

**The American Education Bridge,
Proposal to the American President
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Chapter Two

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Introduction

In spite of dedicated effort, and many positive benefits from our educational system, the consequences of the crisis in education are staggering. Student debt is one sign of failure. There are other signs. Common concerns, over competition from emerging foreign economies, indicate the severity of these consequences. We have two sides to our employment crisis. Many hundreds of thousands of jobs go unfilled due to the mismatch between education and employer needs. And yet the root causes of our crisis are not understood. There are no common agreements on the nature or the reasons for it, or about the practices that maintain it. There are few proposals that attempt to change the current status.

Our proposal addresses root causes. To tease out these root causes, a careful analysis is made using systems theory. We believe that the crisis has no obvious analysis leading to a clear solution path; except by recognizing certain facts. More precisely stated, economic markets are not likely to resolve the crisis in education; because some aspects of the economic system actually benefits from the crisis. Other parts of the economic system are harmed, but the system as a whole does not have the proper utility function. Thus, society as a whole must somehow resolve the structural issues that distorts the positive intent and expectations we say we have.

We understand that causes, in nature, are layered. A description of the layers involved requires systems theory and a separation of various subsystems; within social, economic, psychological, and neurological systems. It is in these subsystems that we find the facts. An example is illustrative. Textbook and software industries have a vested interest is not producing a set of resources that are sufficient and optimal. A larger dynamic exists in the over all business software sector, where industry often plans in obsolescence so that customers have to re-buy again. There is literally no good, pedagogical, reason why college mathematics books are large and change each year. A minimal book and thoughtful teaching practices is what is needed, and not being found.

Root cause analysis leads us to the hope that deep change will result in a complete solution, one leading to universal education for all people. But without real understanding of how systems interact the entrenchment of the education system is too

perplexing for correction. Real understanding has to be based on real time awareness of what is occurring. The proposed high school to college transition infrastructure will produce a real time measure which is not only independent from the schools and colleges, but which has no interest in pointing fingers. How is the new system comparing to the old system. Are learning outcomes well defined? Are they being met? These questions can be answered while transforming individual capacity and not bothering the schools regarding things that are often not under their direct control.

We are not naive. But we do define a positive path forward, in spite of complexity and hidden causes. We do not have everything figured out, either. The suggested path is merely a straw man, intended to get a new discussion started, one based on new ideas. What will eventually evolve will be different than what we suggest. There will be surprises that each of the fifty state *Bridges* will respond to. These surprises will be taken into account; however, by a sensitive polling of individuals being served by the *Bridges*.

One important aspect to our proposal is that digital cognitive aids be provided to individuals transitioning from high school to college. In addition to the traditional classroom; students are provided a virtual world setting. Small groups of students organize into a cohort directed by professor-guided self-study. In both the classroom and in the virtual setting, the individual is provided opportunities to re-align natural interests in the sciences, mathematics and other core academic disciplines. The cohort is provided with an opportunity to create a temporary community in which a digital representation of common perceptions produces a means to organize knowledge about a curriculum. This use of advanced knowledge management tools provides an added benefit to our program.

A knowledge representation interface is expressed as a set of primitives. These primitives are like atoms are to chemistry. Primitives compose into expressions. The composition of expressions, from a small set of primitives, is accomplished using graphical representation of concepts underlying a curriculum. The representation is in the form of a concept map. If there is only one concept, then we call this a focus topic. However, the goal is to see how concepts are related and to be able to provide a narrative about the separate focus topics as part of a written composition.

A Four Step Method TM requires that students make up exercises to demonstrate deep

knowledge of each concept. The individual becomes responsible for an evaluation of multiple concepts, each illustrated by two or more exercises. Handwritten Blank Paper Tests™ are used to communicate to peers, as well as to the professor, a deep learning of the concepts and the skill associated with textbook like exercises. This type of test is discussed in the following sections.

The deep learning methods could be used in a traditional classroom without any virtual elements. However, we are developing a hybrid distance learning infrastructure so as to reduce the over all cost to the student. The use of our tools provides additional social value. Social media is pushing boundaries. These boundaries define who we are as human beings. This seems clear to everyone. But a deep appreciation about the nature of human consciousness is not so universal.

Learning is ultimately a modification of individual consciousness. What is certain is that a pervasive digital media now connects us in ways that are new to human kind. The digital experience is a new phenomenon and with this will come new kinds of experiences. An understanding of individual consciousness is not been a focus of our K-12 system, and yet perhaps it should be. Our proposal is to get the education system out in front of these experiences by providing leadership. As we do this we depend on solid science, and away from ideologies that are not grounded in solid science. This means that behavioral neuroscience and systems theory will become advanced materials that are in the *Bridge* education worlds. This is so that individuals will see the science in things like mediation, or reflection. Our understanding of natural language and human communication can be enhanced.

Human language is an object of scientific investigations, has been for a long time. Recent science shows there to be an implicate nature to the association of things¹ in the world, and our perception of these things. Because some of the underlying mechanisms may exist at quantum levels of organization², one may conjecture that human language evolved from these mechanisms³. In a similar fashion, a new social expression may evolve rapidly now that the digital worlds exist. This new expression may already be shaping the future.

¹ Rupert Sheldrake (1992). An experimental test of the hypothesis of formative causation. *Rivista di Biologia – Biology Forum*, **86**(3/4):431-44. Reprint[*dead link*]. PMID 1341836. Accessed 2008-05-30.

² Pribram, K. (2004) Consciousness reassessed *Journal of Mind and Matter*

³ James B. Hartle (2007) Quantum Physics and Human Language *J.Phys.A*40:3101-3121,2007

One can safely predict that a type of community intelligence will evolve and that digital media will provide an ability to focus collective intelligence. Digital communication, and new toolsets, will amplify the capacity that exists as human consciousness. How this will manifest is difficult to speculate about. And of course there is a lot of speculation. Our turning to science is in an attempt to make this speculation more grounded. These are issues that this rising generation of children will address directly. The full understanding of how collective intelligence may come to express is itself something to discuss elsewhere⁴. The *Bridge* proposal suggests that there are certain social values that will be advanced. Increasing these values may create a pathway that leads to universal higher education.

According to our proposal, methods developed for national intelligence are used to create self-monitoring of what occurs within the *Bridge*. Prueitt worked on a technical capability during the years 1991-2001^{5 6 7 8}. However, his work is a small part of a large spectrum of intellectual effort. This spectrum is literally unknown in most parts of the education system. The founders of the Bridge feel that digital simulation of cognition⁹ should be commonly understood and used. So in addition to the college preparatory elements of our transition programs, we see the need to both use and explain new tools based on these technical capabilities. In particular, it is felt that the capability, which is discussed in public documents, is required if we as a nation are to overcome the crisis in education.

The future will shape education, rather than education shaping the future. This seems an inevitable consequence of our not ending the crisis in education before now. There are multiple benefits that arise as this technical capacity becomes engrained in most forms of popular social media software. For example, an aggregation of some parts of

⁴ 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.

