energy quanta.

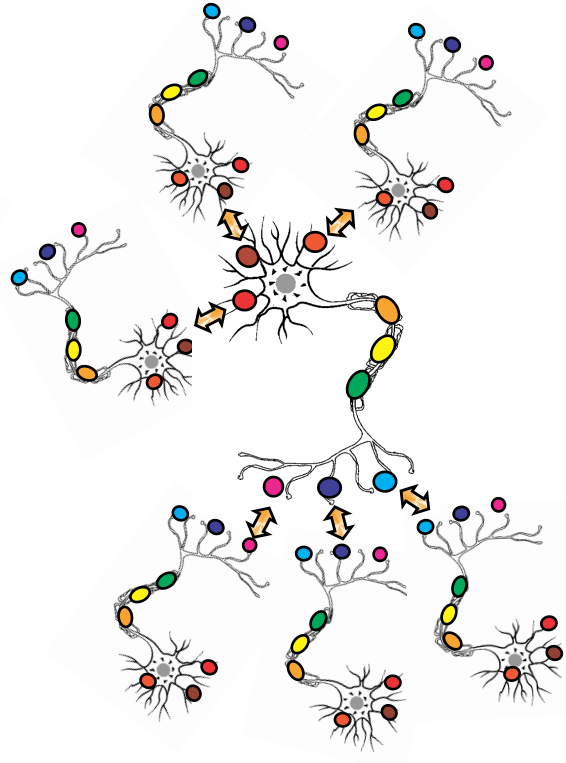
OPTOLOGICAL SPECTRUM



Brain Neuron

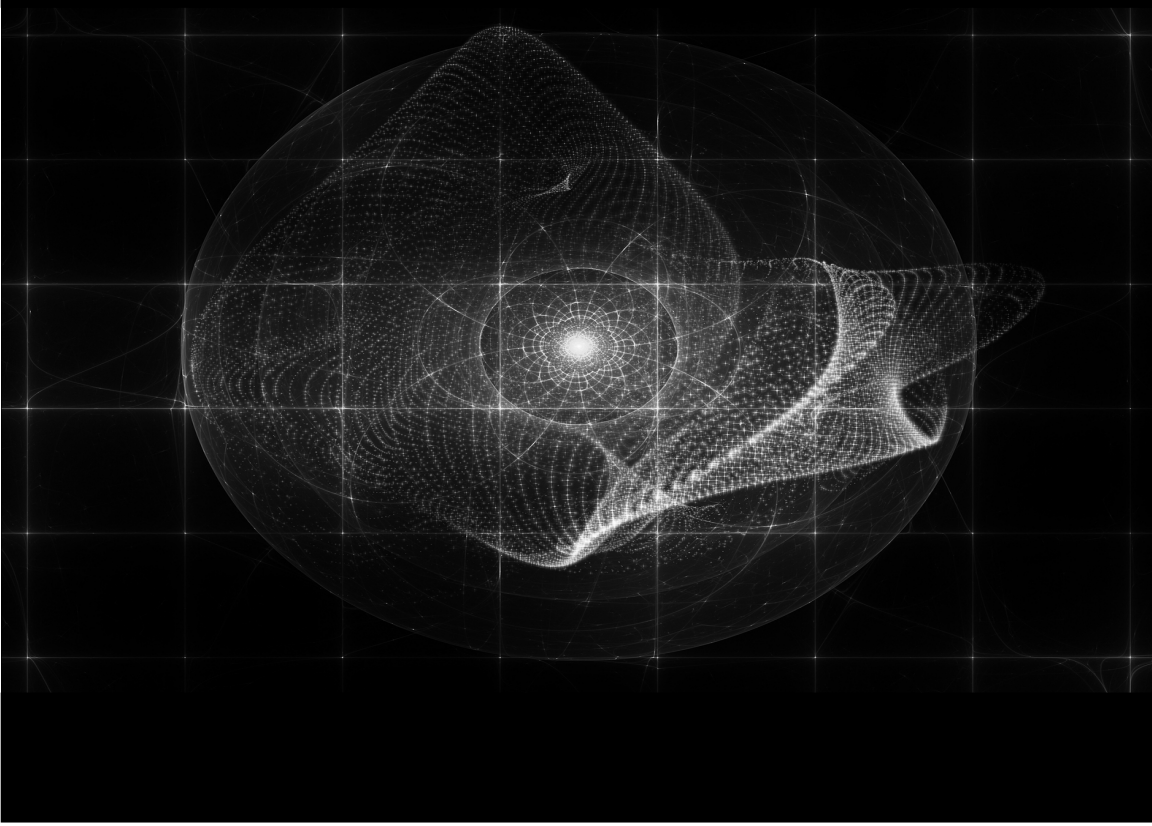


Neuron (Thought) Chains



Cells use the learning system to create the neuron thought chains which control all functions of the body including memory and creative thinking.

