

## 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, but only one, sign of hidden failure. There are other signs. Common concerns, over competition from emerging economies, indicate the severity of these consequences. 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 on the practices that maintain it. There are few proposals that attempt to change the current status.

The Bridge proposal addresses root causes while defining a possible positive path forward. The suggested path is merely a straw man, intended to get a new discussion started, one based on new ideas. New ideas, if they are to be adopted, must have correspondences to the ways things are. Change management principles suggest that a system might only be changed from the outside in rare circumstances. Un-anticipated side effects are to be expected. Change causes uncertainty. The intended change must work with causative forces involved in producing all current system behaviors. The approach must be holistic in nature, and globally so. This requirement is met in the Bridge proposal by stepping back and obtaining a systems view of social causation <sup>1</sup>.

Some elements of the proposal are not surprising. For example, we assert that an over focus on testing may have distorted almost every aspect of the educational process. Testing is a means to require that individuals conform and exhibit obedience. How this distortion is maintained is complex and requires scholarship and thoughtfulness to sort out. The scholarship must overcome some aspects of the current system. These aspects support our scholarship, particularly in the discipline of professional educators. The causes of this support are indeed very complex.

The exposition of root causes requires a new narrative. The required narrative cannot be from one person. Good narrative requires a framework guiding the construction of a single narrative by many individuals. When used by many individuals, a new framework might unify effort, and thus might be an emerging behavior of a new system.

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<sup>1</sup> 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 story we describe is one that outlines causative forces, and a possible pathway to a solution to the crisis. The *Bridge* proposal is long term and long range. We seek to end the crisis in American education. Our outline leads to recommendations that emerge from an understanding of the individual and society. The proposal is in every sense transformative. It must also be generative. We need knowledge management and change management tools, freely available to educators and students.

Phase one takes eighteen months. We would develop a federally funded three-dimensional simulation environment. This software system would be dedicated to education, and individual knowledge of health. It would have a type of information security that is not even imagined in the current IT community. This security is a consequence from an organizational stratification of information parts, and is discussed at ReverseTwitter<sup>2</sup>.

Technology is not the only determinate of the security over private information that we seek. The *Bridge* functions are to be defined as public sector functions, protected by federal and state law. The right to be allowed education is thus deemed a human right, protected by the United States Constitution and our founding documents. This human right is characteristically violated. The success of the current system is not to be understated. But its failure is to be traced to cultural history and to certain human traits such as egotism and self-centeredness. Means to overcome these histories and traits are to be provided a social media supporting individually protected human communication.

The education functions of the new system must be held accountable by mathematically defined outcome metrics. These outcome metrics might be best developed using individualized knowledge management tools. Knowledge Management (KM) is a fully mature academic discipline, taught almost exclusively in graduate school. These tools have not been the focus of educational measurement for complex reasons. The single greatest reason is that the current system does not want to be measured.

Most professional educators deem the individualization of learning, and of testing, unrealistic. Those responsible for the administration of education have a mind set which has become unshakable over the past five or six decades. But there are other

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<sup>2</sup> Prueitt, Paul Stephen (published in the web, October 2010). "Notational Paper in Five Parts" published at [www.reverseTwitter.com](http://www.reverseTwitter.com)

possibilities, which we explore in this book. Immediate steps are taken. Part of what we propose is to provide an independent measurement of learning. Another part is to support universal transition from high school to college experiences. This transition is deemed of such great importance to our Nation, that we are willing to deliver public services supporting individual transitions. These services are not to have any third party involvement, so as to be consistent with current federal and state law.

The sum of all advanced parts of current social media is the avenue we take to achieve this measurement. Social media is to be equipped with a learning theory that is participatory and constructivist. This will decentralize the transition services to the individual, and the individual's interactions with the *Bridge*. The individual will develop an information base using this media.

A high level of information security will be provided, using an encrypting technology that is derived from advanced pure mathematics. As a matter of law, extended from current law, private third party interests will not be allowed to hold this information. Tools within social media will encode information about that individual's skills, interests and accomplishments. This information will be protected by law and by a stratified computing system with pure mathematical formalism serving the *Bridge*<sup>3</sup>.

### **Fifty Private-public Partnerships**

A new communication infrastructure is to be publicly owned and licensed to each of fifty private-public partnerships, one in each state of the federal union of the United States. The organizational details are only suggested, since we focus on pedagogy and the principles underlying open source digital technology. The partnerships must be created in each state of the Union. This requirement is due to our view about enumerated powers in the United States Constitution.