⁵ Prueitt, P.S. (1994). System Needs, Chaos and Choice in Machine Intelligence. Chaos Theory in Psychology (A. Gilgen and F. Abrams, Eds.) Contributions in Psychology Series. Westport, Conn.

⁶ Prueitt, P.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

⁷ Prueitt, Paul S. (1996c). Structural Activity Relationship analysis with application to Artificial Life Systems, presented at the QAT Teleconference, New Mexico State University and the Army Research Office, December 13, 1996.

⁸ Prueitt, P. (1997b). Grounding Applied Semiotics in Neuropsychology and Open Logic, in IEEE Systems Man and Cybernetics Oct. 1997.

⁹ Harrison, A.M., & Trafton, J.G. (2010) *Cognition for action: an architectural account for "grounded cognition."* Proceedings of 32nd Cognitive Science Conference, Portland OR.

individual monitoring will produce a type of community intelligence. Linguistic and related means may be used to aggregate learning outcomes. These tools will reshape educational experience and radically alter the depth that a college class will attempt. Society will benefit as the crisis evolves to a positive resolution, and humanity moves into this new century.

Part of the strategy is to create independence from the existing system. *Bridge* outcomes are designed to achieve individual independence for the system, as well as a good view of the processes occurring within the *Bridge*. How this is done is described in various technical materials under the title of “stratification”. Like social media itself, the science regarding organizational stratification is both rooted in history and new.

Collective Intelligence and Individual Control over Self-Education

We will review briefly. Stratification in nature is into organizational layers, in a way similar to how human memory is thought to function¹⁰. At one level we have the commonalities that occur in many instances; like the color green. At the higher level we have compositions of things experienced. Anticipation is then associated with long-term processes, for which we have incomplete knowledge. The consequences of having this type of measurement over educational objectives are significant. However, there is a paradox. How is measurement to occur without acquiring undue ownership and control over all of the individuals in the system?

The surface answer is simple. The current system acquires ownership. Because this ownership is not structured properly, system ownership is all too often used to fulfill an unwritten system need to exclude those who are, under some set of utility functions, not qualified. As we have stated in Chapter One, the cultural challenge we regard as the “crisis in education” is created by these utility functions. The means to understand systems and how they evolve is not well developed and so our population in general is unprepared to end the crisis. So the simple answer leads to a profound observation. We observe that ownership creates a means to evolve, e.g., with a utility function “over” the system, the properties of the system. To separate ownership and shift the notion of responsibility from the system to the individual is very difficult, and perhaps can only be done at the scale we need using the advanced tools we are proposing.

¹⁰ Schacter, Daniel & Tulving, Endel (Eds) (1995). *Memory Systems* 1994, The MIT Press, Cambridge Mass.

Let us look at what these tools offer. The *Bridge* architecture measures individual cognitive performance. The measurement is encoded digitally. Some artifacts from individual encodings are abstracted into a pre-compositional layer and the digital encoding of this layer is then available to assist a cohort of students in learning how to learn. The assistance is “stratified” in nature. Because of the nature of stratification, a cognitive support architecture offers one set of services to the individual and a second but related set of services to the cohort. The cohort has both face-to-face and virtual interactions over a short period of time.

Informational security and the separation of ownership are both served by a policy. By policy, graduation results in the erasure of digital information gathered or exchanged during the specified period of time. However, while the cohort is active we support active knowledge sharing between individuals, between professor and individual, and between an individual and his or her self.

The means to achieve a community learning experience is found in concept mapping, developed by Novak and his colleagues.¹¹ A graphical user interface allows individuals to arrange the focus topics that students perceive to be a topical cover over the curriculum. Prueitt’s deep learning methods are consistent with concept mapping and with the use of concept maps as measured in Novak’s research. Blank Paper Tests™ and Four Step Method™ re-enforce a deep learning process. All of these methods work together to create both an individual, and internal, representation of the curriculum, as well as an external, digitally represented, view of the topics in the curriculum.

Individual independence separates ownership over the individual from the system, thus creating a possibility that the individual be allowed to re-define who she or he is. Released from an expectation of failure, the individual can become far more motivated. This possibility is a vital part of the *Bridge* design. We must be clear. The ownership by the system is not recognized as for the purpose of inhibiting the development of the image of self. However, it is widely recognized that most individuals feel mis-served by the educational systems we currently have in place.

Many of our under served students are caught in a prison created by their own perception, and the perception that others have about him or her. The system has a permanent record for each person. In part because of this record, the individual is often

¹¹ Novak, J. D. (1984) *Learning How to Learn*. Cambridge, UK; Cambridge University press

caught in a re-enforced depression of self-esteem. In Chapter Three we address this ownership feature more fully. The role of exclusionary selection will be again, as in Chapter One, noted as having positive and negative impacts on the individual and on society in general. Selection is seen as a natural consequence of how the brain uses physical wave coherence in maintaining cognitive process. We will continue to develop this theme well into the remaining chapters.

Our focus in Chapter Two is on the need and means to re-align the under served student's image of self. The *Bridge* is designed to provide a level playing field and a means to re-orient. The re-orientation is seen as an alignment of what feels normal to the individual. What is attempted is profound, in so many ways. The technology designed into the *Bridge* architecture creates new possibilities. Stratification facilitates a paradoxical and comprehensive measurement of the behavior of the *Bridge*, while releasing all individual records in a timely fashion. This paradox resolves as the means to archive this profound objective.

The responsibility for demonstrating knowledge is shifted to the individual. This shift allows the system to release control over each individual, in the cohort, when the time comes for graduation. This release of control has two wonderful features. The first is that the system gives up ownership over all of the individuals in the cohort. The second is that the graduating individual knows that the responsibility for demonstrating knowledge has been vested in "me". The individual can now go and take college level courses and be successful. The enhanced chance of success comes from learning how to learn, and for taking individual responsibility for knowledge of self, society and the environment. Contrast this possibility with current transition activity as a graduating high school student applies for college entrance.

Before moving into a discussion about deep learning methods, a bit more may be said about the underlying grounding in our advancing science regarding the nature of human learning. Stratification theory reflects what we know about memory, awareness and anticipation. Our technology mirrors this theory. A layer of common elements is defined and then manipulated by individuals within a community. The community creates something similar to a language system, but in this case something that is specific to the study of the curriculum.

By grouping individuals into class cohorts, and starting with a blank slate; students

create a community that then assists in the co-evolution of the class and each individual. When graduation occurs, all of the individual records are dissolved. The knowledge artifacts created by the community as whole can be preserved. However, it is the co-creation of a community understanding that is often the spark that ignites individual motivation.

The elements of a curriculum; e.g., digitally specified primitives, can be specified as focus topics related to any specific curriculum. The organization of these elements as a concept map is then individualized and used by the individual to arrange perceptions regarding the curriculum. Hand written compositions allow the individual to demonstrate deep learning in a meaningful way. Hand written compositions also facilitate the use of a digital world as a virtual classroom. Individual identity is strongly verified, while supporting high quality communication between the individual and the professor. Deep learning methods are now discussed.