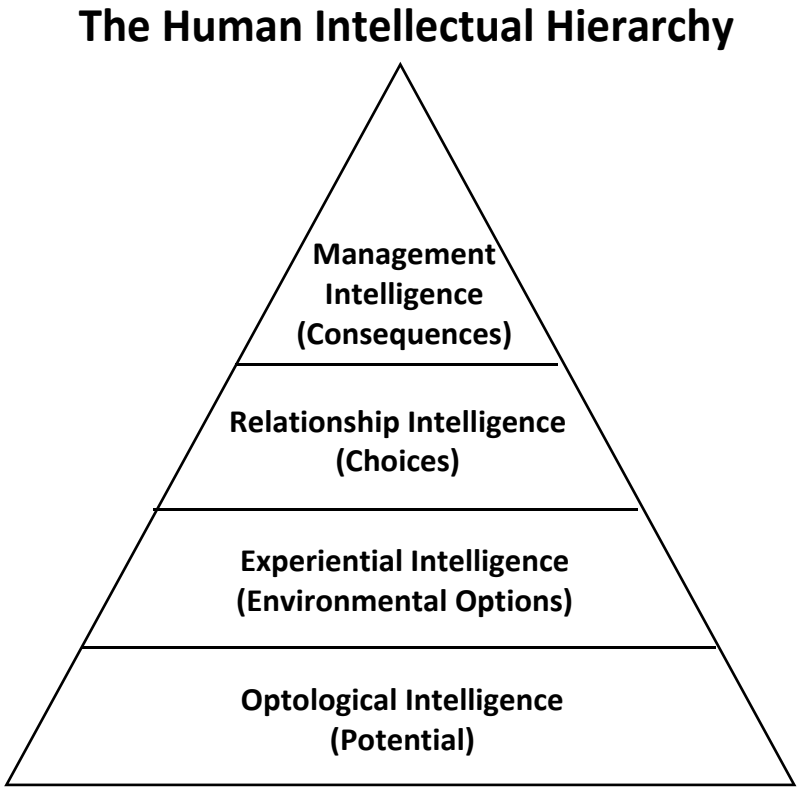
Affective Learning Systems



The Human Intellectual Hierarchy

Optological (Genetic) Intelligence is our potential to learn. As humans we all have the same DNA-Based intellectual system that gives us similar intellectual potential.

Experiential Intelligence is identifying options. As individuals, we all have a unique experience which comes from our interaction with the environment. We have full control over this experience which fulfills our personal identified needs and wants. Human achievement is driven by experience.



Relationship Intelligence is choosing options. We form relationships that share knowledge for choosing our needs and wants. Our reason for being part of a relationship determines the nature of the knowledge we get from the relationship - useful or hostile. Human behavior is driven by relationship intelligence. Unfortunately, there is an inherent conflict between individual intelligence and relationship intelligence which leads to misconceptions of human value.

Management Intelligence is the consequence of our choices. There is a common knowledge that is acceptable across relationships. This large body of knowledge is used to rationalize the management of society. Unfortunately, our brains are not capable of comprehending all the details of this knowledge base, so we tend to select from it and use the selected knowledge to rationalize governance. This is why there is so much conflict among various groups in the world.

The Human Intellectual System

The Human Intellectual System			
Optological Spectrum	Experiential Intelligence	Relationship Intelligence	Management Intelligence
DNA	Sensing / Thinking / Doing	Dilemmas of Thinking	Knowledge Styles (Focuses) Categorizing and Organizing
Independence	Assessing Quality	Choice Dilemmas	Analytic Focus of Knowledge (Mathematics and Engineering)
Creativity	Manipulating Resources	Resource Dilemmas	Concrete Focus of Knowledge (Industrial, Hospitality, Fashion & Health Care)
Prediction	Planning Strategies	Planning Dilemmas	Integral Focus of Knowledge (Natural Resources, Business and Law)
Influence	Garnering Attitude	People Dilemmas	Community Focus of Knowledge (Psychology and Sociology)
Categorizing & Organization	Gaining Perspective	Management Dilemmas	Holistic Focus of Knowledge (History, Geography and Education)
Language	Building Language	Communications Dilemmas	Communications Focus of Knowledge (Linguistics)
Interacting	Expressing Ideas	Diversity Dilemmas	Exhibition Focus of Knowledge (Arts and Recreation)
Belief	Valuing Knowledge	Value Dilemmas	Values Focus of Knowledge (Science, Philosophy and Religion)
Dependence	Accessing Information	Information Dilemmas	Authority Focus of Knowledge (Information Systems and Publishing)

Example Learning Frameworks

Experiential Intelligence

Each person's intellect is uniquely built from our interaction with the environment and its inhabitants. How we think is biological, what we think is spiritual. Scientifically or biologically, our minds all work the same way, but we have the spiritual power to use them differently. The ability to use our minds is spiritual in the sense that we have the choice to do what we want. The genetic optological spectrum becomes a choosing system for each individual. We are constantly making choices in what we say and do.

Experiential Intelligence (Biological)		
Experience	**Relationship**	**Management**
Assessing Quality		
Manipulating Resources		
Planning Strategies		
	Garnering Attitude	
		Gaining Perspective
	Building Language	
Expressing Ideas		
Valuing Knowledge		
Accessing Information		

Experiential Intelligence (Spiritual)		
Experience	**Relationship**	**Management**
Good & Evil		
Hope & Despair		
Optimism & Pessimism		
	Love & Hate	
		Harmony & Conflict
	Truth & Lies	
Give & Take		
Moral & Immoral		
Complete & Incomplete		

Using the Optological Spectrum

The optological framework can be applied at any of the five levels of the human knowledge system to create learning relationships.

Optological Framework	
Objectivity (Deciding)	Learning to juggle
Creativity (System Resources)	Juggling different objects
Prediction (Plan)	Five Steps
Influence (Attitude)	Persistence
Management (Using Knowledge)	Entertainment, teaching
Language (Lingo)	Throws and Catches
Interaction (Teach)	Demonstrate / Discuss
Belief (Value)	Self Confidence
Subjectivity (World of Juggling)	Internet sites

Expansion of Metals

Expansion of Metals	
Objectivity	Compare the heat conductivity rate of four different metals
Creativity	Clamp four different metal rods of the same length are clamped at one end and a bead of wax is placed on the other end of each rod.
Prediction	Safely heat the clamped end and record the time it takes for each bead of wax to melt.
Influence	Ask or research questions related to this experiment.
Management	Record the results of the experiment.
Language	Explain coefficient of expansion of metals.
Interaction	Describe your thoughts about this learning experience.
Belief	Make calculations using coefficient of expansion.
Subjectivity	Research other demonstrations on expansion of metals.