Phase two creates a new federal banking system designed to directly fund building and process innovations first expressed as design elements within this simulation environment. This phase could involve the development of rural American farming and green technology sectors. Again, the states must act independently unless the federal government deems the states as not serving the citizen properly. Again the enumerated

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<sup>3</sup> Prueitt, P. (1998). An Interpretation of the Logic of J. S. Mill, in IEEE Joint Conference on the Science and Technology of Intelligent Systems, Sept. 1998, NIST.

powers of the federal government play an important role.

The power to protect the individual human citizen from the flag of the state is thought by some to be an implicit power of the federal government. Phase Two will make direct loans to the individual human citizen from the state, or federal, government and thus the question of implicit and enumerated rights is relevant, always.

### **Why Must the Federal Government Act?**

Why is a new public infrastructure needed? The answers lie in the current system's failure to understand the nature of the crisis in education. The failure is complete. Those in the system focus only on a positive view of the education system. We have habituated a perceptual avoidance of root causes. The system does not see its role in the crisis. Our argument is that without a radical solution of the type we propose, the crisis will continue forever.

An organizational structure is proposed to support Bridge to Individual (B2I) interaction. These interactions empower the individual both directly through learning activities, as well as in developing a private information base regarding skills, interests and knowledge. If a public infrastructure of the type outlined is developed and finds economic stability, a completely separate system supporting learning will be in place. The infrastructure creates a separate measurement of learning and will place pressure on the existing system to affect deep change. The transition between high school and college is not owned by the current system, and is where the great disconnect current exists.

The federally funded infrastructure will be designed to support the individual directly. This infrastructure is to be developed based on an existing framework and on pure mathematics. Continuation of this support, beyond the eighteen months of the Phase One program, will arise from local control and use. The individual is the focus of the grass roots use of social media. The software merely enables this communication medium to exist in a lawfully protected mode.

Why must individuals make direct market pressure on schools, colleges and universities? The reasons include the fact that the system has failed. The pressure for change is not expected to arise from the educational system. Change must arise from the individual. The accommodation of status quo is so deep as to allow the system to

function as if it was wildly successful.

Focus on the positive is an essential “best practices” in education, so much so that clearly dumb circumstances are not discussed. There is a shallowness that is persisted in the face of the obvious facts about the failure. A singular focus on the positive is accompanied by a deepening self-deception. The system gets clever at avoiding the obvious and persisting the denial that the system has failed. System dynamics is really interesting and may be studied using differential equations, as will be further discussed in Chapter Seven. Models about system dynamics describe and predict system behavior. Using these models we see that the system reaches stable behaviors that are products of deeper levels of causation. These deeper levels of causation are then the point at which change management tools are to be employed.

It is easy to observe that teachers are often pretending to teach and students are often pretending to learn, all the while happily congratulating each other. An increasing number of students are not passing objective tests. Those who do pass the standardized tests do not retain learned topics. This fact can and is all but ignored. Student and faculty behavior has led to accommodation, and accommodation has led to consistent pressure to conform to behavior that is not comprehensible without an analysis of root causes.

The inquiry about why there is a crisis may be re-focused by mutually admiration. It is said that we do well, given the circumstances. We sell education using this positive and excusatory focus. “We do the best we can.” It is said. There is a “truth in advertising” issue, one that is seen in all aspects of our life, but most profoundly within our educational processes. Self-congratulation feels vital to those in the system, but creates an absolute inability to address, or even to recognize, the mounting hidden harm to most individual citizens. Nowhere is this harm seen more clearly, than in the freshman mathematics class.

The harm to our society as a whole is accumulative in nature. As it has accumulated the nature of the harm is more and more hidden. This self-congratulation nature is expressed in social trends and in a continuing high level of social acceptance of commercialism and powerfully expressed intentions of media and education corporations. Self-deception has become systemic. Power reinforces power. Those in the system find a means to require co-workers to recognize a positive focus while

ignoring social reality. The pressure not to rock the boat becomes even greater when the system shifts into a defensive mode.

### **Who Owns the Problem?**

One central feature driving the deepening crisis might be the nature of our social concepts about ownership. Dangerous waters are entered, in talking about ownership. We must explore this possibility with great care. The notion of private ownership is one of great importance; having great intrinsic social value. The intrinsic value derived from the common notions about ownership is everywhere present. However, this notion also has a profound negative impact on many aspects of individual life.

Ownership is complex, and involves concerns. The notion of land ownership should not be placed into question. Private land ownership is a central tenet of the American experience, and leads to our musing about a Phase Two. In Phase One, a significant part of one hundred million dollars is to be spent developing open source software. The "People" will own this software, in a public fashion. Rather than being owned by third party private interests, the software is to be controlled by academic activity in colleges and universities. This is possible because of a mature social activity that has been developing open source software for decades. A community of developers currently maintains vast amounts of open source software.