Deep Learning Methodology

Deep learning methodology puts much of current classroom practice on its head. As such some reasonable concerns are raised. How might deep learning be implemented in the traditional classroom? What are the expected outcomes? Are measured outcomes really better? What are the methods? A history about the development of “lifting pedagogy”, based on deep learning methods, is provided in a position paper¹² and in the *Bridge* proposal.

Some implementation methods have been piloted at Atlanta Metropolitan State College over the past two years. Student essays on the deep learning methods show that students respond to the methods, both with increasing motivation and increased demonstration of skills. However, a full pilot is needed as well as a documentary study, if the methods and results are to be made objective. We would like to conduct this study this summer.

The most difficult concern is related to the issue of testing and measurement. Deep learning requires an internalization of the material, whereas traditional testing provides hints and control over student demonstration of knowledge. In deep learning methods the student is made responsible for the measurement of learning. In theory, it is this

¹² Prueitt, Paul Stephen (20112) Origins of a new pedagogy, posted at www.educationWorlds.com/book/origins.pdf

self-commitment to learning that is itself the only real means to achieve deep learning.

The knowledge required to pass computerized test is most often surface in nature, and often does not always translate into real understanding. One can make some uncomfortable observations about testing. The advancement from basic skills to higher levels of comprehension or to the more abstract nature of higher mathematics does not need to be developed to pass these tests. Passing lower level skills based tests becomes an art form, where no retention is made and certain barriers to further learning are created. Testing itself may create some of the learning barriers we see in the freshman learning support class. The method of testing is changed when using deep learning.

To make a measurement of deep learning effective, the individual student prepares an understanding about the curriculum and presents this much like an English class would write an essay about a novel. In mathematics learning support we start with the rules and laws of arithmetic, as well as its several principles. A commitment to actually understand these principles is fostered. The measurement of deep learning is linked to classroom note taking. However, we also see the need for standardized testing of skills. A balance is sought.

For most incoming freshman students, we find an absence of skill at solving simple equations. The most fundamental notion of a replacement set and a solution set is almost impossible to establish in the student's minds, even after several months. For the mathematician this difficulty is daunting, as the concepts are so simple and are without any prerequisites. An enigma is created. This is resolved when one postulates that students have developed an active aversion to any sense of theory or any retention of knowledge about arithmetic, sets or algebra.

For a simple algebraic equation like $2x + 1 = 4$, the replacement set is the set of real numbers, and the solution set is those elements of the replacement set which give a true statement when substituted for the variable x . In this case, only one value gives a true statement and all the rest, an infinite number, of values gives a false statement. In spite of daily discussion about this relationship between replacement set and solution set, learning support students fail over and over to answer a question like is there a subset relationship between the replacement set and the solution set. So when we move to equations like $3x + 4y = 5$, and ask what is the replacement and solution set, most

student do not admit to knowing anything about replacement sets and solutions sets in the one variable case. They are unable to generalize to the two variable cases.

Deep learning focuses on these types of underlying abstract concepts by allowing individuals to re-express the concepts in a hand written form. Not only are the unique perceptions of the individual allow to play a role, but also the areas of the brain used in handwriting are engaged. The use of focus topics from set theory and fractional arithmetic is developed for the class, so that the deep learning method is understood in the context of a specific curriculum.

Some analysis of the standard first semester learning support class is made. It is noticed that skill in simple fractional arithmetic is profoundly confused. The confusion is often debilitating, as students will strongly avoid working any problem that requires the use of fractions. Avoidance of fractions is found even in the final college course requirement in liberal arts mathematics, and is noticed even in calculus one classes. Many or most students never overcome this confusion. Because the core to the experience in mathematic class is a confused foundation, any test taking skill developed in class is quickly lost.

The development of a first module for learning support has been proposed, based on a complete re-teaching of addition and multiplication, but using any base other than base ten. This module was used in 1994-95 and again in 2005-2006. It was noted then that the novelty of a base other than ten engaged the perceptual system in a way different than expected, and thus students overcame a sense of learned helplessness. The module is very difficult, and yet students become motivated perhaps due to the novelty and then become successful.

A topic-focused outline about the curriculum is the essential first step. While teaching in Atlanta (2009-2012), deep learning methodology was used to address the deficit in fractional arithmetic and in elementary set theory. But more than skills, the student is able to cite the names, or phrase descriptions, of all of the focus topics in the curriculum. This ability to outline the topics in the curriculum is followed by the requirement that a Four Step Method TM be used.

The first step is to construct an exercise coming from the curriculum. The second step is to name the focus topic, and in doing so to use one's own naming convention. The third step is to create a different exercise or illustration about the same focus topic, with

maximum credit given when the second illustration is as different as possible from the first but still on the same focus topic. The fourth step is to create a narrative about the topic using handwritten symbols, well written and expressed.

The Blank Paper Test is identified as a composition, about the topics. The student is responsible also for asking proper questions as well as in communicating a narrative behind these topics. This composition from memory is correlated with the type of internalization that behavioral neuroscience suggests creates deep learning.

As the Bridge proposal is advanced, we will support deep learning methodology using certain principles found in knowledge management and in behavioral neuroscience. Various pilots are being planned, in several states. Each of these pilots will have a dedicated virtual simulation as part of the pilot resource. However, the initial classes will all be hybrid distance learning courses, using a technology like Blackboard™ along with digital pens or smart writing tablets.

Certain advances will be integrated as the various pilots move forward. As an individual class progresses, the student may be asked to keep a portfolio using a data structure based on Prueitt' original work on knowledge encodings. As discussed in other sections of the Bridge proposal, the encoding is provable secure under the definition that an individual security breach cannot occur without notification being instantly given to the owner of the information. The portfolio is initially to be a simple indexed repository of the topics of the curriculum. Posting edited parts of classroom note-taking encourages peer-to-peer interactions.

Student Developed Focus Topic Repositories

A teaching/testing methodology has been introduced. It balances skills-based and deep learning methodology. As part of this advancement, new classroom methodology is further enriched by an innovative use of social media. The advance depends on deep learning methods, as well as an application of existing digital handwriting message exchange technology. It is this exchange technology that we are currently developing over the summer of 2012. The use of digital media such as the virtual simulation worlds has to come after the development of a distance-learning component that involves digital note taking.

The in-classroom implementation involves the Four Step Method, Blank Paper Testing

and digital note taking methodology. This methodology reduces information overload normally associated with computer aided instructional and textbook. Textbooks are to be developed which are far more minimal in nature than the current books, far less expensive and far smaller. However, in our current implementations we depend both on standardized text and myMathLab software. Skills based tests are used to balance deep learning testing in such a way that all students perform better and feel better about the experience.