The Flat Out 5k Road race

The Flat Out 5k Road Race (Running)	
Objectivity	New race / New route / Drive the route to become familiar
Creativity	Temp 0^{o}C / Slight Breeze / Sunny / 3 layers top/ 2 layers bottom / hat / gloves.
Prediction	1st Split flat (slow); 2nd Split up hill (slow); 3rd Split down hill (fast); 4th Split (.125 mi) flat (all out).
Influence	Talk with other runners to get and share knowledge.
Management	Felt good, stayed comfortable, avoided injury and finished with a time close to previous 5k races.
Language	Breathing / Relaxation / Posture / Lean / Split / Heart Rate (HR) / Pace / Stride / Cadence.
Interaction	Compare to other races and identify similarities and differences
Belief	Learn from the experience.
Subjectivity	Time 28.8 (28.0 Last year's average); HR 147 Avg. (151 LYA); Look at previous 5k race metrics as well

Facilitating Learning to Write / Read

Facilitating Learning to Write / Read	
Objectivity	Identify the learners interests.
Creativity	Set up a reading / writing workshop with a wide variety of reading materials from which to choose. Provide access to lots of supplementary aids like games and technological devices.
Prediction	Write a story first. Read a story second.
Influence	Be a mentor.
Management	Keep a portfolio of stories written. Keep a list of stories read.
Language	Make sure the vocabulary is understandable to the learner
Interaction	Create a setting where the learner can speak about what they are reading and writing
Belief	Evaluate reading and writing
Subjectivity	Provide feedback.

A Healthy Diet

A Healthy Diet	
Objectivity	Choose foods wisely.
Creativity	Cook and prepare meals.
Prediction	Use the Canada Food Guide.
Influence	Eat to be healthy. Avoid junk.
Management	Keep daily records.
Language	Read food labels.
Interaction	Count calories in and out.
Belief	Know the nutritional value of foods.
Subjectivity	Research what you are eating.

Playing the Banjo

Playing the Banjo	
Objectivity	I have realistic expectations for the time I can devote.
Creativity	I train my fingers to chord and play single musical notes.
Prediction	I use a practice guide.
Influence	I am persistent in getting pleasant sequences to work.
Management	I am trying to write a portfolio of music
Language	I am learning to read music.
Interaction	I can play several musical compositions so far.
Belief	Playing the banjo is just something I want to do.
Subjectivity	I listen to others playing and I research information on different approaches.

Influencing the Learning of Multiplication

Influencing the Learning of Multiplication	
Objectivity	Select the level of multiplication appropriate for the learner.
Creativity	Set up a mathematics workshop where multiplication can be applied to practical experiences. Encourage the learner to find Internet resources to expand knowledge about multiplication.
Prediction	Help the learner understand and apply the multiplication algorithm.
Influence	Design experiences to build confidence.
Management	Encourage the learner to keep a portfolio of work
Language	Use the vocabulary of multiplication.
Interaction	Create a setting where the learners can share learning experiences.
Belief	Evaluate the learner's knowledge of multiplication
Subjectivity	Provide feedback.

Constancy of purpose (Edwards Deming's 14 Points)

Constancy of purpose (Edwards Deming's 14 Points)	
Objectivity	Eliminate targets (use statistical methods for continual improvement of quality and productivity)
Creativity	End "lowest tender" contracts (require meaningful measures of quality along with price)
Prediction	Cease dependence on inspection. Continually seek out problems. Institute supervision
Influence	Drive out fear. Top management's commitment
Management	The new philosophy (Economic Stability)
Language	Break down barriers (Common Language throughout the organization)
Interaction	Eliminate exhortations
Belief	Permit pride of workmanship
Subjectivity	Institute management education. Institute training on the job

Formation of the College of the North Atlantic

Formation of the College of the North Atlantic	
Objectivity	Greater flexibility and efficiency in learning and credit transfer among programs and campuses
Creativity	Amalgamate the programs of five community colleges and two technical colleges
Prediction	Articulation and Harmonization of Similar Programs
Influence	Focus Sessions
Management	Harmonization Reports
Language	Evolving Optologics
Interaction	New legislation and regulations drawn up and a new calendar published
Belief	More efficient and effective use of funding
Subjectivity	Dilemmas of Change

Balancing Nationalism and Globalism

Balancing Nationalism and Globalism	
Objectivity	In terms of political choices
Creativity	In terms of the Resources we use and the work we do
Prediction	In terms of national and global strategies
Influence	In terms of emotional mobiliza- tion
Management	In terms of leadership
Language	In terms of the language we use
Interaction	In terms of the way we use language
Belief	In terms of human values
Subjectivity	In terms of reliable information

The Future of Humanity

The Future of Humanity	
Objectivity	In terms of benevolence
Creativity	In terms of sustainability
Prediction	In terms of collaboration
Influence	In terms of respect
Management	In terms of optimism
Language	In terms of connection
Interaction	In terms of appreciation
Belief	In terms of liberty
Subjectivity	In terms of equality

Affective Learning Systems Tracker
(Used to track the "completeness" of learning relationships)

Learning Experience	Objectivity	Creativity	Prediction	Influencing	Management	Language	Interacting	Belief	Subjectivity
1 Expansion of Metals	✓	✓	✓	✓	✓	✓	✓	✓	✓
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

Example Institutional Change

Relationship Intelligence

As human beings we form intellectual groups according to mutually agreeable spiritual choices. We form lifestyle, sports, occupational organizational affiliations, etc.

