

Chapter Four: The Social Aspect of Our Proposal

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Society and the Individual

This chapter develops intellectual constructions that we use to explore “demand theory”¹ in the social context. A framework is communicated that connects stratification theory, as applied to natural science; deep learning pedagogy, and the service technology based on stratification². This framework reveals the design of a dedicated digital infrastructure. This infrastructure is what we intend to build.

Demand and supply are compared and contrasted as a means to establish this construction as part of a more general theory over interactions between complex systems. The context is historical. Some sense, common sense or other wise, concerning sociology economics and psychology is assumed as a basis for discussion. A shared sense of history is also assumed, so that a unifying context is seen as one phase in a series of phases in cultural development³. This complicated context does make the construction interesting. We hope that the reader will bare with us.

We all have various viewpoints about the purpose of life, and of the various elements of modern society. Placing the context in America, in Georgia in the year 2012, puts the discussion squarely into an arena concerning whether government or the corporate body is in control of the individual⁴. Clearly the individual is not fully in control of his or her self. If corporate and government control is too extreme, how might the education system provide a balance? If, as is suggested in Chapter One, the state acts through the state educational systems to limit educational access to higher mathematics then an argument is made. This is the argument for the *American Education Bridge*. The argument required that the federal government step in to protect the rights of the individual.

The problem is not merely state political control over the lives of citizens. There is a regime of supply side control over economics and over our educational system. This

¹ Prueitt, Stephen (2011) “Systems Theory and Our Education System, submitted (July 5th 2011) to the Hudson Institute

² Prueitt, Paul Stephen (2011) Systems Science and Service Computing, <http://www.servicetechmag.com/I57/1211-3> Published Dec 14th 2011, Service Technology Magazine.

³ Maon, François, Lindgreen, Adam and Swaen, Valérie, Organizational Stages and Cultural Phases: A Critical Review and a Consolidative Model of Corporate Social Responsibility Development. International Journal of Management Reviews, Vol. 12, Issue 1, pp. 20-38, March 2010. Available at SSRN: <http://ssrn.com/abstract=1537409> or doi:10.1111/j.1468-2370.2009.00278.x

⁴ *Economic Democracy: The Working-Class Alternative to Capitalism*, Allan Engler, 2010, ISBN 9781552663462

control is unbalanced. The individual's interest is subordinated to the interest of suppliers; e.g., the school system, the textbook industry and a consumer biased mass media. This unbalancing was not by design; perhaps, but is an unintended consequence from the deep fundamentalisms that control many of the state governments. The good intentions of our educational system act in an environment where racism, nationalism, self-centeredness, and similar human traits have a profound influence. These traits act together as a guide to the evolution of the system⁵. In systems theory this guide is often thought of as a utility function.

The fact is that no one really understands how to provide universal education to all citizens or a nation. This fact is a mediating factor and a justification for doing "something else". Since we cannot; it is asserted by many education professors, actually educate the masses we must protect those who can be educated. A narrow sense of exceptionalism defines these selected children to be those who are a member of "our" group.

Because no one is really an authority on this question of how to fully educate, other factors are able to step in. The one that is most destructive has been the suggestion that most kids cannot learn higher mathematics. This is coupled with the now common; but false, feeling that "math" is beyond normal understanding even by adults. This factor is part of the interpersonal complex that the author of the *Bridge* proposals has referred to an *Acquired Learning Disability*.

The possibility that Prueitt's 1984 conjecture regarding an acquired learning disability has validity suggests two things

- 1) The educational system itself (along with social media) creates the inability to learn from college level college mathematics classes
- 2) There may be a full remediation of this learned disability under circumstances that are best understood if the neurology and other biological response mechanisms are seen clearly.

The suggestions have lead to classroom practice. Deep learning methods developed since 1984 are designed to create a new perception about the

⁵ Prueitt, Paul Stephen (2012) Alignment between Other Processes and Education, submitted to Interdisciplinary Research, Education, and Communication (IDREC 2012) March 25-28, Orlando Florida as part of The 3rd International Multi-Conference on Complexity, Informatics and Cybernetics: IMCIC 2012

experience of math class. However; as part of our conjecturing, this perception into the topics of higher mathematics is inhibited by biological response mechanisms within the brain system of individuals as well as by cultural forces. As we attempt to extend the classroom practice we are faced with profound challenges.

Our discussion about these challenges cannot be one sided. Good social value has developed due to powerful social agreements. But in certain specific ways these agreements has lead to a curtailing of individual ability. Most individuals do not find a personal path to higher education, and into the middle class. The American Dream became a myth, and then the myth gave rise to increasing failure. Perhaps, even, the middle class has become a phenomenon in which a significant percentage of the population is deceived into an illegitimate role as a consumer.

We have lost in the 1990s and in the first decade of this century what we felt we were gaining during past decades. One thing might be clear, however. If the educational system is to lead our culture into a better world, it must communicate within its professorial ranks regarding this issue. But for now, the current system makes less positive contribution than what is needed.

What might be a positive alterative to the social reality available to those who are not wealthy? Of course there are potentially many “perfect social systems”, where health care is highly functional and education is full and universal. Perhaps, even, the illusions held by the current middle class in America are close to envisioning a perfect social system. But the marketplace is distorted by the wealth of a few.

Market places could produce highly functional health care and full and universal education. But marketplaces create value for the few. The problem is not “Obama care. The problem is wealth generation mechanisms to extract value from “all” social processes. We are close to living in a perfect world, but we are also manipulated by corporate business to achieve purposes that have been reducing the size of the middle class and increasing the plight of the functional poor.

The presence of core structural phenomena within our common perception about education is critical. Individual capacity is more often reduced from compulsorily education, than is enhanced. Our social view about people has created an excuse for

the failure to educate. The view is easy to state. The “average” person does not need and cannot achieve an understanding of history and the evolution of science, philosophy and mathematics.

The *Bridge* steps out in front of an otherwise certain inevitable collapse of the system. If funded and developed; it is designed to propagate a non-business centered educational theory. We suggest how a business process might generate non-governmental funding for the *Bridge*. In doing so, we seek to satisfy all political extremes. We want to support the notion of liberty within an economic system where knowledge of self and of one’s world creates transparency over the consequences of decisions made. We would like for the Bridge infrastructure to be self-funded.

A number of systems models are suggested by our common understanding of supply and demand, in the context of social/economic interaction. We see common elements in any system of interactions between living beings. The commercial interchange is only a small part of a larger ecosystem of supply chains, production processes and private decision-making.

We are self-limited by our own ignorance. For example, clearly a good model does not exist for how human history unfolds. But perhaps such a model will be available in the near future. We first have to resolve some of open questions in systems theory. One of these has to do with the limitations of classical mathematics⁶. In the next section we will address this limitation in very general terms. This material is deep and difficult and may require several readings.

Limitations to Human Understanding

We start out with something profound. Classical mathematics has a tacit and built-in assertion about nature. The assertion is that all natural processes are 100% deterministic. Extensive literatures discuss this assertion and its implications. s

We take a simple position, one that suggests that this assertion is not fully correct, and yet is very powerful. Because of the depth of the debate we note only that utility is often derived from determinism but in using this utility there are often un-intended

⁶ Prueitt, Paul S. (1996). Is Computation Something New?, published in the Proceedings of NIST Conference on Intelligent Systems: A Semiotic Perspective. Session: Memory, Complexity and Control in Biological and Artificial Systems. IEEE October 20-23.

consequences. Deterministic utility is almost always localized in nature, and is thus often blind to consequences that occur over time, or at a distance. The bad practice of capitalism prospers because of this blindness. This is a central issue of our time. We develop the thesis that this issue defines the crisis in education.

This thesis is extra-ordinary because of the depth at which a philosophical grounding justifies non-action in the case of obvious evil. "If", it is argued, "all things are determined, then why should I work to improve things?" There is a sense of pessimism associated with this type of personal philosophy. Of course there are counter viewpoints, thank goodness.

Our first point is that in the case where there is clear social injustice, this injustice can be left unaddressed by moral people if they are pessimistic and believe in determinism. It is also possible that participation in additive behavior is justified under the belief that fate is in control. One can participate economically in activities that pollute the air, under the belief that the future is determined anyway.

Deterministic theory has a rich history⁷. This history is infused into our social understanding. The theory is maintained in modern times by a complex set of economic and social mechanisms. It is re-enforced by commercial advertising and by entertainment media. The reason is primarily because there is utility to be gained.

Determinism is also infused in how advanced mathematics is seen by most of the community of mathematicians. This linkage is one way, among several, in which the crisis in mathematics education supports consumer capitalism. One un-intended consequence of determinism in educational philosophy may be that the door to understanding higher mathematics is unnecessarily closed to the vast majority of individuals. The door is doubly closed because determinism does not explain everyday experience, and yet is packaged with the teaching of mathematics and science. A naive perception that life is not deterministic is common, and at odds with philosophical determinism. The common person can easily see what appears to be a basic and non-removable contradiction between how mathematics is represented and life as lived.

In systems theory we find evidence that things that are good for controlling subsystems will gain advantages when possible. The common belief that things are not under our

⁷ Earman, John (2007) "Aspects of Determinism in Modern Physics" in Butterfield, J., and Earman, J., eds., *Philosophy of Physics, Part B*. North Holland: 1369-1434.

personal control is one that allows these subsystems the control that could be exercised by the individual. It has been this way back far into history.

The conjectured role of mathematics education in limiting ordinary understanding is complicated. The argument goes like this. Human knowledge has limitations that are not recognized when a fundamentalist viewpoint is being advanced. Mathematics also has similar limitations, and these are obvious in some sense to the untrained person. Rather than admit to the nature of human knowledge, the curriculums are forced on the individual without addressing either the natural intellectual curiosity or then unwillingness to learn.