In the deep-learning classroom setting all students are responsible for the development of a set of class notes. Some students will use digital pens and will post video clips to a web-based repository. Others will develop hand written notes held within a three-ring folder. The student will have the option of contributing to the class's set of posted digital notes, or working only on paper with a pencil.

The use of digital pens in class creates useful digital video of actual classroom notes. The technology in the LiveScribe pen, and in other related technology, create a digital video of marks as they form on a flat surface. These video clips are similar to what we are all seeing on U-Tube and other web sites¹³. This repository is to be built each semester by the students, under supervision by the professor.

The development each semester of a student-produced digital Focus Topic Repository gives the students the sense of building, each semester, a class resource. We expect a sense of pride and dedication to develop, as well as evidence each semester of deeply learned topics. Topics will be placed on a web site as students submit digital video after each class has completed. LiveScribe note taking is idea for this activity. The LiveScribe software supports community based sharing of "pen-casts". These pen-casts when played on a computer may be captured for editing. Notes will be posted without voice. Smart tablets produce similar pen casts.

The primary purpose of the summer 2012 pilot projects are to develop hybrid distance learning methods using digital handwritten message exchanges. The envisioned technology is not anticipated by schools or colleges, and yet is supported by the development of handwritten computer interfaces. Prueitt's innovations involve a real time, synchronous, and asynchronous transmission of secure data from handwritten computer interfaces. It is this technology that we need an industry partner to help us

¹³ See, for example: www.khanacademy.com

develop, and use.

Web-based Repository and Virtual Worlds

Our work over the past two years has envisioned a multi-college proposal, and a commercial venture, preparing the ground for statewide *Education Bridges*¹⁴. The approach we are taking is complicated. It is necessarily so, because of the nature of the crisis in education. Commercial development of part of our innovations, as a social media platform, has investment potential. This is because a new dimension to social media is opening up and because the technology innovation has certain cultural values. The new dimension can be seen as enabling a finer quality democratic practice as individuals around the world learn to use social media.

An incorporation of enabling technology in educational platforms has the potential to stimulate new markets and advance social governance. We address this possibility in other chapters of the *Bridge* proposals. Our challenge is in creating economic and political support for something whose nature is in only some ways consistent with the expectations of our current institutions. The package of innovations and the use of these within education, and health care, infrastructure is simply not anticipated by the current institutions. The challenge is then in recognizing the complications and working within the system so that the existing institutions see the *Bridge* as a complementary process.

Possible financing for the *Bridge* is identified as coming from economic development of a new social media technology. The commercial aspects are being offered for development under the conditions that a new social media technology will be available at no cost to the *Bridge* consistent with the principles established in the *Bridge* proposal. Because a generic form of individual knowledge management is possible, the underlying technology has many uses outside of the *Bridge*.

Virtual worlds offer a possible low cost supplement to traditional education. However, without a new pedagogy, the use of social media will fare little better than does on-line education. Deep learning pedagogy has been developed specifically to overcome the increasing number and variety of learning disabilities. The pedagogy is based on the neurology of memory systems, and is designed to develop a proper perception about the

¹⁴ 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>

concepts underlying higher mathematics. The pedagogy also serves as a general method that a student may apply to any college level course of study.

The development of the curriculum to be taught in a virtual world infrastructure will keep in mind the general goals that define a quality liberal arts core education. We understand that higher mathematics should not stand on its own. The history of mathematics can be combined with literature and even politics, creating a well-rounded sense of the self. This well-rounded sense is consistent with the notion of a liberal education.

The transition between high school and college is currently not clearly understood by our children, and is often not aligned to the specific needs of the majority of individuals. Under served individuals have even greater difficulties. The schools are not preparing all students very well. A cycle of failure exists. The universities have not prepared the teacher core in higher mathematics. The deficiencies in mathematics teacher education might be addressed using deep learning methodologies. However, this is not our approach. Our approach is to aid the current generation of graduating high school students. In part because the current system demonstrates an inability to address the increasing difficulty, this aid must at first occur independently of schools and colleges. The administrative difficulties are considerable.

As the system begins to show positive and consistent results, we expect that school administrations will wish to participate in teacher continuing development programs specifically designed to alter how mathematics is taught in high school. This institutional effort is likely to focus on a small change in distance learning technology, rather than on taking the full step into hybrid classes involving a majority to time to be in-world. The change is merely to add digital note taking in traditional classrooms, while meeting half the hours in a traditional distance learning space such as myMathLab or Blackboard.

The *Bridge* resources will be opened up to these administrators as fast as they make requests to use the *Bridge*. We also expect to see many programs developed to support in-service teachers. However, the demonstration of results with the current generation of students is necessary as a first step. The crisis in education is extraordinarily complex, and our approach is made from a principled analysis of the systems involved.

Unraveling the causes of the crisis requires that we understand the perception that has created the belief that most individuals are not able to learn the core elements of basic

higher mathematics. Again we note the complexity of our analysis. We feel that this perception originated, in part, from an exclusionary behavior practiced by most American mathematics departments during the period after World War II. A review of the college catalogues shows that departments of mathematics developed inferior mathematics teacher programs for women. However, our approach is not powerful enough to address a deeply seated sense of selective exclusion. It is this exclusion that still accounts for the clearly observed orientation in the great majority of departments of mathematics.

Systemic Self Awareness

A new horizon has formed^{15 16} from which we may be able to see the next step in human governance. The step involves how humans are aware of the world. Digital encoding about individual experience is now possible a way that is similar to how the human brain works. Digital media usage is emerging. Although this step is not yet complete, we see that digital representation of individual experience is creating new pathways through which individual intention might be aggregated into coherent action.

Digital media is contributing to democratic practice and more. In this section of the *Bridge* proposal, we explore a foundation to individualized knowledge management in the context of the proposed virtual infrastructure supporting higher education. The *Bridge* infrastructure is designed to align expectations from graduating high school students with expectations from higher education. Over a period of self-observation the individual will be assisted in constructing a digital representation of parts of the learning experience. Individualized representation is then compared to social expectation as represented by the colleges and universities. The resulting alignment promises to raise the quality of life, here in the United States and around the world.

The digital world creates new possibility for the measurement of what an individual feels is normal. This measurement is critical because many students entering college-based learning support programs have behavioral problems, as well as profound life issues. The feeling of what is normal is not aligned with college expectations. They do not know what being a freshman college student is supposed to feel like. If this problem can be

¹⁵ 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.

¹⁶ Prueitt, Paul Stephen (2011) Systems Science and Service Computing, <http://www.servicetechmag.com/l57/1211-3> Published Dec 14th 2011, Service Technology Magazine.

fixed, in almost all instances, the crisis in American education will have resided.

Let us compare this possible outcome with the current outcomes. Currently students are selected for advancement based on a sense of fair competitiveness. But life is not fair to most students. This unfairness is one origin to the crisis. To believe that these individuals' performance should be evaluated once and for all times, and without proper remediation, is to fail society and the individual. And yet we do this, day in and day out.