Of the total funds for Phase One, we propose an expenditure of 60% of this amount for software development. The money will be used to pay open source community members for time spent coding out pure computer science, from a framework derived from existing design specs. These design specs are based on pure mathematics, and are thus exempt from private ownership. How this exemption is to be managed is a topic that we address in the chapters of this book.

The Bridge proposals bring into question the ownership of publicly used software, while establishing a bridge to increased private ownership over productive lands. Foundational elements of well specified essential topics from pure mathematics are discussed at the web site for [ReverseTwitter.com](http://ReverseTwitter.com). The discussion about intellectual property is changed due to the means through which we propose to develop new concepts and new reduction of these concepts into specific computable processes.

While necessary, the nature of ownership creates layers of private and public concern.

Ownership is often the cause of social value. For example, private ownership of land, by human individuals, creates the sense of community cohesion. Much of the harm experienced by us humans in our modern society is due to an absence of this sense of cohesion. To close an eye to this harm is to not deal with modern social realities. To look carefully, we see that human communication is essential to developing the vital sense of community cohesion. The only viable social position to take is that software must not allow third parties to own the social media.

We separate the social and cultural issues related to physical land ownership from ownership over the concepts founding pure mathematics, and expressed as software. As some thought is applied to separating the various concepts about private or public ownership we see that the concept of ownership is more complex than the simple notion of property ownership. Many concerns are structural in nature. The structure is both the same in each circumstance, and different from one circumstance to another circumstance.

Ownership concerns are often seen in debates regarding software ownership. Software ownership concerns extend similar concerns from the natures of land ownership. The use of markets to drive the price of land ownership up was one of the root causes to the financial collapse of 2008. With a deconstructed notion of ownership we find that a renewal might redevelop some parts of our notion of ownership in a positive way. The *Bridge* makes a proposal to convert some areas of “federal” lands to private ownership, while governing the nature of this land use. A distributed 3D simulation world will copy the real world. Simulations of possible actions in the real world will come from this “virtual real world”. The simulation of proposed changes in the real world will be easily accessible to private parties. These parties will navigate knowledge representation so as to form communities. This navigation generates information that is protected by current law. The legal aspects of the proposal are explored in the chapters that follow.

### **Ownership over Human Knowledge**

Ownership is often applied to structural difficulties, because these difficulties create economic processes, such as employment, that depend on the continuation of specific structure. Employment creates value by overcoming difficulties. The problem is that the value generated is not always “universal”, in fact most value is local value. Local value is what is traded in most localized economic exchanges. Over time, new structures are

created and then obscure root causes. The local value becomes “hidden value”. This is almost nowhere more true than with the American college and university systems. The concept of ownership over basic knowledge is used to make firm rules through which individuals must follow to be successful. These rules are not perfect.

In the American academy, the institution of educational structure has created a self-sustaining reality. This reality excludes specific types of innovation and excludes them as a central focus of the system structure. Many in the academy do not see the problem as being owned by them, and there is truth in this perception. Perhaps because we use a selective memory, the faculty and administration of the schools, colleges and universities do not accept responsibility for the obvious failure. Parts of the problem are owned, but in a way that is not informed of larger issues.

Systemic behavior trumps individual intention. The educator’s role is undermined, because society has not found a common agreement over basic questions about content or pedagogy. It has been easy to shift the blame, to parents or the television, and to ignore evidence. “I do not see what the problem is” is often heard from administrators and faculty. For example, many mathematics departments focus only on the few students who wish to major in mathematics. The service courses have been watered down and a culture of under performance is accepted.

A culture has developed in which the faculty members are allowed to “own” the effort to train mathematics majors, but they do not to improve the service courses. However, with decreasing mathematics majors, the service courses pay the faculty members salaries. A dysfunction is established. General systems theory makes it clear why these systemic behaviors persist, in spite of what individual faculty members may wish to express. The concept of ownership is central to systemic analysis.

### **The Identity of Self**

We take the position that the continuing crisis in education is rooted in the identity of self. Specifically as children mature, self-identity becomes confused in a number of specific ways. This is stated in *The Education Bridge* as a conjecture. The conjecture is rooted in a three-decade study of disciplines contributing to a specific type of systems analysis. The analysis is difficult to follow, so every effort is made to be clear and to help the reader see the space between the issues.