Any fundamentalism depends on not examining the full truth of assertions, such as the assertion that one race of humans is inferior to another race. Mathematics, as well as deterministic natural science, has this nature. It works and has utility even though there are questions that are raised; e.g., is the set of all sets a set, for example. Because it works, these concerns are set aside. A limited view of the world is then advanced, often one that has great power.

There are certain inner limitations in the foundations of our discipline. Pure mathematicians understand these limitations. These can be presented as part of a college curriculum and that may help the social dialog. But to get students to the point where the limitations can be appreciated is not within reach. The barriers are not merely those that appear in normal light. One has to see how conceptual beliefs are associated in the minds of the public.

An assumption of the "truth" to determinism is often represented in mathematics as models that create "trajectories on a manifold". The concept of manifold and trajectory is derived from common experience underlying our private experience of the physical world. So there is a linkage that may be made between understanding higher mathematics and accepting a means to control the behavior of the individual. This linkage is powerful enough to be felt by the individual even if the details are not perceived. However, the nature of simple physical systems is not the same as the nature of living systems.

The tacitly asserted determinism in higher mathematics may be, in part, responsible for a common social rejection of knowledge about topics from higher mathematics. There is a reasonable confusion that creates this rejection. Many individuals have the illusion

that we are more in control of our self, if we reject higher education. The rejection becomes part of a social or philosophical battle. In the case of under served populations in Georgia, this rejection becomes part of the social identity of our children. The means to move away from this common social perception about mathematics is held within the pure aspects of the discipline.

It is true that we are partially controlled through our experience of education, advertising and social philosophies. With profound insight some elements of control may be rejected. We are; however, under constant re-programming. The system makes the rejection of knowledge of higher mathematics easier than the rejection of advertising about the goodness in drinking beer or playing violent video games. So there are choices and we often take the choice that is made easy over the choice that requires a deeper commitment. In rejecting control we are controlled in what we reject. We close the door to our private understanding of a very powerful tool. On the other hand, opening this door may create serious challenges to the current system.

Let us look at some basic concepts from higher mathematics. The notion of a trajectory is an abstraction, built from a common perception of motion in three dimensions as a function of time; e.g., the flight path of an insect. The concept of a manifold is also suggested by real experience. If we have a three dimensional surface, a steel ball will move according to the shape of that surface. If the laws of Newtonian physics were perfectly correct, we might find a set of variables which represent location and which predict perfectly the future location of the insect. Of course this is not what we observe in nature. The insect flies wherever it intends and makes this decision based on something that cannot be observed. The intention is not "in" the equations.

We might appear to control the flight of an insect by placing a sugar somewhere. This control is imposed using powerful utilities. We have the ability to obtain a pure sugar, and to place this into the insect's environment. The utility hides a deeper awareness that we exercise power in an incomplete fashion.

Given a different set of circumstances, learning might arise in a more natural way, motivated by some internal set of inner desires. We may come to see that the power to control is not exactly as appears from the illusion that the attempt to control creates. Higher knowledge might free us as individuals from the types of enslavement we have all experienced first hand.

The current educational system does not provide to all students an understanding that determinism fails us in this specific fashion. For example, we do not see that the attempt to control others will often create a self-imposed, and often hidden, control on ourselves. The war stance; for example, does not recognize that the ability to control others through war fighting produces a powerful control over our own society.

Our society has the common notion that an equation exists describing all of nature, and that the solution set to that equation is a “trajectory”. However, things in real life are not so simple. In “real” science we use probability theory to modify this assertion. The introduction of probability distributions has not been shown to be a complete solution either. The abstract notion of a “manifold” is the set of possible locations, given a specific equation for the motion of a trajectory. The motion of the ball is modeled by a trajectory. A manifold models the shape of the surface. A trajectory is determined by a manifold’s linearization as a gradient field, where a negative gradient indicates the direction of movement of the trajectory. And on it goes.

If we modify our equations so that the equation’s variables become probability distributions, the variables are then called random variables. Even then we have difficulties producing a deterministic model of real trajectories when the systems are alive. Stochastic equations become descriptors rather than predictors. A different modification is possible only if the abstract notion of a system is made clear. The bottom line is that living systems do not behave, as Newtonian physics would have us believe.

Liberty through Universal Education

We are arriving at an important conclusion. Universal education should release each individual from the illusion of determinism. With this release, we are able to see into the nature of fundamentalisms, in the various forms. The *Bridge* is designed to equip each individual with the tools of science and mathematics.

We work against the exclusionary processes that have created the crisis. Learning processes cannot achieve deep learning objectives unless the individual is released from that part of the social experience that allows collective power to control private experience. This conclusion is offered for examination. It is a conclusion that we make based on observation and with the hope that the new age will change this condition that besets us.

The goal of universal education is to provide to each individual a means to perceive into

the illusions of the mind, while at the same time seeing the limitations that the mind creates. A type of private enlightenment is possible, and through this a means to resist the control that often times is not benefiting the individual.

The nature and quality of our liberal education in higher mathematics will play an important role. Seeing into and “through” higher mathematics is possible. One can become equipped for useful employment while at the same time one can become knowledgeable as a person, capable of obtaining personally valuable representation within a democracy. As this capability is expressed in new social media, we will find a renewal of democratic principles and a reduction of control over the individual.

Proper Extension of Mathematics with Systems Theory

Classical theories about the “system” create the perception that causation is fully encapsulated within the system. Outside causation cannot be modeled, without extending the abstraction to the “outside” of the system. This extension produces a well-known set of paradoxes. For example, the set of all sets can be judged to be a set or not a set based on how the judgment is made. The judgment is external to the system.

So how do systems interact? Mathematical models using differential equations often accept “outside” changes to the position of the trajectory, and also to the shape of the manifold⁸. However, the model for a system is often specified using some type of analysis, external to the formal mathematics, regarding neural physiology or the size of neurotransmitter populations, for example as illustrated in Levine and Prueitt (1993)⁹.

A “stratification” of natural processes into organizational scales suggests that from the interaction of many localized systems, there is an emergent field¹⁰. The field has a different organizational scale than does the localized systems. By localization we mean that the system’s dynamics are treated as if causation is localized. This treatment introduces the logical paradoxes such as the set of all sets paradox. Seeing the difficulty here is helpful if we wish to see clearly the nature of human thought, even about simply political concepts.

⁸ Levine, D (1991), Introduction to Neural and Cognitive Modeling, ERL

⁹ Levine D; Parks, R.; & Prueitt, P. S. (1993.) Methodological and Theoretical Issues in Neural Network Models of Frontal Cognitive Functions. *International Journal of Neuroscience* 72 209-233.

¹⁰ Prueitt, Paul Stephen (2011) *Stratification Theory as Applied to Neural Architecture enabling a Brain-like function for Social Networks*. Presented to Winter Chaos Conference of the Blueberry Brain Institute, Southern Connecticut State University, March 18-20 2011.

For example, let us consider the concept of coherence. Coherence creates paradoxes, because there is a type of illusion created by the power of coherence. Coherence provides the ability to control, and the illusion that we have understood all of the consequences. Coherence creates illusions, which when understood should shift our viewpoint. The emergence of coherence is understood as requiring organizational scales. When seen as an emergent phenomenon we then see that coherence is merely a physical phenomenon.

Coherence is a means to achieve something. We imagine that many subsystems work together to gain a force through which intention is manifest. This is the utility of coherent thought. But this force may be used without a full understanding of the nature of reality. Paradox is what gives the coherent mind pause for reflection. With the complete understanding of paradox, as a creation of coherence, we see that classical causes of conflict are avoided.

The social purpose of education in higher mathematics and a full appreciation of the humanities are now seen clearly. We see in the face of our enemy the person that we are. We come to realize that our conflict is often not with the other, but with our multiple senses of coherence. Interpersonal conflict, and conflict with the self, arise because we think, coherently, that our perceptions are fully correct and complete.

It is possible to over simplify this discussion about our private sense of coherence. There is a reality here that is unavoidable. There are conflicts in our society, and reasons for going to war. In the present it may be necessary to acknowledge the power to control others. Individual survival may depend on having the utility to react in a bad situation. But ultimately all conflict may be an illusion, created because we humans handle our sense of coherence improperly.

Turning to our science we see this sense of coherence in a new light. We see that the coherence of an EM field and the feeling of logical coherence are correlated. Scholars might be able to relate this to the Pribram neurowave equation¹¹. But we also mean that coherence arises due to the actions of metabolic repair cycles. The emergent field¹² is a model of the electromagnetic field potentials that correlates with EEG measurement of

¹¹ Pribram, Karl (1991). Appendix B, *Brain and perception: holonomy and structure in figural processing*. Hillsdale, N. J.: Lawrence Erlbaum Associates. ISBN 0898599954.

¹² J. Kowalski; A. Ansari; P. Prueitt; R. Dawes and G. Gross (1988.) On Synchronization and Phase Locking in Strongly Coupled Systems of Planar Rotators. *Complex Systems* 2, 441-462.

human cognition¹³. The measurement of EEG field potential is made using a trajectory-based model of physical measurements of electromagnetic field potential.

To simplify this discussion, we make the assumption that field coherence, similar to laser coherence, is a neural correlate to human cognitive coherence. Using models we employ the utility of higher mathematics to gain understanding over the nature of individual human thought.

Process cycles are associated with the timely advance from one mode of expression to other modes of expressions in biological subsystems. Coherence is manifest as a minimal expenditure of energy. The cycles are in synch and this synch is reflected in a real energy field that is minimally using up available energy. To shift coherence is to increase energy consumption.