The failure is accompanied by a specific philosophical justification for current learning outcomes. It is the belief of some educators that universal liberal education is not possible, nor desirable. So they are not looking to change outcomes. They believe that current outcomes are as good as we can expect, because most individuals are not capable of learning at the level required to be "educated". This is an old social problem. The new digital horizon suggests that this viewpoint can be and will be soon replaced with an enlightened educational philosophy. What is necessary is that something unexpected be presented, something that opens doors that are now closed.

A technical means to achieve self-measurement of the elements of normative experience is already developing within certain types of social media. As these technical means become better understood, we find programmatic applications appearing within school and college systems. Self-measurement of normative elements is possible via a set of methodologies and agreements. For example, a listing of what the college expects from the student might be used to orient the student as part of the freshman year experience.

We propose to establish supporting methodologies and agreements within the context of transitioning between high school and college. This transition period provides the opportunity if policies and procedures might be worked out. It is also necessary that a means to minimize cost is necessary if colleges themselves undertake the task. The virtual world provides low cost interaction environment within which to undertake a reconditioning of the sense of what feels normal.

An ability to compare individual expectation with social expectations, of various types, has become possible. It may be that a digital world is a better place for this type of work than is the physical college classroom. The possibility creates some challenges that are addressed by careful analysis regarding constitutional provisions. Because of the depth of perception into the individual is enhanced, political theory arising from governance

practices is relevant. The interaction between the individual and his or her society is of critical importance. The ability to compare expectations starts with the unique nature of the individual. The comparison is made within the context of a provision of liberal education. However, without protection for private interactions between the system and the individual; it is simply not possible to undertake a comprehensive program.

A balance is required. Whereas the individual has certain privacy, and related, rights; the benefits to that individual and to society to be gained from liberal education are significant. The ability to model individual expectations is linked to the possibility that learning of a positive nature will be advanced. This balance between individual and social interests must be made. Unless the system can ensure a high degree of informational security over these models, it is unlikely that these methods will be developed and applied to advance the cause of universal liberal education. The *Bridge* infrastructure will make this assurance. The experience by an individual, of the particulars perceived during instructional processes, are to be encoded into a strongly encrypted and compressed digital form¹⁷.

Social science has long used the concept of normative experience as a means to talk about various shared views of self. The commonality of these views defines sub-culture and other aspects of society. Whether as shared behavioral expressions of a family or a tightly bound community, we encode into our mind the expectations of the other. From this encoding we build our individual sense of what is normal. We are, in fact, bound together as human beings through our normative experience. Conflicts and cohesion between our various senses of the normal conditions our everyday experience.

The digital worlds create entirely new possibilities. These possibilities merge with increasing understanding, by science communities, of the physical processes defining the brain system. However, central to mutual enrichment between digital technology and natural science is a shift of viewpoint. We make the case, in other parts of the *Bridge* proposal that a specific viewpoint consistently extends from long held social and philosophical notions into deterministic science and into political and social science. The viewpoint creates specific barriers to universal liberal education.

¹⁷ Prueitt, Paul Stephen (2012) - "Digital Instrumentation and the Measurement of Experience" Accepted: 2nd International Symposium on Integrating Research, Education, and Problem Solving (IREPS 2012) included as a Focus Symposium in the 3rd. International Conference on Society and Information Technologies (ICSIT 2012), Orlando, USA, on March 25th - 28th, 2012

The reconciliation of a theory of human intention with these long held theories of causation seems to be under way. The classical viewpoint is often seen as consistent with determinism and with the notion that all cause and effect is reconciled in each moment. These classical views arise from two very different theories of causation, determinism and action at a distance. They struggle with each other while attempting to remain consistent with deeply rooted political and social beliefs. The possibility of a third way is often rejected as out of hand.

From our understanding a third way is seen. A partial advance is found in the use of organizational stratification¹⁸. We discuss stratification in other parts of the *Bridge* proposal, and in published scholarship¹⁹. This advance suggests a computing architecture²⁰. In fact, stratified architecture is demonstrating what is called knowledge management in the corporate world. More importantly, this advance has some grounding in the natural sciences. We believe that an evolution of digital management of human knowledge will come to better reflect evolving neuroscience. An entrenched political and social viewpoint might be released to be replaced by a new viewpoint based on modern science.

We review stratified theory briefly. Two categories of causative interaction are seen. The first category includes all classical interaction where conserved forces govern. These act within a single organizational scale in very predictable ways. The second category of causative interaction is from one organizational scale into another²¹. This category is not described easily, but it is where intentionality appears to be primarily rooted. Since organizational scales operate at vastly different time scales; quantum verses molecular for example, we open the possibility that delayed actions or action at a distance may be accounted for.

Intentionality may act from one time scale into other time scales. So the question for science becomes regarding how this happens in the brain system. This question leads to

¹⁸ Abrahamson, Mark (1979) A Functional Theory of Organizational Stratification." *Social Forces*, 3, 1979

¹⁹ 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

²⁰ Prueitt, Paul (2009) - "The Service Engine: Structured Communication using Modern Service Technologies" SOA Magazine, <http://www.soamag.com/130/0709-1.asp>

²¹ Conrad M (1995) Cross-scale interactions in biomolecular information processing, *Biosystems* 35: 2-3 157- 160

investigations about the neuroscience involved in learning²². One question leads to others, and eventually to practical concerns regarding our national crisis in education. How might human intentionality become both more empowered and guided by principles consistent with a social mandate producing universal education?

As perhaps anticipated by various authors in critical theory^{23 24}, the aggregation of intention via digital means will result in a refinement of democratic practice²⁵. A contribution to social coherence is through the production of positive social value from individual experience. This is certainly the purpose of knowledge management tools commonly found in large businesses^{26 27 28}. The *Bridge* proposal seeks to advance individual knowledge management and thus to elevate the individual capacity. We offer a hope that an alignment of individual expectations during the critical period between high school and college will be supportive of democratic practices.

Measurement of Normative Awareness

As we develop this technology, and the methodologies and agreements, certain deep questions are exposed. The most central is the measurement problem²⁹. Can the formation and persistence of norms be measured without that measurement causing changes in the norms? One might see this as a version of the Heisenberg uncertainty principle at a different scale of observation. This question is central because the core concept of democratic practice requires the state not impose on the individual without the individual's informed agreement. Normative alignment must allow the individual to agree that an alignment is personally desirable.

The incoming freshman college class has many normative feelings, such as the feeling

²² 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

²³ Stuart Sim & Borin Van Loon, (2001)"Introducing Critical Theory". ISBN 1-84046-264-7

²⁴ Charles Arthur Willard, *Argumentation and the Social Grounds of Knowledge*. University of Alabama Press. 1982.

²⁵ Habermas, Jurgen (1981) *The Theory of Communicative Action* From wiki: *The theory of communicative action* has challenged the Marxist focus on economics (alienated labor) as the determining factor of oppression. Habermas argues that the key to emancipation is rather to be found in communication that is in free moral discourses between individual and deliberative discourses amongst equal citizens.