Group management is always wrought with making choices which fall into four categories - economic, political, progress and reality. Economically, we are making financial choices. Politically, we are making governance choices. Progressively, we are making choices about the future. And realistically, we are making choices of expediency. Group decision making is further complicated because all decision making is interconnected.

Relationship Intelligence				
Dilemmas of Thinking	Economics	Progress	Management	
			Reality	Politics
Choice Dilemmas	Purpose of Organiza-tion	New Idea	Quality of Services	Issues
Resource Dilemmas	Physical Presence	Investment	Cost to User	Technologi-cal Change
Planning Dilemmas	Productivity System	Implemen-tation Strategy	User Impact	Continuous Improve-ment
People Dilemmas	Organiza-tional Culture	Organiza-tional Persistence	Public Perception	Human Resource Deployment
Management Dilemmas	Services	New or Improved Service	Impact on Society	Efficiency and Effective-ness
Communica-tions Dilemmas	Organiza-tional Knowledge	Training	Education	Competi-tiveness
Diversity Dilemmas	Branding	Promotion	Organiza-tional Citizenship	Image
Value Dilemmas	Worth	Acceptance	Obligation to Society	Footprint
Information Dilemmas	Sustainabil-ity	Research	Transpar-ency	Philan-thropy

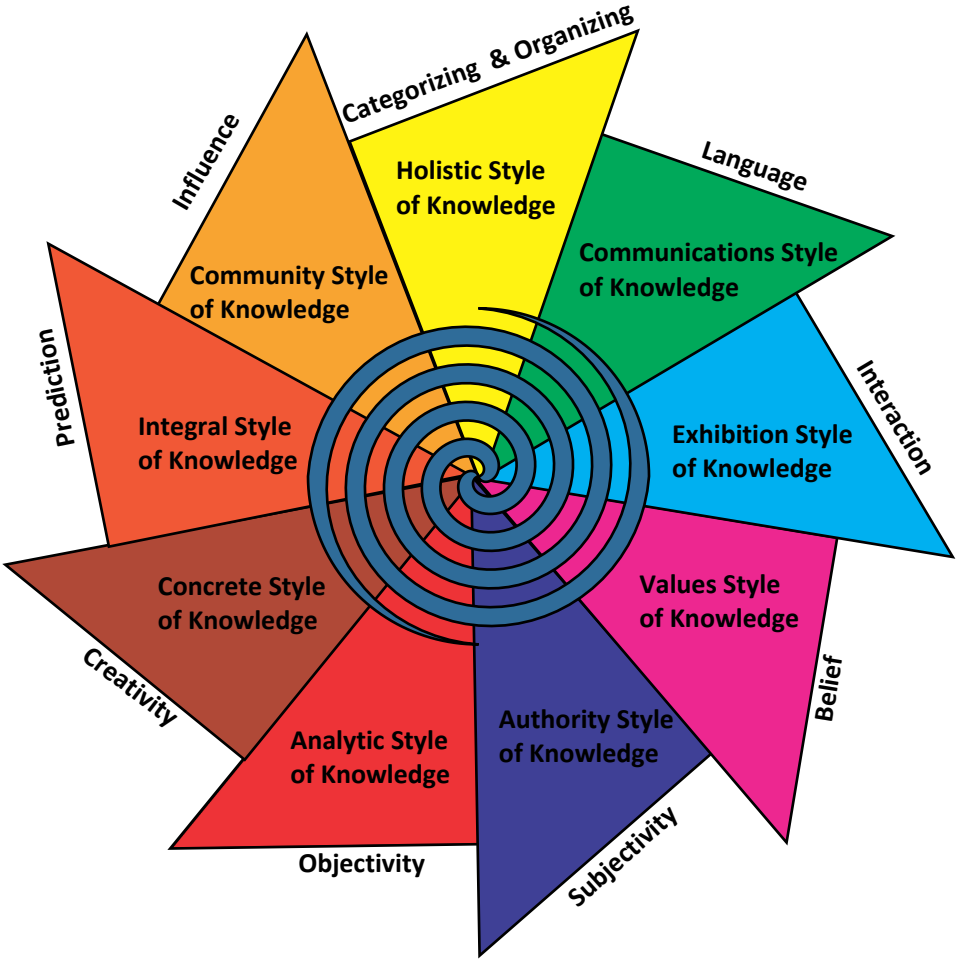
Educational Change

Educational Change				
Dilemmas of Thinking	**Economics**	**Progress**	**Management**	
			Reality	**Politics**
Choice Dilemmas	Education is the kindling of a flame, not the filling of a vessel. (Socrates)	Change to an optological model of education.	The quality of education will be measurable.	Education is not meeting the needs of contemporary society
Resource Dilemmas	Physical presence is schools, colleges and universities	It will require redirection of existing resources.	The will be no changes in cost to the user.	Technology has made conventional education redundant
Planning Dilemmas	Productivity system is grades, diplomas, and degrees	Grades, diplomas and degrees will be redefined.	The user will benefit from the new system.	Value of degrees and diplomas is diminishing.
People Dilemmas	Organizational Culture is autocratic.	Teachers will become true professionals.	Public confidence will improve.	The nature of teaching is being questioned.
Management Dilemmas	Service is teaching of Knowledge	Effectiveness and efficiency will improve substantially.	Society will benefit substantially.	Effectiveness of education is being questioned.
Communications Dilemmas	Organizational knowledge is IQ, Learning Styles, Multiple Intelligences, Bloom's Taxonomy	Optologics provides a collaborative model of learning.	We can all be objectively educated about education.	The competitive model of learning is being questioned.
Diversity Dilemmas	Branded as the road to Success	An empowerment image of education will emerge.	Education will have a renewed impact on society.	A trivial image of education is emerging.
Value Dilemmas	Net worth is major public funding	Optologics is a global solution to education issues.	The obligation of education will be recognized.	Education issues are global.
Information Dilemmas	Sustainability is infinite	Public and private education will have equal value.	Trust in education will be restored.	The philanthropic model of education is being questioned.