The coherence of a field potential is understood with higher mathematics and natural science. The formation of a "field" or field potential "carries" our selective attention about something. In the case of getting wrong answers verses getting right answers, the issue may be as discussed as whether we can see the beginning of (and end of) neural activity as measured by EEG, correlate to a correct OR incorrect decision¹⁴.

The "stratified" model generalizes to the notion of event identification, but we need more than a single system to achieve this generalization. The point we started with is revisited. Events in the brain systems do not merely happen in a Newtonian fashion. There is support from other events, from a substrate and within an ecosystem¹⁵. We have called this "system stratification", or organizational stratification. This type of model is of a different category than simple trajectories on manifolds.

Stochastic Theory and Many Worlds Hypothesis

The many worlds hypothesis is a manifestation of the extension of deterministic theories to theories based on probabilities. A trajectory is provided many possible next steps, and thus there are many co-existing manifolds to guide movement in location. This is a silly illusion. When we move to this level of abstraction we must accept the relevance of

¹³ Prueitt, Paul Stephen (completed as report to under contract - 12/24/2011). "Technical Foundations to Stratified Theory and Articulated Machines", an internal report. 25 pages

¹⁴ Stevens, R., T. Galloway, et al. (2008). Assessing Student's Mental Representations of Complex Problem Spaces with EEG Technologies. Human Factors and Ergonomics Society, New York, New York.

¹⁵ Prueitt, Paul S. (1995) A Theory of Process Compartments in Biological and Ecological Systems. In the Proceedings of IEEE Workshop on Architectures for Semiotic Modeling and Situation Analysis in Large Complex Systems; August 27-29, Monterey, Ca, USA; Organizers: J. Albus, A. Meystel, D. Pospelov, T. Reader

systems theory regarding paradoxes. The models developed in support of the *Bridge* proposals depend on a stratification of interaction where each of many systems is viewed as having an internal, hidden, nature. The dynamics of social interaction is then modeled. In this model, we are co-creators of a single reality that manifested along an arrow of time. Of course, it is not we humans who have the single upper hand.

When we depart from the illusions of deterministic thoughts, the individual is allowed to see the “ghost in the system”. We see actual forces that co-determine social history. We see the powerful influence of business and government on decisions made “on behalf of the individual”. A “new” purpose of learning higher mathematics is then revealed. It is to gain a life long appreciation of how social forces shape individual decisions. Additional value is gained, but this new goal is most important. At this point in human history it is necessary that the common individual be in control of his or her own private experience.

This control starts with economic balance. By understanding the power of coherence we open the door to the application of higher mathematics in employment opportunities. In theory, the liberty of the individual is enhanced both because of increased economic capacity and increased understanding about the consequence to personal decisions. The *Bridge* proposals assert a specific theory about human nature. This theory is a free market theory; one where individual free will is formative and decisions are far more transparent of consequences than what we now have. If the human individual is always fully informed about the consequences of behavior then the economic marketplace will produce a more perfect society.

We propose that an informed citizenry might use new social media to define and achieve political objectives. Two keys exist. The first is that education must be full and universal. The second key is that individual intention is to be more completely aggregated using various linguistically based intelligence technologies¹⁶. To empower society with the second key we might instrument a technical capability supporting individual intelligence tools, embedded in a virtual world environment. In a sense, we must develop a means to construct possible futures so that an informed decision is made on a more regular basis.

¹⁶ Prueitt, Paul Stephen (2011) *Stratification Theory as Applied to Neural Architecture enabling a Brain-like function for Social Networks* . Presented to Winter Chaos Conference of the Blueberry Brain Institute, Southern Connecticut State University, March 18-20 2011.

The proposed virtual world system will support self-organizing peer-to-peer learning. The capability and the common understanding of how to use new technologies must be similar in nature to a natural language. This leads to democratic capitalism. The *Bridge* proposal produces a more legitimate reading of what markets are, or will be. Social activity within the system will provide a better guide as to which production system might profitably supply a future market.

Shifting Paradigms and New Resources

A discussion about shifting paradigms and new resources provides an overview of our proposals. Is it possible that humankind chart a better path than that which is being determined by a continual conflict between various forms of fundamentalisms? The false philosophy of determinism and the various forms of multiple-worlds hypothesis have to be off set. The means to do this is through universal education in the natural sciences and in higher mathematics. The current education system is not designed to achieve this purpose.

We show a clear difference between current educational policy and practice, and an alternative "deep learning" paradigm. We see institutional misdirection at the most profound level imaginable. However, we make the argument that current work in educational psychology may be corrected and a new paradigm agreed on. We seek to quickly achieve an advancement of what is positive and good about the current system, while providing technological and scientific foundation for universal education. Setting aside the mythology that human beings have no free will makes advancement in democratic practice. We seek to set aside the false concept that the future is determined in an absolute sense.

One might make the case that blind consumerism is the functional purpose of systemic support for deterministic theory. This is an interesting thought. Consumerism can be seen in a paradoxical fashion; supporting economic power while robbing the individual of the democratic ideas our nation is founded on. Rebalancing the intrinsic and functional power of inner understanding, and enhancing the role of self-knowledge about demand is essential to a correction. Consistent with this idea is that a return to democratic practice is possible only if we gain control over blind consumerism. The deep learning paradigm is democratic in nature and empowers the individual to express intention in a natural way. Thus it acts to reverse the damage we have suffered.

The task we have undertaken is a difficult one, but one which follows naturally once the proper principles are established. The plan is very simple. A scientifically grounded theory of learning is to be created. This science is to replace the good, but incomplete, effort that now serves in the colleges of education. We expect to create a demographic study of all outcomes related to mathematics education, and more generally to the processes through which an individual learns. Our effort is to bring best practices forward through a deep philosophical analysis and then to ground these practices in modern natural science.¹⁷.

It might be possible to regain democratic control over the marketplace of goods and ideas, using social media. The challenge is to motivate the use of current immersive Virtual Worlds (iVWs) based on consistent principles seen in the natural science. The first task is to step away from how current Internet gaming environments are used to promote a warped sense of entertainment¹⁸. Simulation worlds might then be used to support social media, communication, and the simulation of real processes, such as found in nature. The advance will be sudden and powerful. Educators will provide knowledge of substructural frameworks to allow the self-structuring of filters between commercial media and individual people. These frameworks are developed transparently by communities as a means to aggregate the individual intentions of the members of that community¹⁹.

The Central Conjecture

Our central conjecture is that natural capacity for learning is strongly inhibited by several aspects of how our society functions. This conjecture defines a hope. Movement to universal life-long learning practices might be provisioned by deep learning pedagogy. The pedagogy opens an understanding of learning to the individual. Many of these are hopes that were talked about in past decades, but which have been unfulfilled. The development of the *Bridge* will use virtual classrooms with avatars. Voice, handwritten message exchanges, and text messaging creates, not a gaming environment, but a

¹⁷ Prueitt, Paul Stephen (2012) New Proposal for Educational Reform, submitted to Interdisciplinary Research, Education, and Communication (IDREC 2012) March 25-28, Orlando Florida as part of The 3rd International Multi-Conference on Complexity, Informatics and Cybernetics: IMCIC 2012

¹⁸ Prueitt, Paul Stephen (Oct 22, 2011, presentation delivered in Second Life) Virtual Worlds, will this be the new Distance Learning Platform? Posted at: <http://www.educationworlds.com/pdf/nextLearningPlatform.pdf>

¹⁹ Prueitt, Paul Stephen (2011) Systems Science and Service Computing, Published Dec 14th 2011, Service Technology Magazine.
<http://www.servicetechmag.com/I57/1211-3>

duplication of the means to communicate found in a real classroom. According to the proposals, a new business sector would be developed, based on coffee and teas shops and having corporate charters designed to support a public-private partnership.

A new pedagogy is based on rebuilding a capability that is lost as children matriculate in the current K-12 system. The original capacity as well as an inhibition of this capacity is modeled using mathematics and neuroscience. The inhibition is modeled as a neurological response to poor and under stimulus in science and mathematics instruction while in school classroom. This model has not yet, as of early 2112, been tested in clinical setting. Prueitt's 1984 thesis was that an acquired learning disability is caused by experiences in the math class. However, it has taken thirty years to describe this thesis in terms accessible to the common person. The thesis is now centered on the notion that cognitive coherence may develop around a false belief, and that this belief can be shifted if deep learning methods are used.

The pedagogy has its roots in the R L Moore learning method²⁰ and in Prueitt's study of cognitive neuroscience and systems theory²¹. The two traditions are merged to form a "lifting pedagogy". The inhibition of natural interest about higher mathematics is lifted. Our experience in the minority colleges of the South has shown the problem of remediation after the damage done in K-12 is profound. As four semesters of work on new methods were completed, the new year of 2012 finds our work at an impasse. Either the system is more fully capable of persisting failure rates of around 75%, or the deep learning strategies are simply not correct.

The conjecture is that an acquired learning disability is a natural and predictable consequence from education seen as a product to be supplied and consumed. Up to 2012, we have made a reasonable argument that the learning outcomes were caused by the system, not the individual. It is easy for the system to reject our argument. Obstructionism and common sense of professionalism and self-protection are easy to manifest. After several years attempting to implement deep learning methods at the college level, we were caught without any thing more than marginal results. We also are disheartened by the persistence and power of systemic opposition to reform. Our development of a new model using advanced computer simulations and some specific

²⁰ Parker, J (2005) *R. L. Moore: Mathematician and Teacher* (Mathematical Association of America)

²¹ Prueitt, Paul Stephen (1988) Some techniques in mathematical modeling of complex biological systems exhibiting learning, PHD Thesis, in Pure and Applied Mathematics, University of Texas at Arlington Press

models of human neural and immune function was undertaken. This new work is discussed in Appendix B.