²⁶ The literature includes many authors. At this point on our proposal, we must rely on the reader's background. However, the wiki references are always excellent.

²⁷ Prueitt P. (2005) . Global Information Framework and Knowledge Management; Part 1: Published November 8, 2005 by Datawarehouse.com

²⁸ Prueitt P. (2005) . Global Information Framework and Knowledge Management; Part II: Published December 8, 2005 by Datawarehouse.com

²⁹ Pattee, Howard (1992) The Measurement Problem in Physics, Computation, and Brain Theories. In M.E. Carvallo (ed.) *Nature, Cognition, and System,2*, Dordrecht: Kluwer, pp. 17

that to study outside of class is not normal. Students in learning support often say to professors, “your job is to make this easy for me, and you are not doing this”. Dress code and other normative behavior are often specifically designed to act out; e.g., to protest against established social norms. Students can and do act collectively to disrupt the sense of normality felt by the professor. All too often even the most compassionate of professors are not equipped to understand the conflict between normative expressions.

The situation is not simple. Some of these established social norms, in turn, might not be as positive as often represented by society in general. For example, a persistent sense of minority bias and elitism is built into our economic system. Television and entertainment media often project a negative norm. So the situation is complicated. Students have good reason to challenge some social norms. Perhaps it is in not challenging other norms that the individual fails to achieve the means to life a productive life. An agreement is not always easy to achieve.

In the *Bridge* virtual classroom, a self-measurement of learning will occur, and will occur in such a fashion that individual private data is strongly protected. How an ultra-secure data transmission is obtained is discussed in technical papers ^{30 31}. In essence, the segmented elements in dedicated data streams between avatars are parsed into categories indicating events relevant to the system’s self-measurement. These categories are substructural, and have properties that any life experience is representable as an aggregation of what are effectively “semantic” primitives.

Measurement tools can be used to provide a safe environment for learning. Event detection is instrumented as a core function of the system. For example, instances of or precursors to bullying would be automatically detected. This measurement is not invasive; however, because much of the measurement is under the control and within the responsibility of the individual student. An information firewall is technically consistent with the stratified nature of data processing. Individual records are maintained by the individual’s avatar, and when the individual completes the transition these records are no longer present.

³⁰ Prueitt, Paul S. (1996c). Semiotic Design for Document Understanding, in the proceedings of the Workshop on Control Mechanisms for Complex Systems: Issues of Measurement and Semiotic Analysis: 8-12 Dec. 1996.

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.

Informed agreement is necessary. Individuals must acknowledge the value of measuring normative experience as part of the agreement to use the *Bridge*. There is, however, a social expectation that information is protected and that information is used in well-specified ways. Moreover, event ontology may be specified to preserve only information that the community of *Bridge* professors has agreed is relevant to a measurement of learning. When measurement has occurred, it is also possible to let go of the data. Unlike school and college, once the student exits the transition program, all information about that individual is erased. Not keeping records is a very essential and non-removable feature of the *Bridge* proposal. Statistical data can be kept, so as to help the *Bridge* improve on outcomes; but this data will be missing all private reference.

Shifting Responsibility

The *Bridge* is designed as a transitional process. Students graduating from high school do not have expectations that are consistent with the requirements of college. Our focus is on assisting students with their normative feeling about learning. Specifically, the student's sense that deep learning is normal is to be enhanced. The methodology related to deep learning is discussed in the following sections of Chapter Two.

Deep learning creates an inner capacity to express skill and knowledge. Deep learning focuses on internalizing real knowledge of a curriculum. The *Bridge* transition curriculum is foundational, often without any prerequisites. It has many of the natures of developmental or learning support courses now offered at community colleges. A few foundational concepts are studied at a deep level. The result is that students learn how to learn, as well as learn what should already be known. The goal of the transition process is to remove the damage done by poor and incomplete instructional processes.

One of our first objectives is to shift responsibility for learning from the professor to the student. This requires that the student participate in learning, rather than merely watching the professor. Again the notion of what is normative is central. Many of the learned behaviors create barriers to learning college level materials. By the middle point in the transition, the student will have assumed responsibility for retaining knowledge.

The development of models as consequence from the digital social interaction has implications to a number of deep academic discussions about social theory. As a result of critical theory, the normative process in social systems is seen to create the means through which humans communicate with each other. Critical theory takes an additional

step by suggesting that democratic practice is enhanced when citizens exercise critical judgments based on shared norms. The *Bridge* technology allows the individual and the system to look under the hood, so to speak.

Digital media may be used to enhance the individual's role in this process, potentially giving the individual more control over various ideologies in which that individual is participating. We increase the possibility that positive democratic influence is manifest. Whereas we expect the positive development of normative experience in digital media, we focus in the *Bridge* programs on this realignment of the sense of self to positive norms required of a successful college student.

The higher level of learning taxonomy, such as evaluation and synthesis, are sought with a transitional curriculum that is foundational. "Why is this relevant to me?" This and other questions become common when deep learning methods are used. Deep learning methodology requires the individual to take more responsibility for knowing the self. A strongly protected digital profile is the enabling technology. A radical cost reduction provided by digital worlds can then be capitalized.

The Change We Seek

We are inquiring as to how to get the current system to allow us to make the change that is needed. One would think that the system would be seeking some insight into how to fix the global problem. However, this is not what is real. The system is busy defending itself. There is a lot to defend. Perceived educational outcome is publicly viewed as not being what is required. National competitiveness is one bottom line. In this measure of national health we are going into the red. Other measures are consistent with the assertion that the system has entrenched. The entrenchment separates the managers from the true reality produces by the system being managed.

We maintain that economic competitiveness is unbalanced because of our under focus on liberal education, and because of exclusionary exceptionalism. The system habitually excludes. Some time in the past this exclusionary selection, of the "best", stopped being merely a vestige of the past. It was coupled with the system entrenchment. The system itself became the cause of propagating a negative cultural feature, in which most people are excluded from learning. We may be prepared socially to accept multi-culturalism; but the entrenchment holds us from this goal.

Aligning our proposals to facts on the ground has been the focus of our analysis. Part of an entrenched educational philosophy is overly based on an unexamined, and false, concept of fair competitiveness. This is part of the facts that we face. All parts of the existing system is corrupted by exclusionary processes. However, we cannot create a new system that is completely independent from the old system. The current system is larger than anything we can imagine. Perhaps two trillion dollars, per year, in the U.S. alone is directly tied to educational delivery. The entertainment industry is even larger, and acts in a parasitic fashion with the education system. Advertising is often undermining education, and is itself a trillion dollar industry. And then there are those things that cannot be measured in monetary terms.

Old hatreds and superstitions often act in a unified way to undermine universal education and life long learning. Given how basic and how important education is we should not be surprised. There is no surprise that this current system would develop a sense of self and the resources to protect current practices? The protection is profound in specific ways. For example, if there is a potential breakthrough, such as real time handwritten message exchange technology; this breakthrough is guarded against. It is as if the system has its own intelligence. In a very real way, it does.