Even as a conjecture, it has been hard to present evidence within professional communities involved in the educational processes. The first statements about this conjecture were made in 1984. I was a graduate student teaching at University of North Texas. I begin to understand how odd freshman student behavior was. They were not interested in learning the curriculum; even then. For me, mathematics was something lovely and almost sacred. But this was not how the students perceived it. As I was to come to understand, the conjecture was equivalent to the idea that the system was designed to fail. To succeed in providing true universal liberal education would impact the social and economic realities enforced through various strong forms of the concept of ownership. The change caused by this impact is resisted.

In the first chapters of *The Bridge* we are going to look closely at this conjecture. We will make some observations about why students are not interested. For many reasons, the incoming freshman students are confused about the value of education; and the value of traditions. But who is confusing the students? While this is an interesting question, the fact is, the question cannot be answered in a simple way. The confusion is very hard to isolate and it is very easy to over generalize. The confusion arises from the complexity of these issues related to the various natures of this concept of ownership.

We have suggested that we must look to the natural science if we are to understand the nature of the confusion. Neuro and other regulatory mechanisms must be involved, of course; as well as social mechanisms. If we attempt to tease out knowledge about these mechanisms we realize how little natural science we have regarding the nature of self-efficacy of the individual or about the inner dynamics of a social network.

We must extend this science if we are to gain clarity. How this extension might be done is then coupled with the general problem that we envision being addressed by the proposed three-dimension simulation infrastructure. This infrastructure might provide glue to a grass roots movement. A top down information core might be established based on a focus topic decomposition of college level liberal arts curriculum. So the pieces seem to be in place, if only we might put them all together.

*The Education Bridge* if funded would create a fifty state digital infrastructure supporting American college and school learning. New science is to be extended from future interactions between professors and students. On the other hand there are surface understandings, primarily about the liberal arts topics, that also must be carefully

presented. For example, many of our children are learning on their own, and not learning what is taught in schools, colleges or universities. The use of a virtual learning infrastructure supports a number of public functions, including secure health information exchanges and educational processes. These may be combined into a general resource now available to the individual without cost, or with minimal cost. The benefits to society would seem to support the notion to the start up costs for the system, if these cost were kept minimal, might be managed by federal and state actions. The continuing cost would then need to be supported and we propose how this might be done.

The development of healthy self images might be assisted using fully monitored learning environments. But why is it necessary to have complete monitoring? The social need seems clear enough, and education now is a monitored process. The teachers and administrators have a public trust, which must be honored. We are simply recreating a monitored and nourishing in classroom activity using dedicated next generation gaming environments, but without the games. Teaching using games is not what we are proposing. Serious scholarship and a means to communicate is what we are developing. This point about our work, not being learning by entertainment, is important.

Many of our children are not completing high school. The problem is that serious study is not taken as serious. Required coursework is often not the objectively correct or relevant course of study for that one individual. So students lose faith in the system. 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 will celebrate what the educational system has accomplished; note that there are problems; but primarily, we will focus on new pedagogy and some methodology that may show us a better way.

The goal is to end the crisis. So let us get some focus on our approach. We may start by suggesting that it is not the children's fault. It is also not the fault of the poor and under served. We must face facts. Our vision, as educators, for our students is not complete, and is often not consistent. The message we convey is not always clear. The harm that we do, through the educational system, is as profound as the positive values we also sometimes impart.

We have; however, the tools that we need. We are simply not using what is available. Science is also better developed today than yesterday. So as we move our science

forward we have clearer understandings about the natures of human interaction. The science of how the elements of behavior are propagated will be more fully understood. We will apply what we know about social networking. 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.

Not merely for those of us in the education sector, but for all of us; we are as yet imperfect. The consequences of our actions are often left open to question. We sometimes fail to communicate. We fail to listen. We become all too often self centered and 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. For example, confusion may arise as advertising media attempts to, and often does, manipulate the viewpoints of an individual. This influence has created a consequence that we see in the poorly, and under prepared status of entering college freshmen. The consequence is quite apparent but very little research has been developed that makes the actual causative linkages clear. Who is to pay for this research, the private sector? The public sector must provide a balance of interests, in such cases.

We see in this question one of the many reasons why we might wish to separate pure public sector function from hidden, or disguised, control by private interests. This 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. This shaping may be in ways that are not found in models of a pure competitive economic system. The issue is transparency. Transparency is only one unresolved issue that our model of a free marketplace does not address very well. Transparency depends on anticipation.

## **Mechanisms of Control**

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 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.

Education is pure communication informed by knowledge. It provides and talks informatively about what is supplied. It is full. It is rich. But current practice is uncertain, always incomplete, and has uneven results. The type of objective analysis has not been made so that we as educators understand the mechanisms involved in learning. The art of advertising is far more developed than the art of teaching.