What is this harm that the caused by the system? This is a difficult question to address. We can address this in a simple way, one that most individuals have direct personal experience with. The humanities, science and mathematics are often presented without acknowledging individual creativity and interests. The non-recognition of the individual is part of the means through which educational failure continues. The individual's stimulus response mechanisms are subpoenaed. We suggest that evidence for Prueitt's conjecture is measurable, using methods from neuroscience. Specific physical measurements of neural activity should, we predict, find signs of learned disability affecting the majority of Americans. If this level of evidence is found, using clinic studies, clearly there should be support for a solution based on the same theory. The results of decades of educational crisis affect our capacity to remain competitive in evolving global marketplaces.

The need for a more precise and complete model of the neural processes is felt. We have proposed the development of a next generation of real and virtual classrooms and web based processes and procedures, which are seen as both a remediation and an enhancement, working for the individual and society. But we cannot gather evidence due to the power of the system to resist attempts at change. We have hope. If the new model might be fielded and specific tests for the disability developed in the clinical setting, we may regain lost national capacity.

Self-directed Learning and Cultural Identity

Local governance and local control over education is a part of our national sense of health. Localization is not merely geographical location. Tribal American culture has been dispersed, for example. Virtual governance systems have potential application to establishing secure cultural repositories in cases where local control over education produces a separation of all children into those well served by the current system and those who are poorly served by that same system. So the concept of local control over education takes on some new meanings. What do we mean by "our" community? We have a new answer. Using the virtual infrastructure, the isolated or dispersed community may self organize and develop culturally focused control over how higher education is presented and consumed.

The proposed infrastructure is to be based on a secure, self-monitored, and locally controlled immersive Virtual World (iVW) platform. To achieve a degree of local control, basic principles will be adhered to as the Bridge is developed. The objective is that social and economic development be driven by grass roots activities. For this reason, the key to developing virtual world communities is found in community centric management of knowledge. Curriculums will be organized in a top down fashion, and yet the demand for, and use of these curriculums will be driven by local community activities. The definition of a community is modified so as to support geographically centered local control, as well as the self-organization of virtual communities, such as are Native American communities.

Public ownership over decision-making is a central objective, which is consistent with democratic values. How it is to be achieved, is subject to natural experimentation and to “demand technology”, which is discussed in detail in later chapters. This involves the creation and use of a set of basic informational atoms. They are initially developed in a semantic extraction to ontological model process, and may be redeveloped rapidly if the need arises. The atoms are combined to express distinct human intention. Because we are allowing the individual intent to be expressed digitally, we are also able to use semantic technology to aggregate knowledge structure as created by the whole community.

This has never been done before, and thus one has to understand a great deal more to see how this is done. Since, of course, not many are interested in the theory; it is fortunate that these new capabilities are close to being achieved publicly. The results may be examined and understood without theoretical detail.

There will also be a “Bridges” bricks and mortar infrastructure, based on a market based business model. The Second School Community Center [™] is designed to be a franchised business that supports teleconference centers, and a place for social gathering. A public sector infrastructure is to be supported by what appears to be a for-profit business. This is not exactly the case. A new business model is needed. We consider the development of the Second School [™] in a certain way, but clearly it will evolve on its own and develop its own means to prosper. This is not of great concern, as this book is merely an effort to plan at the scale we need, if we are to renew educational quality. This renewal is what is important.

Grounding the Second School in everyday life has a purpose, which will be discussed at length in the pages to follow. In brief now, the most visible purpose in grounding our plans in everyday life is related to increasing efficiencies and reducing costs to public sector function. This notion suggests that the closer government is to the individual, the better the governance will be. We agree.

How is the iVW secured? What does it mean to have monitoring and how is local control to be expressed? These are important questions. The text of the chapters to follow will describe how new Internet based learning platforms are likely to develop. In this context, a few points may be made about our plans. The core of virtual world platform development is open source. We have the ability to participate in this development without excessive proprietary consideration. We assert the belief that the infrastructure must be free from monopoly control and that ownership over the infrastructure must be public in nature.

Non-owned Communication Platform

The principle is, that a non-owned communication platform will support a market in innovation, as well as other forms of commerce. In this sense it extends the business model of Amazon.com and other social networks. However, the infrastructure is considered also to be similar in nature to the national interstate highway system. It is to be provided for and cared for as a public common. The origin for capital for maintaining the infrastructure is to be a for-profit corporation. This legal entity will have a carefully developed charter designed to decentralize the control of the community centers, while maintaining quality control from one state to the next state.

There are many deep principles that we are trying to preserve. The principles are philosophical as well as legal. *The Education Bridge* is to provide a public service in a specific approach. Our children may be provided the right to get an account, remain anonymous to all except a duly selected school board.

Within this monitored public commons the students will be asked to not share real world identities. This request will be, of course, ignored in cases where individuals create real social networks that are to be monitored by the school board so that educational purposes are reinforced. The behavioral rules might be compared with a small boarding school, where it is assumed that most but not all of the intellectual activities of each student is conducted within well-defined norms. Regulatory rules govern information

exchanges within the community of professors and administrators.

It is expected that each individual will build an in-world identity focused on knowledge of self. Members of an education community will monitor this activity. A type of social network will have many properties envisioned and anticipated by popular movies like Avatar and Harry Potter. The properties of localization will provide to this community an ability to serve minorities within a simulation that preserves the cultural traditions of that minority.

Monitoring will be by permission from the individual and for the sole purpose of guiding the individual in preparing for and selecting his or her college. Regulation and law will govern the behavior of the school board, and delegates, as they define extensions to current certification and accreditation bodies.

We are proposing something that is already happening, in fact there may be a certain type of inevitability to dedicated virtual education worlds. Platforms dedicated to education are rapidly being developed. Each month new groups begin to make partnerships involving K-12 teachers and college professors²². In 2009, the activity related to college, university and school activity in Second Life²³ and in several of the open simulation worlds, such as Reaction Grid, tripled.

Our proposal is more than mere involvement in what is a strong historical trend towards dedicated virtual world infrastructure for education. In its many parts the *Bridge* proposal must be understood as a whole package. A number of inquiries must be made about unexpected things: For example, what is meant by local control, and how is it achieved? Can individual identity protection really be achieved? What is the underlying technology, and why/how might it “not be owned”? These are challenging and exciting issues. For example, the issue of ownership might only be properly understood if new language is developed where ownership and control are separated, and community e-governance processes localize control.

What are the security issues? Does this new technology achieve 100% information assurance? Is there a new pedagogy that is different from the competitive consumer driven paradigm we now support? Will resilient private markets be stimulated by a pure

²² Kapp, Karl; O-Driscoll, Tony (2009) Learning in 3D: Adding a New Dimension to Enterprise Learning and Collaboration. Wiley publishers

²³ We will discuss at a later time the limitations if we were to use Second Life.

public sector? Will this be good for our American society? These many issues are identified and will be addressed in the following pages. The first of these is the insight that education is governance. .

Thoughts about Governance and Education

In the work that follows some surprises will be laid out. These surprises may change the discussion; about private versus public, capitalism versus socialism, or demand versus supply. In some cases the existing debates will be set aside; for example non-productive debates about monitoring, by someone, of a virtual school using current national intelligence tools, or the necessity of public ownership over the enabling *Bridge Infrastructure* software. We all know these debates; because there is a crisis in education and governance. In fact the crisis has been part of all of our lives. Is it not now time to move on? Is it time now to acknowledge that “where” we are in human history has specific self-created challenges?

What the non-productive debate does is to polarize viewpoints. For example, the nature of stratified monitoring over social networks is properly understood as paradoxical. The individual expresses in a social media in various ways, and this expression is instrumented in the social media. The media has a technical requirement to “be the expression”. Memory of the expression is not a literal ability to re-express; rather it is a means to represent the expression in the abstract. This technical abstracting process is an induction of categories of occurrences with which models of expression might be produced.

The protection of an individual’s private information can be achieved, even in the presence of powerful knowledge management tools. The analysis of particular instances produces a reified ontological model. Ontological models can and should leave behind much of the specifics of the instance. The positive use of this technology insures that information about individuals is left behind in the development of models of social, or economic, exchanges. A negative use of this technology would be seen as a violation of principles of law, and therefore punishable by civil and criminal law derived from the principles set out in the United States Constitution. A similar analysis is explored in the context of public versus private ownership over the social exchange media.

The challenges we face may be the aggregated consequences of a phase of development that characterize various parts of a global economic/political system. Of

course, negative uses of capacity produced from wealth or other power could be deterministic. This is a theoretical possibility, and is evidenced by some human behavior. However, positive uses are also possible. The understanding of these challenges reveals new capacity for acting in a way that decreases suffering.

The assumption is that human nature would tend to decrease suffering if all other things were equal. This assumption cannot be proved or disproved with circumstances as they are, and individuals often become dedicated to one view or the other regarding this question. The quality and nature of education is then central to deciding between positive or negative use.

The crisis in education may be seen as an artifact of resistance to what is a natural transition from one phase of systemic expression to another phase. Ending the crisis might then be part of how this transition is embraced. We cannot know for sure that social transformations will always produce overall positive results. However, we may further develop our common sense of good, and reflect this in law and constitutional interpretation.

We do not suggest that each of the deepest of issues we raise is seen properly in every instance. All that is suggested is that the current system may be improved upon, if some specific social/economic/technical transformation is empowered. We are not interested in an extended discussion about the failure of education or the failure of economics; there are already many books on this topic. We look to outline a path to a better future for everyone. An approach to proactively address the crisis is outlined. This approach is designed to be at the scale that seems to be required if the crisis in education is to be properly addressed. The ending of this crisis is then seen as the means to reduce global conflict. It is thus deemed to be necessary if we are to survive.