Example Governance

Management Intelligence

Management intelligence refers to intelligence that we use to manage knowledge. We organize and reorganize knowledge into categories and sub categories. Management intelligence is dynamic and forever evolving as old ideas change and new ones evolve. It is a never ending spiral.



Knowledge Styles (Focuses)

The analytic focus of knowledge includes the means by which we measure and analyze the value of the goods and services we produce. This focus of knowledge encompasses mathematics and engineering and, over time, has produced those subject areas. This focus of knowledge is integral to all the other focuses. We attempt to measure everything. Measurement enables us to be more definitive when we describe things – especially the forces of nature. The thrust of this focus of knowledge has created a level of confidence in our own abilities that has taken us off the planet and into space doing all that that entails. Some believe, and I am one, that there are no limits to what we can do. But we must always consider the consequences. Through measurement, we assess the products we produce, and set the basis for modification and ever increasing efficiency and effectiveness. Look at how far computers have come; look at the good they are doing; but also look at the destruction they can cause. Measurement is a two-edged sword and we should wield it wisely.

The concrete focus of knowledge is associated with the provision of the physical products and services that we all use. This focus of knowledge encompasses food services, construction, clothing, transportation, communication and health care. It includes the technologies that drive all those services. Over time, this focus of knowledge has produced the subject areas of industrial trades and technology, fashion, hospitality and health care. Industrial trades and technology includes the areas of construction, communications, transportation, etc. Fashion includes the design and manufacturing of clothing and personal services such as hairstyling and esthetics. Hospitality includes food services, accommodations, travel services, etc. Health care includes medical services and community health. The knowledge focus of manipulating resources is fundamental to everyday survival. It has grown from basic primitive origins to our sophisticated industrialized society and is the basis of our economies. The thrust of this focus of knowledge is immense in magnitude and one that needs to be continuously scrutinized in terms of its impact on human life. Will the consequences of the uncontrolled proliferation of this focus of

knowledge ultimately exhaust our resources and destroy humanity? As the technology gets more powerful, our capacity to destroy ourselves becomes greater. The destruction of the codfish stocks off the northeast coast of North America in the 1990's, because we have the capacity to do it, is a good example. Do we need to use more discretion? I believe we do.

The integral focus of knowledge is associated with acquiring resources and creating strategies for their use. Strategic planning includes financial resources, physical resources and human resources. Over time, this focus has produced the subject areas of natural resources, law and business. Natural resources cover our use of everything on the earth, above the earth and below the earth. Law consists of the rules we have created to control our activities and interactions. Business is about the ways we share the world's resources among ourselves. Individually, this focus of knowledge is about how we use what we have to plan our day-to-day activities and our lives. Collectively, this thrust of human development is about politics and consequences. Because our understanding and comprehension of our use of global resources is limited, we must always make political decisions on premises. How many fish are in the sea? What is the extent of the world's minerals? What will global warming bring? We don't know for sure. Our best scientists give their estimates and we draft our premises from that. The everyday decisions depend on the big decisions. It affects all of us. Caution is important.

The community focus of knowledge is the way we interact with others to turn ideas into actions. Self-perception and the will to act are part of this focus of knowledge. Over time, this focus of knowledge has become the sectors of psychology and sociology. Psychology focuses on the behavior of individuals. Sociology focuses on human interaction. Collectively, the process of garnering attitude explores the reasons why human beings act the way they do. Individually, this focus of knowledge reflects the ways in which we act on our feelings to go about our daily activities. In my opinion, this focus of knowledge is still the most primitive and it is the area where we must always be ready to question conventional wisdom. The mind is still very much a mystery. Will we ever be truly confident that we understand all it's functions? It is my belief that optologics will contribute to solving this mystery.

The holistic focus of knowledge is the way we find meaning in our lives, identify our needs and create the desire to fulfill those needs. It requires using knowledge from the past, understanding the knowledge of the present, and passing knowledge on to others. Over time, this focus of knowledge has become the sectors of history, geography and education. History is our perspective on the past. Geography is our perspective on the present. Education is the perspective we pass on. Collectively, the focus of gaining perspective reflects and determines the nature of humanity. Individually, this focus of knowledge reflects and determines the directions of our lives both on a daily basis and in the all the major decisions we make. I think that the overall thrust of this focus of knowledge has the greatest importance because it deals with the perspective of humanity – where do we want our world to go.

The communications focus of knowledge is the means by which we think and imagine. This focus of knowledge encompasses the languages of the world. It is what makes human beings unique. But because it is synonymous with etnic groups, it is one of the divisive forces of humanity. Evolution of language is slow; and assimilation is even slower, and for many, undesirable, because language is linked with culture. People learn new languages, but they rarely become completely assimilated in the culture. The thrust of this focus of knowledge is probably as developed as it can be unless we make contact with aliens who can teach us mental telepathy or something like that. We are generally all alike when it comes to learning. Learning is everything. Humanity exists because of our power to learn, but it is also our power to learn that makes us different. I believe that to recognize this and to respect it is enough. We already have the power to translate efficiently, and I predict that eventually we will have hand held gadgets that will automatically translate what we say and hear from one language to another. We already have Google Translate.