We may look at economic theory briefly so as 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 a perfect society. Perfection is in the eyes of the beholder; yes this is true. But 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.

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. We also need to understand 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. 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, and the new tools. This capacity provides something to the individual or to a social network that has qualities of the neural

and immune function in individuals.

## **Demand side to Our Purpose**

To avoid negative consequences from our behavior one must be a critical thinker and work very hard to gain a proper perspective. Currently it is often very hard 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.

Throughout history we have lived in an imperfect world. At times the world was reasonable for most people in a small area of the Earth. This; however, has been a rare thing. The central concern for me, in my lifetime, is the control of social processes by private interests for economic gain. This type of control does shift the origin of control. The demand by the individual is not by his or her inner intention. It is not the informed intent of the individual that is what shapes the flow of history. In a pure sense, social processes control this shaping.

A “system” has been developed. Many good and beautiful things exist because of our system of economic trade and transactions. However, the system is often the creator of unintended consequences and consequences that are negative. 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. This 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.

The demand side needs to come into existence and to play an active role on our economic system. For this to happen, the individual must have knowledge of the world and knowledge of self.

This observation, about the causative relationship between the crisis and the imbalances in economic, political, social, environment and all other systems, leads us to the Phase II of the proposal to the White House. Phase I is to expend 100M in federal dollars so as to create the social network and software necessary to create the *Bridge*.

In this Phase, to start eighteen months from the beginning of the funded period, we suggest that the President and the national congress establish a dedicated banking system. This system will support direct loans from the government of the United States of America to individual (human) citizens. How the funds would be dispersed would be made clear in the infrastructure's first deployments. However, the funds in Phase II would be created using a specific public-private partnership. This is unlike Phase I where the total budget is allocated and spent in its two primary tasks, in eighteen months. Phase II is to settle parts of the lands now owned by the federal government, we the People, and to use the natural resources in new ways. These means are to be sustainable, economically, environmentally and culturally.

Without getting ahead of our exposition, we just state that the three dimensional virtual worlds allow the construction of models of buildings, landscapes, machines, processes and social interactions. What is required, and what is promised, is a pure public sector infrastructure where local governance is expressed and various means to influence governance is aggregated and propagated. All of this is designed to support governance and education without the hidden agenda of private interests.

We express our work on these issues, as a proposal to the President of the United States. Why is this done? We take the time to justify our answer. The mechanisms through which the crisis in educational practice was established are discussed all through the chapters of this proposal. We will also examine the question as to why this predicament continues. The answer indicates that focused effort is needed if the educational crisis is ever to end.

The technology we propose cannot develop without the level of funding we have identified. An extensive review of the technology and costs associated with developing a next generation immersive Virtual World (iVW) infrastructure has lead to a cost estimate of around one hundred million dollars. This is Phase I. It is critical that this expenditure be done with the right motivation. The technology must be not owned by corporations and must serve the public interest exclusively. Money alone is not sufficient, however. We also need to find the necessary scale of social activity. These two requirements are facilitated only if the natural science is fully developed. We turn to natural science as a guiding force, rather than to a 'free market' economy. So we return to the concerns we all share with others about mathematics and science education.

## Education and e-education

Education is becoming e-education. Increasingly on-line teaching is occurring. There is more learning and teaching on-line to come. This does not mean that we will show our children that we understand their digital world. We cannot do this. They understand this world far more than we will be able to, in this lifetime. There is a new generation that will shape things in ways that we cannot imagine. Paradoxically, it will move away from the impact of being digital, by fully embracing virtual worlds, and linking this embrace to well-defined and scientifically grounded, response pedagogy. This is enabled by the 'demand theory' developed in this book.

The definition of "demand pedagogy" is the central intellectual task of this book. The task is complex and has many parts. Understanding the neuroscience is part of the task, to be communicated. Understanding the pedagogy is another part. The task of integrating those two parts with a third is discussed in the next section.

A model of social behavior is suggested in Prueitt's autobiography. This model is a delineation of a framework on the aspects of human intention. It is extended to include how intention is gathered into social behavior. The stratified theory developed by Prueitt is put to good use. The language in the theory, including the notion of reification of category is essential.

We will use the term "reification" to talk about any specific accumulation of many unique aspects over a set of categories representing the social and individual behavioral phenomena. This is a method developed from Soviet era quasi axiomatic theories. Logics from J S Mill and C S Peirce will be used to frame the functional aspects of reification<sup>4</sup>. This aggregation of aspects of the particular into a universal; e.g., an abstraction, construction leads to emergence of new category, or the reinforcement of old category. Human memories and human anticipations involve local and non-local phenomena. An induction emerges as thought. Clearly this induction is "learning", in a general sense. For demand theory to work as pedagogy the mandate of the individual must be clear. Our science on this process must also be clear. Manipulation of this plea will induct social phenomena. This manipulation creates behavioral traits that block the

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<sup>4</sup> 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

learning of natural science, computing theory and mathematics.