Let us consider some specific features of the *Bridge* proposals. We recommend a public infrastructure supporting educational services to the individual while he or she is enrolled in high school. A class of educational services is prototype and a class of individually centered e-governance services is outlined. The proposal includes the continuing development of open source standards in computer/communication technology; pedagogy grounded in enhancing individual intention, and methodology from knowledge management disciplines.

Specific features include a renewal of the American Dream. Public infrastructure is

designed to allow our young minds to interact with individuals and communities who are building a virtual model of regional farming and production ecosystems. Models of new economic/social systems are evaluated based on an active peer review of value to society, by members of society. Each of the virtual models is an education world²⁴ designed to transition the work force to a decentralized community of technology entrepreneurs. The means to avoid concentrating wealth is provided by a new model. Redistribution of wealth through taxation is not the primary means to keep a healthy middle class. An active distribution of knowledge of how to produce goods and services is. The means to this distribution are the fifty *State Education Bridge Infrastructures*.

The approach is grounded as best we can in natural science. For example, our reasoning is based on a type of situational logic. We will discuss a notion of rationality as well as the related ideas of non-locality, induction and emergence as we get to the central concepts of multi-coherence. As we do this we are attempting to actually represent the full and complete nature of human thought as is seen by the most advanced natural science. The role of social perception on what the individual seeks to accomplish, or not, is addressed in a full fashion.

It is easy to miss-interpret what is being proposed. We believe that in the near future our economic system, in the United States, will be a better system. It is to be supported in a fashion that is more dynamic than how it is maintained today. There is no intent to play down the social values that represent the best part of who we are as Americans. There is much to admire about the current system and certainly the best parts of the current system may be moved forward. A common appreciation of a city on a hill and the American Dream has inspired people from around the world. There is a next step, however. This involves being more inclusive and more secure because of this inclusiveness. The paradox between these two qualities is embraced only with a profound knowledge of nature.

Direct and Alternating Current

We can get a sense of what is possible using a comparison between direct current and alternating current. The present-day economic system might be compared with a direct current circuit, which operates at only one temporal scale. The current economic system

²⁴ Education Worlds, under development (2010) www.educationWorlds.com

does not account for the inner reality of the individual.

Stratification will create a new organizational scale. Such a change is barely anticipated unless one looks carefully. Perhaps this is what is next for humanity. We believe that total world economic flow might increase an order of magnitude; e.g., ten times, while reducing the unnecessary side-effects that create an imbalance in so many social and environmental structures. Power and control might be decentralized while at the same time individuals are aided in finding fulfillment in activities that are less consumer oriented and more oriented to healthy living. Clearly many people are involved in a personally destructive life style. Individuals who were more fully aware of positive knowledge about the self, society and the environment can direct individual energy towards healthy activity.

Perhaps the reader will visualize a circle with energy all going one way. This is a simple model of direct electrical current. An historical parallel may be used to illustrate the principle of stratification. Edison attempted the task of lighting a city with direct current, until Tesla showed that this could be done far easier with alternating current²⁵. The difference is the same as what we are proposing when compared with the existing supply side educational system. Using deep learning methods the individual internalizes knowledge. As the doors open up, so does an appreciation of how the mind works. One sees more clearly that the feeling of coherence is generally positive, but that some forms of extreme exceptionalism creates difficulties for other people. Knowledge leads to respect and respect leads to a lessening of suffering.

Clearly the sheer size of the population of humans on the Earth is an issue that is either to be accommodated in a peaceful and uplifting fashion, or with continuing expenditure in life and wealth on wars and other forms of strife. Our central thesis is that universal education is essential if sufficient numbers of humans are to live peacefully together. The only possible path to a world where peace and health is expected for almost every one is a path that starts with universal education. Education of this nature must be centered on the individual, and yet connected to a rich complex of social values and histories.

The current educational system has failed because it treats knowledge as if it were

²⁵ Margaret Cheney, Robert Uth, and Jim Glenn, "Tesla, Master of Lightning". Barnes & Noble Publishing, 1999. ISBN 0760710058.

money. Money creates the direct circuit, where everything is treated as if the same social value. Everything is reduced to dollars. When knowledge is treated properly we see that the individual potential for good is enhanced, while the social ability to regulate in support of a legally defined common good is also enhanced. It is no longer a zero sum game.

When an educational process recognizes the complex interior of the individual, there is a new capacity revealed. The present system, in most cases, does not recognize the individual. When the individual is self-directed in his or her learning, then this capacity is explicitly recognized. The same is true about economic flow. A great economic circuit exists but this can be expanded only if the inner needs of the individual are explicitly recognized. Empowering the individual creates additional capacity, and if it is channeled towards personal fulfillment the results will be a reduction in over all conflict. If the individual is not recognized then an increase in struggle is likely. This paradoxical result characterizes the challenge we face, nationally and globally.

The current economic system is a marvelous creation, but appears to some to be unsustainable. The potential is seen in several separated dimensions. Environmental destruction is one, but also is the concentration of wealth into the hands of fewer and fewer very rich individuals. Wealth concentration is seen as essential to a healthy economy in some economic theories²⁶. There appears to be phases, characterized by so called Kuznets curves, also in which wealth distribution moderates as a society reach higher levels of social enlightenment²⁷. The problem is that economic theories are often extremely polarizing, and truth, if one can say there is a truth, is difficult to get at.

A full treatment of economic theory is beyond the scope of our proposal on universal education. It seems reasonable, however, that if we are to live within a sustainable economic system, the role of the individual must be allowed to express in a positive fashion. It is through this recognition that we might create greater efficiencies in how economic exchange occurs, with the result that the physical and moral environment realizes greater carrying capacity²⁸. Achieving better capacity for supporting human population is only one aspect of a more complex consideration, since population growth

²⁶ Bauchaud, Jean-Philippe; Mezard, Marc (2000) Wealth condensation in a simple model of economy” http://adsabs.harvard.edu/cgi-bin/bib_query?arXiv:cond-mat/0002374

²⁷ Fields G (2001). *Distribution and Development, A New Look at the Developing World*. Russel Sage Foundation, New York, and The MIT Press, Cambridge, Massachusetts, and London

²⁸ Daly, H. and Farley, J. 2004. *Ecological Economics: Principles and Applications*. Washington: Island Press

may also swamp any potential capability.

Education that is humanistic is a necessary component for a decentralized economic system. A new social/economic reality may be on our near term horizon. The philosophical controls imposed by the theory of determinism can be lifted through the process of deep learning. We as individuals might play a moderating role on what is now a wasteful use of economic power in the service of war and strife. Deep learning leads to an more full understanding of our own nature and the appreciation that we are not all the same. We see things in different ways. An appreciation of the other is then implicit in the deep learning methods. This is true even today in really simple circumstances, such as turning off the lights when the room is not in use.

Like the educational system our economic system is in crisis. By decentralizing energy and commodity production and use, we create a new capacity for economic exchanges while also producing a more sustainable economic reality. However, in order that reorganization becomes understood, we need a new type of scholastic system. The Bridge does not replace the current system. It is focused only on the transition between high school and college. What it will do is provide the system evidence that long held view about human nature have been fabricated, largely in support of a theory that is not correct. College freshman will start college knowing the nature of the human mind a bit more clearly.

Education, Communication and Democracy

In the *Bridge* proposals, we state a strong assertion, which underlies a working principle. In a democracy there is a critical role for a well-focused pure public sector, and in particular one that serves the goal of universal education. Our problem has been that it has not had the tools needed to perform its job. As the system evolved, from the post World War II stimulus, we exchanged the idea of universal education for the concept of mass education. The system realized that it's idea was really only for white men. The sense of exceptionalism could not envision universal education for everyone. So there has been a struggle. A strategy that pretends to educate was adopted. Educational science was not developed. Advertising and business processes were developed. Inadequate tools are only part of the problem. College degrees in education refined a process of pretense to a high art form.

Market forces shape us, behaviorally, to be consumers. Our history provides many

instances of injustice and misjudgment. A particular observation is immediate and powerful. We are within an interesting circumstance. The same technology that is used to acquire and aggregate intelligence about competitors, and enemies, might be used to assist public servants fulfill intended functionality. The proposal is to use technology developed for national intelligence as part of a new social media that has self-monitoring and the knowledge management tools needed to create a virtual boarding school, with three million students. Of course we will start with far fewer students and develop what is needed.

What does the Bridge need to start with, and how will this evolve? First, monitoring requires a type of social brain²⁹. The *Bridge* professors must be able to develop models about individual performance and capability, or better yet the individual student might develop an ability to model his or her own command of curriculums. The methods of deep learning require that the individual accept more of the responsibility for learning and for demonstrating knowledge. Self-monitoring is turned into a means to acquire evidence that “I” know the curriculum, say in college level algebra. It is this, unexpected, feature of the deep learning methods that allows us to imagine supporting all graduating high school students.

This possibility is in particular exciting, because the student becomes more independent from the system and is able to take responsibility for life long learning. There is a history to this circumstance, and this history brings us to a new point. New communication mediums are now possible. With this possibility comes a means to improve or degrade ongoing social transformations. Social media is now focused on creating consumers out of human being, rather than being used as a means to understand the self. Self-monitoring at least gives the possibility of changing this. Through a deep understanding of self, we open the door to understanding the nature of social media.

The requirement, it seems to us, is that a virtual public communication infrastructure be developed. This infrastructure is not to be used by the wealthy or the politically connected to control the behavior of individuals. Thus the core capacity for self-monitoring is vital and has to be understood in a specific way. The right to control

²⁹ Prueitt, Paul Stephen (2011) *Stratification Theory as Applied to Neural Architecture enabling a Brain-like function for Social Networks* . Presented to Winter Chaos Conference of the Blueberry Brain Institute, Southern Connecticut State University, March 18-20 2011.

information about oneself is essential and must be strongly protected by technology and by legal practices. Through deep learning methods the individual is given an capability that only he or she has ultimate rights over.