The exhibition focus of knowledge is the process by which we express ourselves. This focus of knowledge encompasses the arts and recreation. Human expression may take many forms – print, speech, static and moving images, music, dance, craft, sculpture, recreation, sport, etc. The thrust of this focus of knowledge is to communicate ideas.

Of course, computers are the latest and greatest tool for doing this – from simulated music to computer generated animation. It is how we capture our heritage and develop our individual identities as people and collective identities as nations and races. The exposition focus of knowledge has the greatest potential for enabling humans to recognize and respect one another because it is a non-threatening and enjoyable medium. Culture is so much a part of us all. It enables us to see the good and bad sides of our own humanity. It is the most positive aspect of life. Whether it is a movie, a painting, a novel, a song, a dance or a sports rivalry, the potential for positive communication is always there. It is where our hope for a peaceful world exists.

The values focus of knowledge is the process by which we analyze new knowledge in terms of what we already know and believe. This focus of knowledge encompasses the subject areas of religion, philosophy and science. It is the domain of logic, reason, and belief. Science is about the facts we have derived deductively and inductively from premises. Philosophy looks for conceptual answers to life's mysteries. Religion addresses mystery as interpretation of human needs. There are still so many things in the world that we are unable to explain through reasoning. Much accepted knowledge is premised on ideas we cannot prove definitively. Even Einstein's theories of relativity contain a "cosmological constant" that he could not prove existed. It is only recently that scientists are proposing an explanation for it. So we do not know for sure if all the great advances we have made as humans are happening on a grain of sand in the greater scheme of the universe. I believe that the valuing focus of knowledge is far from fully developed. The thrust of this focus of knowledge is to recognize that the truth about humanity may lie far beyond the powers of science and philosophy to rationalize. The path to truth may indeed lead to infinity, but we must never cease to travel on it. We must continue to grow because when we stop growing we die. When all is said and done, truth may indeed be beyond our understanding. Who knows?

The authority focus of knowledge is the processes of recording, storing and retrieving the knowledge we record. This focus of knowledge encompasses printing and publishing, libraries and digital information systems. There are stories about the power of the pen that go back to the scribes who made books by hand and how they guarded their

power fiercely by destroying printing presses when they were first invented. Today, through the Internet, all of us have the "power to publish" at our fingertips. Computers have revolutionized this focus of knowledge in a few short years in a way that surpasses the changes brought about by the printing press. I believe that the thrust of this focus of knowledge will be to bring first-hand knowledge to everyone. As more and more people get access to computers, the world will shrink and we will all get to know each other more intimately. The end result will be greater understanding and more power to the masses.

The Natural Human Knowledge System

There are nine styles (focuses) of knowledge.

Styles of knowledge are subcategorized into 22 knowledge sectors.
Sectors are subcategorized into specializations (careers).
Specializations are subcategorized into services.
Services are subcategorized into projects (specific applications of services).

We all know everything to some degree but our proficiencies are skewed toward the type and number of projects that we do.

At the project level we are free to categorize and organize knowledge in any way we want. It is incumbent on us to use knowledge responsibly by understanding its limits and create beneficial scenarios rather than destructive ones

The Related Education Project

My ideas of optologics were initially developed from this project. The related education project was designed to provide students, who had dropped out of school, with support skills in communications, mathematics and science so that they could engage in trades and technical training. Trades training consisted of shop projects with integrated theoretical instruction. The trades associated with the project were automobile mechanics, electrical, drafting, marine engineering, refrigeration and air conditioning, welding, heavy equipment repair, and industrial mechanics. Each trade was analyzed to identify the science support skills required and science projects were developed around each scientific concept. Science projects were developed around matter, metallurgy, heat processes, simple machines, structural mechanics, dynamics, basic electricity, electromagnetism and solid state devices. Science projects were paired up with the requirements in the various trades and technical programs and done in the order they were needed as the trades training progressed. Mathematics was integrated into the various science projects as it was needed to solve problems and describe technical processes. Reading and writing were made part of the projects and students were required to research and report as part of their projects. Summative evaluation was required by the school and it was made an integral part of the overall assessment process. Science projects consisted of demonstrations, constructions and simulations depending on feasibility within the facility and on equipment and supplies. Trades shop work and theory also provided opportunities to demonstrate the science, mathematics and communications. The related education program was completely integrated and meaningful. The idea of passing and failing did not enter into this view of education. In accordance with the level of the work completed, credit could be given toward high school certification. When the academic skills are achieved in context, evaluation is much more realistic. The connections are an essential part of real understanding. Learning is not just remembering facts to pass a test. Teaching and learning done on an experiential base are infinitely more meaningful.