The emergence of individual and social behavior is often without a compensation for all consequences. So it is by appealing to a grounded understanding of human intention that we define a balancing pedagogy. Supply side theory is provided with demand side theory; then we are able to talk about how to balance these two very different natures. As we do this we must also seek efficiencies in the cost of education, as well as metrics on the increase in satisfaction that citizens find from earning college degrees.

### **Three Lines of Battle**

*The Bridge* proposal focuses on three lines of battle. *The first* is the pedagogy that asks the individual to take greater responsibility for learning. *The second* is the methodology through which human knowledge may be encoded digitally. *The third* is the technology that must not be ownable by any thing or anyone.

E-governance will revolutionize the relationship between the individual and governance. Jane Fountain, at Harvard, gives the history of these programs in the United States in her excellent works. This history will not be reviewed in the *Preface*, and will only be viewed as part of the background in the chapters of *The Education Bridge*. Part of the reason is that some of the original work is still classified. The history is complex in how ideals and self centered behavior clashed. What we do know is simple.

The e-governance program was created by direction of President Clinton in 1996. Since then an expenditure of over eight hundred billion dollars has been spent under the direction of federal Office of Budget and Management. Most of these funds were simply given to IT corporations as a form of corporate welfare. All but around four hundred million dollars were spent during the presidential terms 2000-2008.

Fountain details how over 80% of these federal funds were used to obtain consulting services with a few well-entrenched IT corporations. According to her and to many others, this consulting activity has been a parasitic process. As we are not focused on the negative, we may now remark that eight hundred billion dollars has yielded some positive consequences, particularly in the resilience of the open source software movement. In a well-documented deception by IT corporations we see the same nature as what we see regarding some specific failures of the educational system. We are manipulated by a "system" that is seemingly more powerful than we as individuals are.

This system is the machine we have created. We may now delineate the natures of this machine and evolve a new system. *The Education Bridge* is the necessary infrastructure needed to accomplish this task.

The many positive consequences reified by a machine provide an avenue to returning intentional capacity to the individual; including faculty and administrators, as well as students. *The Bridge* proposal traces out a plan, including the three lines of battle. The evolution of immersive Virtual World platforms will be discussed in the next section. As we will remind ourselves often, all three battle lines must be advanced at the same time.

A summary is in order. We have many positive consequences from our school experiences. Our society is blessed to have many elements in school experience involved in creating diversity within a sense of comfort. The great struggle with school boards has been to normalize one's cultural histories. So we teach "one" Texas state history, in Texas. We teach Georgian history in Georgia. Much of this normalization is valuable to the individual and to society. The struggle is to provide more diversity to our histories. *The Education Bridge* would classify this type of strong normalization to be a form of mono-coherence. We link mono-coherence to neurological science and to cultural fundamentalism. The *Bridge* is designed to assist individuals in becoming multi-coherent in their thought behaviors, to see the other side and to appreciate cultural diversity. For us, this is what being an educated person in this century will entail.

What is essential now is to get pure natural science around why there is a crisis. As we develop an objective view of what governance and education are in 2010, we must be very clear. Enormous benefits arise from our system of education. We do many things correctly. So the foundation is here for a positive extension of the current educational experience. But extend, we must. We propose to extend in a simple fashion. We wish to balance the now, overly supply oriented, economic system to one with automatically aggregated demand based on the digital representation of (many) informed individual intents. What this means and how this is accomplished is the focus of the *Bridge* proposal.

We propose to use what has been gained but also to balance how it is gained by something that is in many ways "opposite" from what we now do in school. Our common way of thinking does establish the principle that paradox is an indicator of something not perceived rightly. However, sometimes paradox is an essential nature of a real model of

the real world. So we argue that common thinking leads to a deep and profound error, in some specific cases. We thus reject Occam's razor from classical logic, and create a situational ontology using the work of Mill and Peirce<sup>5 6 7</sup>.

The difference between a mono-coherence view of ontology and a multi-coherent view is now clear. Situation and differential ontology has a representation of the paradox<sup>8 9</sup>. Science becomes purely observation based, and the current National Science Foundation's view about the nature of scientific theory is challenged. The new theory will be called "stratified". What happens at one organizational scale may have a logic that is "situation" and not comparable to the logic fitting over other scales of organization. Moving a selective attention is then a shift from one mono-coherent view to a different mono-coherent view. We will discuss the neuroscience regarding this shift in some detail in later chapters<sup>10</sup>. The role of the frontal lobes in selective attention is discussed in the literature<sup>11</sup>. This reversal in the methodology of natural science has been difficult to define, but there is now a complete description of how this might work.