Testing is now a process whereby the system controls access to knowledge. The system tests and in a selective way opens the door or closes the door depending on the purposes of the system. If the system is functionally designed to limit access to real knowledge of science and higher mathematics, this will be reflected in the means through which we are given tested. Our thesis is that the American educational system evolved, in particular since the mid 1940s, in such a way that trains most students to believe that higher mathematics is not learnable. We then connect the dots. The current economic system has used this trend in education to enhance an exploitation of the masses, through advertising and economic control. The dynamics includes interactions between communities, and often these communities have an extreme form of exceptionalism. This sense of exceptionalism has positive and negative consequences. Part of the negative consequences arises because of a linkage between fundamentalism associated with racism, nationalism and with the self-centered egotism.

We propose that the *Bridge* infrastructure develops a body of open source software. In this proposal we take existing open source software and extend to a next generation system, with knowledge management and monitoring tools. The current software supports business activities such as Second Life, but is not owned by any business. What we are seeking is the means to focus and refine an effort to extend and perfect this technology. A large part of our foundational papers are focused as an attempt to justify open source technology, the deep learning pedagogy and the natural science.

The angle we have is on creating an educational support structure where monitored peer-to-peer learning and self-learning become directed primarily by the individual students. We also wish to define and develop the concept of a second school and virtual education worlds. The second school will be an entity supported by a for-profit corporation having a non-business model designed to support virtual education. The cost for individual participation would be minimal or free.

One way to frame the discussion is to assert that governance and education is one and the same thing. By achieving a new level of educational access we create a deeper realization of the democratic model for governance. The importance of separating

business processes from schooling developments is now clearly seen. We understand that business may develop too much control over states and federal government. We understand that business interests have too much influence in the existing failed educational systems, and that the interests of business and the interests of the people are not always the same. Education procedures are, or should be, designed to create huge potential social value. Business developments are designed to capture social value and convert this value into private ownership and revenue.

The second school will be developed to provide governance over a virtual education world infrastructure. Each state will share certain elements while exercising local control over how the common elements are used. State led governance will be subject to a non-business model. However, questions remain. Is the provision of education using a commercial model possible? The regulation of commerce is also an essential part of governance. How does state government's regulatory responsibility, play out?

It might be possible to have a public-private partnership where the private part was completely at the service of the public part. It would seem that some aspect of that public sector must have transparency over most aspects of the partnership. We say, "seem", because there is some complexity here. What do we mean by transparency? How are the processes involved in such a partnership's business activity? How might the system achieve minimal clarity, and no more? How might individual rights to privacy be held as a non-removable operational principle, while allowing the definition of proper curriculum? How might professors and teachers guide the individual student?

There are technical solutions to these concerns. Business processes might be measured while minimal transparency is provided through the use of the proposed architecture. To the degree that schools, colleges and universities are run as if a business, we see functions of governance come together. Our proposal would first apply the virtual world architecture to an instrumented measurement of K-12 and first year college activity. This is via a virtual world infrastructure using open source software in which any self selected individual in K-12, plus the first year of college, are allowed to registrar and participate. This means that a next generation immersive Virtual World (VW) infrastructure, dedicated to educational purposes, is to be developed³⁰. The grid is

³⁰ This task requires less than eighteen months, with proto-types available immediately, and a code development budget of sixty million dollars.

conceived as independent and separate from any school, college or university.

The second school will provide a uniform set of metrics on educational processes in the first schools. The second school will work to refocus the status of schools, colleges and universities as public servants. The notion that a university is a profit center will be modified so that pure educational processes are not distorted by intellectual and social elitism.

The technical solution offered by the new architecture includes new work on measurement. The measurement of any system; however, involves some surprises, in particular in how locality and non-locality paradoxes are embraced. The understanding of how the latter is manifest in natural reality may be used to help us separate some of the aspects of our social world that have become confused. In particular the differences and similarities between education and business may be delineated. Different measures will be developed and applied. In particular a demand side measure of the value of educational services will be more fully developed and used.

Capitalism is seen as a positive part of overall governance over social and economic processes. In order for a public sector to work well, and thus to optimally support an economy based on capital formation, we must have some well-defined public functions separated from the influence of private interests. The quality of public functions may be measured only if the difference between economic and governance processes are well understood. Given a clear understanding, an independent assessment over a spectrum of outcome metrics might be made minimal in terms of direct interaction, thus decreasing the friction that is created by opposing interests.

The second school concept provides for a type of student directed tutorial service, and through this service the virtual, and bricks and mortar infrastructure is able to create value for the individual. We are then able to separate that value from the second school. He or she may better apply this value in his or her life. There is a business model, and thus a means to support the development of virtual education worlds as well as second school community centers. The economic support for the *Bridge* will come from social services, and from the sale of coffee, tea and baked goods.

The second school will set up a number of education worlds. Each of these will be a self-monitored dedicated simulated world where an individual or community uses the world as a cultural repository, complete with specific knowledge as to how to do things in

real life. Part of the simulation will be of a classroom, with the ability to support avatars sitting in desks, and professors writing on the white board. The classroom will have full support for voice as long as the computer has a microphone and speakers, as well as for video, in-world on any flat surface, and real time handwritten message exchanges. All of these capacities exist today in Second Life and other 3D simulation world environments. These virtual worlds might be where one may go to provide or receive instruction about how to create things in the natural world, including how to create deep knowledge of college curriculums.

Educational Pedagogy Consistent with Stratification

In the *Bridge* proposals, we state a strong assertion, which underlies a working principle. In a democracy there is a critical role for a well-focused pure public sector, and in particular a public sector that serves the goal of universal education. The problem has been that public education has not had the tools needed to perform its job. As the system evolved, from a post World War II stimulus, we exchanged the idea of universal education for the concept of mass education. Systems supporting human interaction can create a type of unified behavior and often does create a common sense of social coherence. The system that was evolving was under the control of one specific subpart of the American population.

The system realized that its idea about universal education was really only for white men. Without really thinking through the consequences, white men in mathematics departments excluded women from actual training in higher mathematics. What was substituted was an inferior training in how to use a slide projector. The teachers for the next generation of students were taught that “they” could not really understand mathematics. The role of the textbook and multiple-choice test was substituted for actually knowledge based learning.

The sense of white male exceptionalism could not envision universal education for everyone. Not only were women excluded, but also any minority community. This exclusion was not well thought out; however. The result is that many white men are also excluded, and trapped into a system that is functional designed to support economic servitude. So there has been a struggle. A strategy that pretends to educate was adopted. Educational science was not developed. Advertising and business processes were developed to enslave as many as possible into a belief that higher mathematics is

unlearnable.

Inadequate tools are only part of the problem. College degrees in education refined a process of pretense to a high art form. People came to feel that knowledge about higher mathematics was simply not obtainable by anyone except a few. Degrees in education were awarded only to those who would accept the lie. Those graduated became our teacher core. The individuals who could have provided educational innovation were not graduated, and those who were graduated were placed into a system where blind policy serves the needs of the system.

Market forces shape us, behaviorally, to be consumers. Our history provides many instances of injustice and misjudgment created because of this over emphasis on consuming. One particular observation is immediate and powerful. We are within an interesting circumstance. The door to advancing, as we should is blocked by skepticism. The same technology that is used to acquire and aggregate intelligence about business competitors, and national enemies, might be used to assist public servants fulfill intended functionality. The *Bridge* proposal suggests the use of technology developed for national intelligence as part of a new social media that has self-monitoring and knowledge management tools. These capabilities are needed to create a virtual boarding school, with three million students. Of course we will start with far fewer students and develop what is needed. But how can we start, when the door is blocked by reinforced skepticism.

What does the *Bridge* need to start with, and how will this evolve? First, monitoring requires a type of social brain³¹. The associative mechanisms and the executive function³² provided by the human brain can be duplicated³³ and then provided as part of the capabilities underlying a social media. The *Bridge* professors must be able to develop models about individual performance and capability, or better yet the individual student might develop an ability to model his or her own command of curriculums. The management of this knowledge can be made far simpler than is imagined if we use

³¹ Prueitt, Paul Stephen (2011) *Stratification Theory as Applied to Neural Architecture enabling a Brain-like function for Social Networks*. Presented to Winter Chaos Conference of the Blueberry Brain Institute, Southern Connecticut State University, March 18-20 2011.

³² Levine D; Parks, R.; & Prueitt, P. S. (1993.) Methodological and Theoretical Issues in Neural Network Models of Frontal Cognitive Functions. *International Journal of Neuroscience* 72 209-233.

³³ Prueitt, Paul S. (1995b) An Implementing Methodology for Computational Intelligence. In the Proceedings of First International Conference on Computational Intelligence and Neuroscience. IEEE

available technology that now has only been used for business or for war fighting.

Knowledge management tools for *Bridge* professors are only part of the innovation. The methods of deep learning require that the individual accept more of the responsibility for learning and for demonstrating knowledge. Self-monitoring is turned into a means to acquire evidence that “I” know the curriculum, say in college level algebra. It is this, unexpected, feature of the deep learning methods that allows us to imagine supporting all graduating high school students. This possibility is in particular exciting, because the student becomes more independent from the system and is able to take responsibility for life long learning.

There is a history to this circumstance, and this history brings us to a new point. New communication mediums are possible and are being developed in ways that have not been anticipated. With this possibility comes a means to improve or degrade ongoing social transformations. Social media is now focused on creating consumers out of human being, rather than using social media used as a means to understand the self. Self-monitoring at least gives the possibility of changing this. Through a deep understanding of self, we open the door to understanding the nature of social media. The use of knowledge management tools by the individual creates an ability to develop and own information that certifies that knowledge has been acquired and retained.