A Masters Degree in Self-Directed Learning

I used my masters degree project to develop a formal definition of learning. St. Francis Xavier University in Antigonish, Nova Scotia, offers a self-directed learning program in adult education. The program is practical and requires a project which, along with a literature review, constitutes the core of the thesis. I was looking for a way to rationalize my ideas on project-based learning. My project was self-directed. I decided to define the self-directed learning process as the focus of my program. My literature review concentrated on the various definitions of experiential learning and the concept of learning styles. My intention was to use the work I had done in project-based related education to generalize the learning process. My project was a trial and error process which started out from a very general literature review and ended in a practical definition of the learning process. My definition of the process was an integration of structured academic learning and experiential learning. Instead of totally open-ended learning, I proposed a general framework that could be used to design, implement and evaluate learning experiences. I began to develop the concept ofoptologics. The main author I used to inspire my thinking was John Dewey. Dewey provided a sound rationalization, but I wanted to actually build a working model that could be used universally in mainstream education and training. As well, I did not get a lot of encouragement, mainly because people thought it would be a long shot at best. Others thought it was futile. Through the masters thesis I managed to get a program design job that had a lot of freedom to experiment. As a program designer, I could work with content experts to design project-based learning programs in a college setting. I had a large range of existing programs to work with and also had the responsibility of building new programs. Also, I would be faced with a number of challenges that would help me expand my thinking on project-based learning and the use of frameworks to give learners and teachers more autonomy in the classroom.

The Learning Guide Project

The learning guide project was an attempt to use a framework to plan, deliver and evaluate project-based learning in pre-employment training. Learning guides were done for a large number of programs in

trades and business education. Focus sessions were conducted to create system frameworks for each program. Each learning guide documented one of the services being provided by the training program. The learning guides provided a framework for teaching and learning. The actual projects were selected and done within the framework. Teachers had lots of professional discretion and learners had lot of input into the process.

The whole thing started off well. But there were two drawbacks. The printed learning guides got bigger and bigger and more detailed as teachers tried to make them into detailed programmed learning tools, and producing learning guides and keeping them up to date for thousands of services became a paper nightmare. The spirit of the project was compromised. I had no fundamental theory to rationalize what I was trying to do. All I had was experiential learning theory which was very subjective. The struggle was between those teachers who were comfortable with frameworks and those who wanted a definitive curriculum. Some teachers wanted every project described in detail; others wanted the discretion to choose projects within the general guidelines of the service. Everything polarized on one side or the other. All the existing educational theory was on the side of the definitive curriculum. The cost of producing the learning guides was escalating. As learning guides became more and more regimented, the effectiveness of the project diminished until it became worse than conventional education. The project was cancelled. I was back to the drawing board.

Trades Articulation and Harmonization

The objective of the trades articulation project was to use learning frameworks to bring together various types and jurisdictions of trades training into a single system. There were 37 programs involved. Most of the trades were from the industrial sector except for commercial cooking and baking from the hospitality sector; hairstylist from the fashion sector; and forest ranger from the law sector. All programs were one year pre-employment. Many of the programs also had apprenticeship training components.

All the programs were articulated in terms of the services they provided. Each service was identified as a course. A course database was established. In an effort to avoid the mistake I made with the learning guides, services were defined without specific recommendations for projects. Projects were the discretion of the teacher eliminating the cumbersome paperwork of the learning guides.

One of the advantages of the system was that trades would have common courses. Another advantage was that pre-employment training and apprenticeship programs were harmonized and merged. Students could get the same credit for a course by doing it in school or in the field. Of course, keeping the database up to date was easy. There was extreme flexibility.

This was a landmark accomplishment for me. Nothing like it had ever been done before in the world. The report influenced trades training throughout Canada. It defined me professionally. I was asked to harmonize many other program sectors and develop many new programs using the same approach. The success of the trades articulation project brought a new need for more effective and efficient programs. With my ABE and trades precedents, I set out to use learning frameworks to harmonize the sectors of business, information management, and natural resources.

Business Education Articulation and Harmonization

A long list of business sector courses from one year, two year and three year programs were articulated and harmonized into one comprehensive system with diplomas offered at three levels and courses used interchangeably among different programs. Information technology sector programs were articulated and harmonized in the same way. Natural resources sector programs were articulated and harmonized as well. Those projects went extremely well.

My structured thinking projects produced databases of courses based on the framework that could be used to define the various programs within a program sector were becoming management springboards. Programs were no more locked in and owned by individuals. By defining courses to the services level, big picture consensus with each

department could be achieved. Teachers worked together as teams. They shared. There was joint ownership. Effectiveness and efficiency were unprecedented. Flexibility became easy. Students could move among programs until they found their niche. Projects made learning accessible and easy.

The Scaffolding Project

This project is interesting because it used an international focus group. A scaffolding program was needed to train workers for building and maintaining offshore oil rigs and production platforms. At the time there was no scaffolding program in Canada that met the requirements. The scaffolding requirements for those huge structures were extremely sophisticated. Much of the scaffolding had to be engineered. The program was to be developed by the college in conjunction with the carpenters union and the platform construction companies. Articulation committee members were recruited from local construction companies, from Canadian construction companies, from American construction companies and from Great Britain offshore oil platform construction companies (Scotland and Wales). The program was developed quite successfully and is the basis of the current scaffolding standards for North America.

Bridging the Gap

Bridging the Gap projects were designed to integrate ABE skills into project-based workplace learning and were directed at people who hadn't completed high school and who had an employment opportunity in a local industry which included training. The 14 projects were unique because they integrated education, training and work. Students worked as they trained and brought their education skills up to meet the needs of the workplace. And they got paid. The projects were all done in rural communities were unemployment was low. Residents who met the criteria were selected and trained to work in local industry. Many of the companies and businesses were start-up or expansion and wanted a stable dependable workforce. Bridging the Gap is significant because it shows that we can successfully integrate education, training and work using optologics metrics and do it to a very high standard.

Bridging the Gap was the only projects to fully incorporate the concept of optologics in both design and implementation and the first to have people trained in optologics which I called Affective Learning Systems for the purpose of training.