A specific new language has been developed in order to explain 'demand theory' and how it applies to pedagogy and to the technology we will propose to reveal. A note, here, is useful about our use of language. The economic language regarding "supply and demand" is essential to a discussion about a generalized theory. This discussion leads to an offer that we measure the processes, and thus gain transparency on the nature of the positive and the negative, which will form. an oppositional scale. Therefore, these dimensions may manage conflict between humans.

Sometimes this conflict is due to cultural histories. So education is the path to good self-governance as well as a path to a better educated work force. The average person may

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<sup>5</sup> Prueitt, P. (1997). Grounding Applied Semiotics in Neuropsychology and Open Logic, in IEEE Systems Man and Cybernetics Oct. 1997.

<sup>6</sup> Prueitt, Paul S. (1996d). 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

<sup>7</sup> Prueitt, P. (1998). An Interpretation of the Logic of J. S. Mill, in IEEE Joint Conference on the Science and Technology of Intelligent Systems, Sept. 1998, NIST.

<sup>8</sup> 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.

<sup>9</sup> Prueitt, Paul S. (1996) Optimality and Options in the Context of Behavioral Choice, in D. S. Levine & W. R. Elsberry, Eds. Optimality in Biological and Artificial Networks?, Erlbaum, 1996

<sup>10</sup> . 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.

<sup>11</sup> Levine, D. & Prueitt, P.S. (1989.) Modeling Some Effects of Frontal Lobe Damage - Novelty and Preservation, Neural Networks, 2, 103-116.

become educated enough so that as individuals they are equipped to address interpersonal conflict, and thus rise above the current political divide. The comparison between what we call mono-coherent and what we call multi-coherence is essential.

Multi-coherence insists on there being a perception of what is situationally correct rather than a statement of absolute correctness. The perception is a projection from a greater reality, and is not the only perception that may be considered correct. So we see our conflict over perceptions in this light.

So where are we in history? We have an entrenched educational community in crisis. We also have an employment crisis. These are social phenomena, and the solution lies within the preview of good governance. Because state and local governance has failed, it is necessary for federal government to step in.

*The Education Bridge* would step in with a strong work force development focus on the decentralization of the ownership of what are now under the control of very large corporations. We will achieve other goals, but this one goal is a significant one. We establish the goal to homestead vast public lands where decentralization and off the grid technology may be used to support resilient and green living. This conversion of ownership over land, from the state and federal control to individual human citizen control, is precipitated by the modeling power of the immersive Virtual Worlds, like Reaction Grid and Second Life. A new horizon is here to be discovered, and to manage for the benefit of our children. We then have a chance of turning over a social infrastructure where citizen centric challenges may be undertaken. As we do this we will have mature knowledge management tools available for collective decision-making by the communities involved.

### **Immersive Virtual Worlds and the Second School**

So let us be specific. We propose significant sums, totaling one hundred million dollars, of federal funding be used to extend the open source realXtend code base<sup>12</sup>, and to create a network of community centers, two for each state. These bricks and mortar buildings, and the business that will grow up around each center, will support all maintenance costs for a next generation immersive Virtual World (VW) system. The start-up costs are reasonable when compared with any of the programs now supporting

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<sup>12</sup> The realXtend code base is the open source code base on which Second Life and Reaction Grid depend.

national education reform efforts.

The “EducationWorlds.com” branding may be developed so that people will know about the *Bridge between High School and College*. Once this is established, continuing funding will be generated locally as a function of community centers, and for-profit franchises that are proto-typed by the two centers. Two centers per participating state will prototype a bakery, tea and coffee shop, where significant telecommunication capacity will be open to the public. In each state, the community center will be franchised with the branding Second School Bakery, Coffee and Tea Shops Inc <sup>TM</sup>. These businesses will be supported by the national project to form a business co-op in each state.

The *Bridge* is to be a fully monitored and dedicated peer-to-peer iVW system. Due to public ownership over all of the code-base, very high levels of information security are available. Monitoring is to be via a two level stratified semantic engine using reverse Twitter, a form of semantic technology<sup>13</sup>. Because of the development of intelligence technology, this monitoring capacity exists today. The capacity may be found in expensive; e.g., \$250,000 per year site license, large IT contractor form. However, advances in semantic extraction software is inhibited by the bottleneck caused by the incumbent technology sector<sup>14</sup>.