The facilitating requirement, it seems to us, is that a virtual public communication infrastructure be developed. This infrastructure is not to be used by the wealthy or the politically connected to control the behavior of individuals. It is to be used to provide universal access to higher education. Thus the core capacity for self-monitoring is vital and has to be understood in a specific way. Self-monitoring is coupled with knowing where “your” information is located. The right to control information about oneself is essential and must be strongly protected by technology and by legal practices. Through deep learning methods the individual is given a capability that only he or she has ultimate rights over.

Testing is now a process whereby the system controls access to knowledge. The system tests and in a selective way opens the door or closes the door depending on the purposes of the system. If the system is functionally designed to limit access to real knowledge of science and higher mathematics, this will be reflected in the means through which we are given tested. In too many instances the test that is given will

establish a ceiling and a floor to what is counted.

Our thesis is that the American educational system evolved, in particular since the mid 1940s, in such a way that trains most students to believe that higher mathematics is not learnable. We then connect the dots. The current economic system has used this trend in education to enhance an exploitation of the masses, through advertising and economic control. The dynamics includes interactions between communities, and often these communities have an extreme form of exceptionalism. This sense of exceptionalism has positive and negative consequences. Part of the negative consequences arises because of a linkage between fundamentalism associated with racism, nationalism and with the self-centered egotism.

We propose that *Bridge* funding mechanisms will develop a body of open source software. In this proposal we take existing open source software and extend to a next generation system, with knowledge management and monitoring tools. The current software supports business activities such as Second Life, but is not owned by any business. The core technology is not owned, even now. What we are seeking is the means to focus and refine an effort to extend and perfect this technology. A large part of our foundational papers are focused as an attempt to justify open source technology, the deep learning pedagogy and the natural science.

The angle we have is on creating an educational support structure where monitored peer-to-peer learning and self-learning become directed primarily by the individual student. We also wish to define and develop the concept of a second school coffee shop and virtual education worlds. The second school will be an entity supported by a for-profit corporation having a non-business model designed to support virtual education. The cost for individual participation would be minimal or free. The costs will be supported by revenue from the coffee shops. The details will be developed separately in each of the fifty states through franchise agreements.

One way to frame the discussion is to assert that governance and education is one and the same thing. By achieving a new level of educational access we create a deeper realization of the democratic model for governance. The importance of separating business processes from schooling developments is now clearly seen. We understand that business may develop too much control over states and federal government. We understand that business interests have too much influence in the existing failed

educational systems. The interests of business and the interests of the people are not always the same. Education procedures are, or should be, designed to create huge potential social value. Business developments are designed to capture social value and convert this value into private ownership and revenue. This is not brain science to see that there is a fundamental conflict of interest.

The second school will be developed to provide governance over a virtual education world infrastructure. Each state will share certain elements while exercising local control over how the common elements are used. State led governance will be subject to a non-business model. However, questions remain. Is the provision of education using a commercial model possible? The regulation of commerce is an essential part of governance. How will each state's government regulatory responsibility, play out? How will federal and state law develop?

It might be possible to have a public-private partnership where the private part was completely at the service of the public part. Systems theory is needed in order to refine our understanding of the issues. It would seem that some aspect of that public sector must have transparency over most aspects of the partnership. We say, "seem", because there is some complexity here. What do we mean by transparency? How are the processes involved in such a partnership's business activity? How might the system achieve minimal clarity about the knowledge of individuals, and no more? How might individual rights to privacy be held as a non-removable operational principle, while allowing the definition and projection of proper curriculum? How might professors and teachers guide the individual student?

There are technical solutions to these concerns. Business processes might be measured while minimal transparency is provided through the use of the proposed architecture. To the degree that schools, colleges and universities are run as if a business, we see functions of governance come together. Our proposal would first apply the virtual world architecture to an instrumented measurement of K-12 and first year college activity. This effort is to be via a virtual world infrastructure using open source software. Any self selected individual in K-12, plus the first year of college, are allowed to registrar and participate.

This means that a next generation immersive Virtual World (VW) infrastructure,

dedicated to educational purposes, is to be developed³⁴ through a grass roots movement. The grid is conceived as independent and separate from any school, college or university. The second school will provide a uniform set of metrics on educational processes in the first schools. The second school will work to refocus the status of schools, colleges and universities as public servants.

The second school concept provides for a type of student directed tutorial service, and through this service the virtual, and bricks and mortar, infrastructure is able to create value for the individual. We are then able to separate that value from the second school so that the individual receives a reward. He or she may better apply higher education in his or her life.

The second school will set up a number of education worlds. Each of these will be a self-monitored dedicated simulated world where an individual or community uses the world as a cultural repository, complete with specific knowledge as to how to do things in real life. Part of the simulation will be of a classroom, with the ability to support avatars sitting in desks, and professors writing on the white board. The classroom will have full support for voice as long as the computer has a microphone and speakers, as well as for video, in-world on any flat surface, and real time handwritten message exchanges. All of these capacities exist today in Second Life and other 3D simulation world environments.

The Conjecture about Acquired Learning Disability

Our core functional conjecture is that slow and generally un-insightful instruction during the pre-college experience leads to an acquired learning disability. If this assumption is correct, this disability, once established, has neurological and immune system roots³⁵, and these roots are developed through adaptation and reinforcement mechanisms, which are resilient because the biological system habituates the associated class of behavior. The origins of the incapacity, while arising from the biology of the brain system, might also be found within our cultural practices. These practices are also resilient.

In response to what appears as a reduction in student capability, colleges and

³⁴ This task requires less than eighteen months, with proto-types available immediately, and a code development budget of sixty million dollars.

³⁵ Prueitt, Paul S (1988). *Mathematical Models of Biological Systems Exhibiting Learning*, PHD Thesis, The University of Texas at Arlington.

universities all too often accommodate a corresponding reduction in the quality of education. We accept less from freshman, and demand less as freshman matriculate. No complete understanding about the process involved in watering down curriculums has been available. In fact most funded research ignores this issue. Programs, sometimes involving four semesters of pre-college level course work, have come into existence.

Developmental mathematics now occupies a significant role in colleges and universities. The sense may be that human beings just do not take well to math, and thus that the outcomes we see are just part of the expected world. Educational practice has some jewels, but there is much that is completely wrong, in our opinion. Current practice may have developed because the system seeks justification for what it is doing rather than an understanding that there is a crisis created by current practices. It is not the limitations of the human being, but the self-imposed viewpoint by the educational community. The problem is greater in scope than simply the question of what one teacher or professor can do.

The problem in the classroom is deepened by a specific social viewpoint. There is much that might be researched regarding the conjecture of acquired learning disability. In my experience, students exposed to a challenging pedagogy will form two groups; those who see the point to self-directed study and those who do not see this point. Those who do not see the point will take action to influence the administration in making what this group sees as corrective action. The idea that the system is inadequate is one that is very hard to manage.

The outcome for the class may depend on which of the two viewpoints are supported by school administration. The pressure will come more strongly from students who are not prepared to receive a standard instruction and see no personal option other than to drop the course or change how it is taught. These students would be best served through counseling and one-on-one work with a knowledgeable teacher. Such support is not generally available. The demand pedagogy we have developed could provide a web based social network in which students first learn how to be self-directed, and then are provided the tools to share what is learned. This technology and instruction is currently outside of the teaching paradigm, but is not so far removed that a campus wide adoption might be made. A first attempt was made in the spring of 2010 at Norwich University. The target curriculum was an introduction to information systems designed as a

freshman elective.

If the counseling is reinforcing the idea that the work is too hard and that mathematics, or any other curriculum, is not for them, then the student is poorly served. The other aspect to educational practice is the degree to which learning is self-directed. This has become increasingly difficult and yet it occupies a different dimension than work which is supplied without choice. The separation of these dimensions is necessary if the issues facing actual reform are to be addressed.

It is noted that some trends in educational psychology identify an expert blind spot as a major cause of decreasing capacity from entering freshman college students³⁶. We conjecture that a type of brain injury occurs due to the means through which our children are educated, and not only in mathematics. This is an alternative view that has very different reform strategies. The injury is an accumulation of under stimulated experiences with math. The injury occurs by under stimulating young children with years of poorly taught arithmetic and algebra. The immunological mechanism is discussed in my early research³⁷. The cognitive neuroscience is also discussed³⁸. It is not the blind spot of the expert, but the grounding of education in Dewey and Darwin and the supply of "education" by people who do not know what mathematics is. It is the consumerism of textbooks, and computer tutor programs that are correlated with the decline in educational outcomes.

The underlying thesis found in over engineered educational psychology literatures³⁹ may in fact enhance the harm being done.

When we have used the new pedagogy, a modified R L Moore method⁴⁰, we observe the consequences of a type of nihilism. The students who find the challenging training to be exciting and uplifting may find no external support to express this excitement. If faculty members are expressing pessimism about student capability, then that influence

³⁶ Nathan, M. J. & Petrosino, A. J. (2003). Expert blind spot among preservice teachers. *American Educational Research Journal*. 40(4), 905-928.

³⁷ Eisenfeld, J. & Prueitt, P.S. (1988.) *Systemic Approach to Modeling Immune Response*. Proc. Santa Fe Institute on Theoretical Immunology. (A. Perelson, ed.) Addison-Wesley, Reading, Massachusetts

³⁸ Levine D; Parks, R.; & Prueitt, P. S. (1993.) *Methodological and Theoretical Issues in Neural Network Models of Frontal Cognitive Functions*. *International Journal of Neuroscience* 72 209-233.

³⁹ Nathan, M. J., Kintsch, W., & Young, E. (1992). A theory of algebra word problem comprehension and its implications for the design of computer learning environments. *Cognition and Instruction*, 9(4). 329-389.