Workplace Training

Learning frameworks were used to develop workplace training programs for three major industrial companies. The programs developed were Hydroelectric Systems Operator, Mining Engineering Technician, Mining and Mineral Processing Program, and Pulp and Paper Operations. Optologics works well for developing workplace training. Committees are drawn from various areas of the workplace who are currently doing the work. Programs are developed using the learning framework. A database is constructed and programs are modified as needed. The training is usually mentored by local workers where possible. Teachers are also brought in as required. The big advantage of using optologics to develop those programs is that they can be customized to meet the needs of the company. The programs can be held on site and used as required.

High School / College Course Harmonization

Learning frameworks were also used to harmonize college business education courses with high school business education courses. This allowed high school students to gain insight into the college's business education and get credit for doing it. The credit was also used toward high school graduation. The advantages of this are obvious. Students get the opportunity to bridge the gap between their academic education and career training. Focus sessions were held involving college and high school teachers. Course frameworks were articulated. The college and the high school were physically connected. High school students went to the college to do their business education courses. The idea that college courses can be used to fulfil high graduation requirements worked out well. Education does not need to be segregated along jurisdictional boundaries. It creates the possibility of integration of high school and college programs. The same can apply to high school and university courses.

General Program Development

I developed learning frameworks to work with instructors and advisory committees to design education and training programs. The program design or revision process was always done with content experts from business and industry or they could be instructors or they could be both. Essentially, I used the framework to organize the thoughts of the participants as we constructed the curriculum for each program. The process begins with a brainstorming session. Ideas are written on computerized post notes which are then organized in terms of the services provided by each program. Each service is defined using the framework. An articulated service is equated to a course. Courses are combined into program specializations. The focus sessions were extremely efficient and effective. It was all about compromise and consensus. Participants could see the big picture and the details at the same time. Details were always rationalized in terms of the bigger program context. Everything was articulated to the point of consensus. The description of each service could then be used by teachers to design specific project-based applications which also integrated the optologics spectrum Training projects were left to the discretion of the teacher to be done within the guidelines of the service description. Essentially, the curriculum became a framework for holistic teaching and learning. There was lots of room for students to be involved in the whole project-based process from design to evaluation. Over 60 programs were designed and redesigned including innovations such as high school / college transfer and private / public college partnerships.

Five Year Plan

Optological frameworks can be used for other things besides education and training. The five year plan is a good example. This was done for a chamber of commerce. A focus session was held with the members of the chamber using a project-based approach. Projects, timelines, resources, etc. were established. Details of implementation were set. The main advantage of the approach for this effort was the short time in which consensus was developed. There is a feeling of accomplishment among participants when they realize that collaboration works when it is done in the appropriate context.

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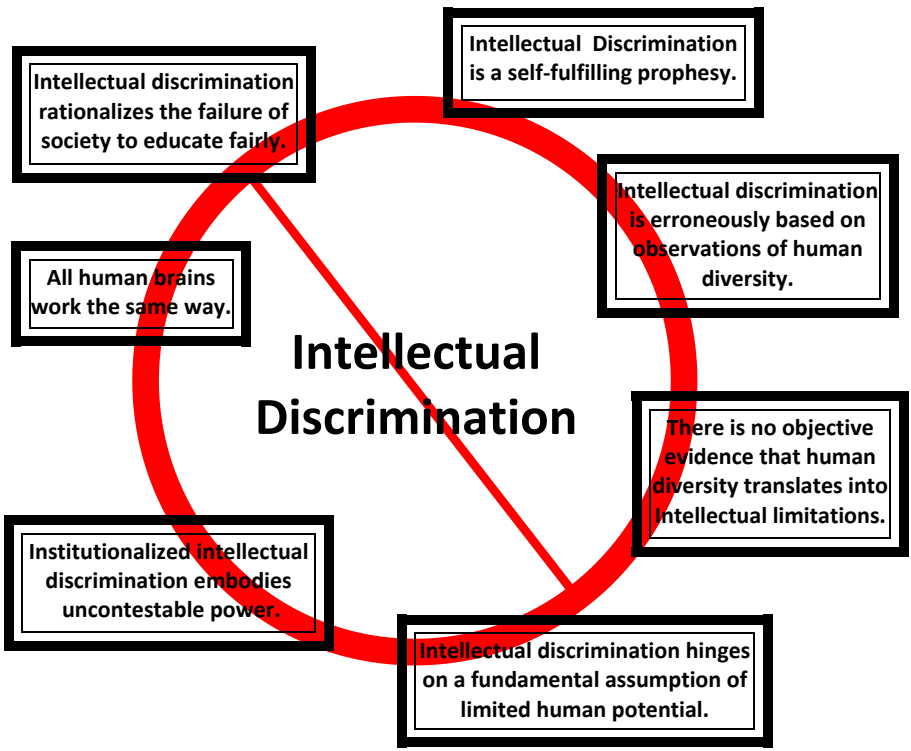
Norman Doidge (The Brain that Changes Itself) for influencing my view of brain cell dynamics

Paul D MacLean (The Triune Brain) for describing the energy of the brain

Spenser Wells (The Journey of Man) for describing the history of human DNA

It is time to move on from discriminatory rhetorical views of intelligence and replace them with an objective view.



What is Optologics?

This book provides an objective way of looking at intelligence called optologics which is a refreshing alternative to conventional subjective approaches. It gives us a better way of building education and training programs that looks for the creative potential in students rather than just trying to measure what they know. Optologics requires educators to take on a much greater responsibility for the development of student potential. There can be no more hiding behind the subjective politics of comparison.