We are lead to a startling conclusion. The change we seek can be manifest only if our *Bridge* system has a better self-intelligence system, and is able to react to the current system's defensive mechanisms.

So how might we move forward and actually achieve the change we want to see? We again turn to systems theory, realizing that complexity is embedded in larger systems and have subsystems constraining what occurs. To change a current system, a large and complicated system such as the American education system, we must have precise models of the many layers of supporting processes. This cannot be done without somehow starting somewhere. We selected the transition between high school and college because we felt that here we might do the most good and have the least opposition from existing entities.

Change management principles suggest that a system is changed from the outside in only rare circumstances. Outside forces will cause uncertainty, as the system will attempt to pretend as if no new influence has occurred. For example, un-anticipated side effects are to be expected even if the outside intent is well meaning. Part of the

consequence of attempted change arises from the targeted system's reaction to the attempt. To reduce this affect, the intended change must work with causative forces involved in producing current system behaviors.

The approach must be holistic in nature. This requirement is met in the Bridge proposal by stepping back and obtaining a systems view of social causation³². The event model reflects the view and creates an operational means for a type of *Bridge* self-awareness. As will be discussed, we expect to use knowledge management principles, as well as a strategy that establishes a demonstration of social value. We have found a gap between high school and college, where this external force might be applied. And as this force is applied, we expect the system to react.

Some elements of the proposal are not surprising. For example, we assert that an over focus on testing may have distorted every aspect of the educational process. Testing is a means to require that individuals conform and exhibit obedience. This creates a natural resistance to deep learning programs. We propose that a deep learning method will be effective in changing student motivation. This learning method assists the individual in self-organizing an internally directed study of sets and arithmetic. The nature of the transition curriculum is discussed more fully in later chapters.

Monitoring and Mechanisms of Control

The *Bridge* will move a significant part of the interaction between professor and student into a virtual world with avatars. As we do this, we will maintain the sense of personal interaction and peer socialization found in the traditional classroom. The development of healthy self images will be assisted in monitored learning environments. A type of advanced knowledge management system, based, on concept maps, will be provided and taught. This will set the gold standard.

Why is it necessary to have monitoring? The answer is simple. Education now is a monitored process. Teachers and administrators have a public trust, which is honored as difficult tasks involved are addressed. Behavior in the classroom must be controlled for a variety of reasons. But as we have seen, control over education processes has not worked well for everyone. Specific deficiencies have arisen because the need to control

³² 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.

student behavior has been difficult to understand. What is understood is often difficult to administrate.

We are re-creating positive monitored and nourishing classroom activity using dedicated virtual world software. We start with open source software similar to Second Life™ and Reaction Grid™. We put into place a knowledge representation engine that helps in creating concept maps about any type of curriculum. We separate access to our technology from game technology and put into place strict use guidelines. Our repurposing of the existing software creates a next generation gaming environment, but without the games.

Teaching using games is not what we are proposing. Serious scholarship and a means to communicate is what we offer. But we also advance other capacities. The virtual worlds offer a simulation of real world phenomenon. In the game worlds, simulation is often not particularly healthy. Video games add very little to the individual's academic preparation. This point is important. Entertainment and education should not be thought of as being the same thing. And because of the self-interested power of the entertainment industry, we often make a mistake when educators enhance an improper correspondence in the minds of our students.

The problems in education are as profound as any that we know of. Many of our children are not completing high school. Many who do cannot pass the first college courses. A central problem is that these children do not take academic study seriously. They do not agree that their education is serving their interests. They see that an ideal is not being achieved for him or her, as an individual. This problem is entangled with other problems. Education is blind to most of these. We respond to administrative problems and all too often the solution to these problems works in the opposite direction.

Many of our children have lost faith in the system. For example, the need to standardize often produces programs that have various problems. Required coursework is often not the correct or relevant courses of study. College algebra is the best example. Why not have freshman curriculums on set theory, logic and probability? It is not that college algebra courses might be useful; it is that the students do not see them in a positive light. The way things are there is a struggle. Students are rejecting learning this material and the colleges are entrenching. An immovable object and irresistible forces are at work. But in this case, the system will not consider making the move that should

occur.

The statistics regarding high school completion are covered in many other books and talked about in some political circles. Repeating these statistics is not what *The Education Bridge* is about. We celebrate what the educational system has accomplished as we will focus on new pedagogy and methodology that shows us a better way. What we have achieved is a proper step to the next stage for human kind.

Science is also better developed today than yesterday. As we move our science forward we have a clearer understanding about the natures of human interaction. We see the actual affect of violence and excessive consumerism, from the mass media, on our young children. We might overcome these negative personal characteristics by advancing the ever-advancing science about consciousness.

In this new century, the science of how the elements of behavior are propagated will be more fully understood. We may apply what we know about social networking and combine this with new, publicly owned, Internet technology. We will “close the loop”, to create measures of learning outcomes and then show that various new learning principles, when applied, do make a difference.

The consequences of our actions are often left open to question. These questions are habitually un-answered. We sometimes fail to communicate, or to listen. We become all too often self-centered. Our institutions reflect this, as well as reflecting an imperfect history. As mentioned, this nature arises due to many factors. It has been part of the many crises all of the years of our life. We have each been touched, in positive and in negative ways, by the nature of governance and education. It is to these processes that we must expect to find a resolution.

The Education Bridge offers a specific hope. If we ground educational theory in natural science, we may define our terms well enough to distinguish from what are generally positive behaviors, from those that are not positive. We will work against certain trends supported by the mass media. For example, confusion may arise as advertising media attempts to, and often does, manipulate the viewpoints of an individual. This influence has created consequences that are quite apparent. But very little research has been developed that makes the actual causative linkages clear. The absence of research has its own set of systemic causes. Who is to pay for this research, the private sector?

The new *Bridge* infrastructure will pay for this research. It will provide a balance to the interest of the current system, in such cases. As the proposal is written, we seek one hundred million dollars so as to create the next generation virtual worlds software and a nationally franchised business. The business franchise is seen as a means to ground the virtual infrastructure to communities. It is also necessary that support for the emerging *Bridge* infrastructure be completely separate from political institutions that have so far not been able to bring the crisis to a conclusion. The plan is not set in stone; however, and most details are left to evolve. The point is that the economic value of the services that the *Bridge* is designed to provide is far in excess of the start up fund.

There are many reasons why we separate pure public sector function from hidden control by a few private interests. The first is that these interests have extreme forms of concentrated economic power. This power is not kind to the idea of universal education. The separation is argued for in the *Bridge*, using several points of view. For example, we point out that even in Darwin's pure competitive model, there are opportunities for collaboration and the formation of linkages between competing interests. We take a few steps further; however, and suggest that some type of preexisting order shapes the social sphere. Once structural mechanisms, for example in support of racism, are in place; these mechanisms cannot be set aside easily.