⁴⁰ Charles A. Coppin, W. Ted Mahavier, E. Lee May, and G. Edgar Parker, *The Moore Method: A Pathway to Learner-Centered Instruction*, (Mathematical Association of America, 2009).

is felt. Faculty members trained in the old ways, the First School, are always distrustful and act in an authoritarian fashion. So in this way, a minority will sometimes be able to control the outcomes of the class. Of course, these processes are active in all college and university classes.

Particular colleges or universities respond to this in different ways. For example, at Talladega College in the spring of 2008, all of the students did come to a community consensus that a particular kind of challenging pedagogy was really working for them. This is not always the experience. It is odd at first that the patterns of response are different in under-served communities. In these communities there is a wisdom that is acquired and a willingness to try something different. A personally uplifting experience means something to the individual and he or she will respond well when the system reinforces positive experience.

The other response is one that has been habituated long before the student starts college. The social skill used by students in college is achieved while in high school, but the process starts in middle school. There, the leveling of instruction creates pressure on students to only learn what is being taught. What is taught is test preparation to shallow curriculum that is not difficult, and which no student in that class will find challenging. If there are students in the class that find the material perplexing, the curriculum is revised to accommodate this situation. The objective to challenge students becomes secondary. Teachers are working in a system that has become over whelmed. The nature of how students are confronted has changed. We accommodate the failure and make this failure the norm.

A downward spiral is created in which there is no upward counter force. The concept that a student should, "learn how to learn" is methodologically set aside. In middle school the conditioning of all students becomes absolute, with dissention by parents or students being discouraged. Parents are told that the child who is ahead of grade should be held back intellectually so that the child is not out of place. In the fourth and fifth grade many students who are ahead of grade will be at the "right" level by the time high school is completed. Developmental mathematics, in college, then picks up at the sixth grade curriculum.

Learning Order, Grade Leveling and the Alternative

The supply side learning theory is based on the work of an accepted educational theory

that asserts that each element of curriculum must be learned in a specific order. Almost all individuals who are awarded degrees in education must consent to this assertion. Teacher certification must consent to this avowal. So it is natural that teachers require that this contention be accepted as true, and not to be questioned. Educational research is funded, or not, based on acknowledged acceptance of this.

The thesis placed before the education community is that supply is factually based on good science, but this is incomplete. We suggest that the completion will take into account also the internal intention, and the uniqueness of each human being. Demand pedagogy is developed and then used to supplement the existing practices. An alternative to grade leveling is proposed. Curriculum may be represented as a list of focus topics. An assessment tool is created where each topic is considered at three different levels of proficiency, skill, terminology, and theory. This tool is used both by the student and the school. The proposal as to how this could occur will be developed in the main body of *The Education Bridge*.

The problem with grade leveling is combined with mass education. Supply of mathematics curriculum in the fifth grade is set with no allowance for being ahead or behind. Moreover, this method of learning becomes part of a social fundamentalism. A set of unexamined and non-examinable assertions are made and reinforced. It is in itself incorrect, because the order of learning for an individual cannot be set, as an absolute, outside the inner perceptions of that individual.

We come to an essential question. What is needed from a mathematics curriculum? This is a very difficult question. The problem of linearization is compounded by mass supply of one specific curriculum, but which one, and which one fits all? There are no proper answers to these questions as long as all students must learn only one way. Today, all too often, every student must learn it together. The consequences of this leads to a filtering out of students who are not performing, at some time, in this single program and thus are judged as being incapable of understanding. The children see an intrinsic unfairness. Their loyalty is to friends.

What is not covered, in standard syllabuses has become a concern. In my mind this narrowness is nowhere more evident than in the liberal arts curriculum in mathematics. Much of what is beautiful about math is only slightly addressed in high school geometry and not at all in the problem solving aspects in high school classes.

Because of almost universally adopted classroom practice in middle school, high school students will be discouraged from moving ahead of the grade level. The argument has developed by many teachers that parents should not be pleased with children who are testing several years ahead of the grade level. This argument is often heard in PTA meetings. In various organizations, the debate goes on almost without end.

The justification for the argument is almost everywhere present in the journals of professional education and in trade journals. This is often justified as a sort of socialization argument, saying that children who test ahead of grade level will have social interaction difficulties. In fact, as suggested above, students almost universally acknowledge this, and actually create peer social pressure to not learn beyond the grade level that defines the classroom curriculum⁴¹. Some speak of the grade leveling as a financial issue, and point to the scarce resources society has to spend on education.

Bridge from High School experiences to College experiences

The experiences that are habituated from K-12 experiences might be unwrapped and an opportunity provided for that individual to reshape his or her capacity to learn higher mathematics and even real science. To make reference to the famous 1987 book, "Closing of the American Mind", the American mind might then open⁴².

The mind of the next generation of students may be shaped by a sense of multi-culturalism and diversity. We, as Americans have always celebrated these concepts. However a focused resistance to this evolution may have some roots in the entrenchment we see in our application of education and learning theory to teaching. In some simple sense, we propose an evolving educational theory that moves the individual from mono-coherence to multi-coherence. A concept about the nature of multi-culturalism will also be addressed in the body of *The Education Bridge*. This depends on making a distinction between coherence and multi-coherence, and it will take some time to develop.

The possibility of a universally applicable remediation is why an underlying excitement has arisen over the years. If the conjecture on acquired learning disability is correct,

⁴¹ It is tempting to start a description of specific instances, but there are in fact so many instances that the specification of instances leads into controversy. I appeal to each reader's own experiences to verify the truth of the assertion that students in college actively work to degrade curriculum, and feel justified in doing this by personal experience in middle school, and then high school.

⁴² Bloom, Allan. 1987. *Closing of the American Mind*. New York: Simon & Schuster. ISBN 5-551-86868-0

then new strategies might be developed. As I may have shown, the approach may be used without any technology. I do not claim to have settled all of the issues. What I may do is to lay out an argument that it may be perfected and then scaled so as to affect the entire education sector in the United States.

The methodology is based on a shift in education, from what we call supply to demand pedagogy. The shift may be seen as radical, but it appears necessary if we are to change what has become a deeply seated historical trend. When the new pedagogy is successful, the student sees a purpose in what is learned.

“So overall, I love this class and everything we do in it. I find everything we do in here very useful not just for now but for future use as well. We found ourselves coming across problems that we thought could not be fixed, but yet we worked through them and fixed them. I feel that was the overall lesson of this class, to keep working through the problems and get to the goal.”

Norwich University Student spring 2010

From this purpose the student comes to compose original expositions about what is learned. The underlying methodology is based, in part, in the use of a list of focus topics that outlines the curriculum.

“Pedagogy is the study of being a teacher. This portion of my paper explores the Demand Pedagogy. It will be the standard one day, but as of right now is still in development. The idea of using a focus topic grid instead of a syllabus is clever. A syllabus is a good tool, in that it lays out the plan of the course for the entire semester. The problem is, however, most syllabi are hard copies. What happens when the teacher gets sick and misses two days of classes?”

Norwich University Student spring 2010

The composition process replaces multiple choice and short answer tests with focus topic framework based exposition. The student takes responsibility for saying, “I know this”, and giving evidence that this is a true statement. The key is to make learning self-directed while also imposing a regular order on the processes provided by school, colleges and universities.

A short course might create, within the capacity of the individual, an ability to learn a school curriculum no matter how well or poorly the curriculum is taught. This capacity is,

in theory, created through the use of a focus topic grid. The student creates a model of the courses. There is a shift in responsibility to the student for learning, and being self-directed in how he or she goes about the learning process.

In some cases, the student will realize that all learning does not have to occur in the high school classroom. He will go outside of college to find stimulating content. In essence, the top down regulatory law being produced by federal legislation would be replaced with a universally accessible virtual world infrastructure. By making this groundwork dedicated and available anywhere and by any child, individual pre-college or freshman students could demonstrate skills, knowledge of terminology and understanding of theory. Based on this evidence, the student would be assisted in finding a college and paying for the two or four year program. Clarity with respect to these issues would be developed by the child, and from this would come the increased potential for an adult citizen.

The easy way to talk about an external solution to an individual's difficulties with the study of mathematics, and other subjects, is to suggest the existence of a structural incongruence. Teachers and faculty members have developed a system that is not working for most individuals, and yet the scope of the existing system is entrenched. Justification for the failures is lifted onto the student or onto society. The system seems incapable of any deep change and that is the only type of change that leads to different outcomes. We justify how we teach, based on some set of ideals that are not working. Unpeeling this onion is complicated.

Faculty members often see students rejecting standard curriculums. One sign of this rejection is poor classroom attendance. Even if attendance policy is well established, the excuses and student expectations often argue against failing, based on absences. So students push the absentee rules, sometimes expecting to be absent more than 30% of the time. There are other signs, such as expressed viewpoints about feelings towards mathematics. The challenge that students place on this instruction seems almost of the nature of water finding a way to flow downhill. Paradoxically, many appear both incapable of learning and are bored. Our proposal is that we increase the challenge while giving the student more choices.

Later, we will discuss more on what our proposal is, and how it is justified. First we wish to illustrate what the problem is. Our illustration must see through a false sense that

everything is really ok. It is true that things are ok, in some instances. There are some who, for one reason or the other, are able to excel within the structure, so success does exist. But our educational system all too often pretends to be successful by focusing on a few.

We may trace some of the causes of the current difficulty to the over competitive nature of K-12 and college experiences. Our sense is that success "for everyone" may be limited by a strong inhibitory paradigm. Competition might not be working as well as we wish. A selection is occurring, but is the selection ideal? How might we unravel all of these issues? The purpose we have is to understand and to improve.