There is, from these statements, an indication of a theory about how social evolution occurs. The full theory is not revealed here. But we will address the concern we have that causative mechanisms are responsible for the crisis in education. It is possible that these mechanisms hid even from those most in support of the specific negative cultural phenomenon. They are structural in nature. We point out that support for racism continues in ways that are not found in models of a pure competitive economic system. So an issue of greatest importance is transparency. We have to understand the consequences of our behavior. The damage done though the vestiges of racism are profound.

Transparency is only one unresolved issue. The common model of a free marketplace does not address the absence of transparency over consequences from economic decisions. Real world evolution depends on anticipation³³. We act through anticipation,

³³ Prueitt, Paul Stephen (Oct 2004) "developing Anticipatory Responses from Thematic Analysis of Social Discourse: Responding to the RFP http://nrc.mitre.org/arda_explorprog2005_cfp.pdf and published at: <http://www.ontologystream.com/beads/nationalDebate/challengeProblem.htm>

and yet our science is incomplete. It is a complex phenomenon. The science about human anticipatory mechanisms has long been inhibited by mythology and superstition. A new stratified science is changing this condition but only slowly. We can simplify our analysis by suggesting that anticipation is linked to the sense of what is normal.

We expect what we believe to be normal. So if we come to feel that it is normal to not study and to turn a blind eye to the supposed value in mathematics and science education, this is what we anticipate. We create a self-fulfilling cycle. The students expect to not understand science and mathematics.

The destruction of our sense of normality by consumerism has been one of the outcomes of various fundamentalisms. This point is made over and over again in our arguments for federal investment. Something deep within our culture is keeping education from working. This deep phenomenon is often rooted in structural impediments blocking the natural desire to be educated. These impediments are in turn very likely reinforced by state laws and local legal practices.

Students often come to college class expecting to passively sit and receive passing grades. They say that they pay for the class and deserve to pass simply because they paid their money. Many college professors have accommodated this expectation. This is how the sense of normality is experienced. The system evolves under a generative process that re-affirms this bad sense of what is normal. The *Bridge* experience must re-align this sense of normality so that it aligns with the expectations of the best professors. Without a concentrated power this task will not be accomplished.

As we explore the chapters of *The Education Bridge*, we point out that many of our social processes do violate natural processes involved in maintaining a healthy society. For example, the problem derived from advertising, stems from the desire of suppliers to control demand. But some, like tobacco, ads are exceedingly deceptive. Like so many other issues, this concern is very hard to talk about. We come up against the argument that tobacco suppliers have the right and liberty to grow and sale this poison.

We must repeatedly state, in an explicate fashion, that there is a type of promoting that is merely communicative, and is forthcoming without intended deception. This is what education is, in its pure form. We walk a narrow path if we are to not mischaracterize all marketing; not something that we intend to do. Proper marketing is good. We just need to see how to make an exception, and yet this ability is subordinated by the current

system.

Education is pure communication informed by knowledge. It provides and talks informatively about what is supplied. It is full, and rich, but current practice is uncertain, always incomplete, and has uneven results. An objective view using systems theory has been needed for a long time. The type of objective analysis we supply has not been made public before now. The system itself does not support the development of objective understanding of what occurs in the school or in the college.

The battle to separate the nature of deceptive advertising from enlightened teaching is not one that is waged fairly. Educators do not understand the mechanisms involved in learning. This science is not made accessible to them. The art of advertising is far more developed than the art of teaching. There are practical consequences.

In particular we point to the challenges that deep learning methods have from the textbook industry. The acceptance of an authority, the textbook companies, over teaching is more favored than is the development of deep learning strategies. In fact, the requirement that a textbook be used is a first hurdle to our use of deep learning methods in college learning support courses. This issue is discussed in later chapters. Our point here is that deep learning methods turn all aspects of current classroom practice on its head. This is not by design, but is an indicator of how perverse the current practices are.

We may look at economic theory briefly, in order to get a perspective on what “advertising” is currently, and what it may evolve into. Advertising is not at its root bad. It has just not been developed with the type of clarity that might be expected from an advanced society.

Perfection is in the eyes of the beholder; yes this is true. We have made a deep analysis in which we seek to advance both liberal and conservative agendas. Nowhere is this more relevant than with the notions about advertising. To achieve free markets one needs to have transparency about the nature and origin of available products. Let the markets decide. Yes, let the markets decide. Advertising has a positive value in this context. But the current level of deception being created is systemic and pervasive. There is an unjust and unacceptable control by economic processes over all aspects of modern life.

The educational system may evolve so that one of its primary purposes is to give us transparency over the economical marketplace. In this sense, we find the need to understand when advertising is not truthful, and that education has in some ways, also, been un-truthful. More will be discussed about transparency as we introduce the technology aspects of the *Bridge* proposal. As mentioned, transparency must be provided to mechanisms that are anticipatory. The unique nature of an individual will be expressive to the degree that anticipatory actions are deeply informed.

Anticipation is linked in a natural way to learning. If we cannot anticipate we are not likely to learn the real lesson. We will not learning in a meaningful fashion. The learning will not be deep, and will not be retained. The value of a college liberal arts math class will be in passing the class, not in understanding the nature of self, society or the environment.

We envision a revolution in how society sees itself. The *Bridge* has un-anticipated technology elements that would bring a new kind of knowledge verification capacity to anyone using a cell phone or computer. With these new tools the individual will develop an ability to see transparently into the things of life, including economic decisions. This new capacity provides something new to the individual or to a social network.

To avoid negative consequences from behavior one must be a critical thinker and work very hard to gain a proper perspective. Currently it is often difficult to obtain the information one needs. Perhaps simply due to this difficulty we do things that are not healthy for the environment, or for oneself. Yet we all realize that many negative consequences exist, due to the way our economic and social system is set up. This situation, of course, has always existed. What is new is a means to change this specific characteristic of the social world.

The *Bridge* is proposed in a historical context. Throughout history we have lived in an imperfect world. At times this imperfect world was reasonable for a few people in a small area of the *Earth*. This condition has been a rare thing.

The central concern for us, in our lifetime, is the control of social processes by private interests for economic gain. This type of control does shift the origin of control to the few. The demand by the ordinary individual is not associated with anticipation that is under the control of his or her inner intentions. Our anticipation is shaped by a false normality. It is not the informed intent of the individual that shapes the flow of history. In

a pure sense, hidden social processes control this shaping.

The designers of the *Bridge* should not be misunderstood on this point. Many good and beautiful things exist because of our system of economic trade and transactions. However, the economic system is often the creator of unintended consequences that are negative. We must get transparency on these consequences so that they turn into positive outcomes. The evolution of marketing into something that has high-quality educational value is one pathway.

We are hopeful that this “system” will come to work in a sustainable way. But there are concerns. We conjecture about some of these, and we propose some actions. A transformative evolution will not happen until the crisis in education, in America, has come to an end. So we come back to our analysis and to the proposal that the *Bridge* be created, in a fashion that is consistent with principles laid out or modified from those in this book.