There are more pure and more accurate forms of the intellectual property that current software vendors claim to own. Because this capacity is consequent from what scholars have published into open source, the *Bridge* may adopt the rule that the grid software remain as it is today; e.g. open source. The inclusion of new knowledge management software can be made open source because the work is published and innovations needed have not yet occurred. The plan is to create an innovation path that is different from current owned technology and is superior in nature. This will be disruptive of some IT corporations, particularly those involved in consulting for the United States federal government. This is not the intended function of the planned iVW infrastructure, but merely a consequence.

The branding, Second School <sup>TM</sup>, EducationWorlds <sup>TM</sup>, MathPedagogy <sup>TM</sup>, etc is

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<sup>13</sup> Reverse Twitter technology and branding language is being revealed from the web site [www.reverseTwitter.com](http://www.reverseTwitter.com).

<sup>14</sup> On the nature of incumbent bottle neck see : Bresnahan, Timothy; Yin, Pai-Ling, “Reallocating innovative resources around growth bottlenecks”, Stanford Institute for Economic Policy Research, Discussion Paper 09-022. July 2010.

designed to create an economic platform so that the federal government does not itself own the software elements. The ownership will evolve to state and local government. To the one hundred community centers are entrusted the financial supports for the continuation of the *Education Bridge*. With legal incorporation instruments, the *Bridge* makes itself available for local community development. A form of Rosetta Net<sup>15</sup> community interaction model is to be adopted.

How does demand pedagogy work? It is simple. The intent of the individual is expressed in regular formed templates. These regular forms are, collectively, a three layer computational ontology within a computing system designed to assess the skill and capacity of an individual high school. The templates are the containers in which focus topics delineate the elements of agreed on curriculum. For example, one of these templates might be composed of a list of topic names or phrases, sufficient to “cover” the semantic space associated with a specific curriculum. These templates are focus topic frameworks, as discussed in great detail in the following chapters.

These concepts are foreign to the current educational authorities because our educational system is not “deep”. However, our purpose is to develop an understanding of how templates may be used in a natural way to exercise individual demand. Of course, students will learn from practice how to interact within the *Bridge*. This learning experience is part of the training that does occur, often from each other. The concept of peer learning is given a proper content in our plan. We plan to learn how focus topic based knowledge management may allow individuals to develop life long learning as well as the ability to demonstrate, at any time, knowledge of curriculum learning in the past.

Within the VW system, existing capacity spreads so that hundreds and then thousands of schools, colleges or universities open virtual world models of individual campus. In spite of the large sums of dollars that will be spent on lesser solutions, education worlds may be set up now, for as little as a web site and URL name would cost. Less than a thousand dollars will provide the open source code base, and one individual staff

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<sup>15</sup> “RosettaNet member companies represent \$1.2 trillion dollars in annual revenue, and transact billions of dollars in transactions within their trading networks using RosettaNet Partner Interface Processes (PIPs). RosettaNet PIPs allow trading partners of all sizes to connect electronically to process transactions and move information within their extended supply chains. The community is comprised of talented resources that provide thought leadership across multiple segments. These resources work together to develop standards that simplify increasingly complex supply chains”. From: <http://www.rosettanel.org/>

member is sufficient to form a professional relationship with the open source code development community. Given a free training process, the faculty and students will quickly develop the college or university campus model, including the interior of classrooms. Registration could, for example, take place in a 3 D game environment where students would have a better understanding of choices.

The URL [www.educationWorlds.com](http://www.educationWorlds.com) is now reserved as a focal center for new education worlds. The *Bridge* will offer services to those college and universities who wish to contract with it in support of recruitment and retention. Metrics will assess skill and capability within the *Bridge* activities. Once a critical mass is achieved, say at around 10% of all eligible individual citizens, the entire education Worlds' grid will transform K-12 and colleges and universities. This is the plan.

The VW-based model equips a new generation of educators, and also provides a path to new economic development. The *Bridge* is a work force development program, to be funded by the federal government. The proposal is that young people would design and then move into new green living ecosystems. The federal government would finance this movement of young, and old, families into new living centers. How is this to be achieved?

The current realXtend code base is free and is easily set up on a personal computer server. A system of digital immune systems is to be established and the security of information is to be deeply protected. The digital immune tools are genetically and differentially encoded into each dedicated VW. The genetic encoding of a localization of the computing backplate allows any VW to communicate with any other VW in the hypergrid. However, this is done using completely self-monitored data streams.

With a system of digital immune systems', monitoring of the education worlds may be shown to be complete. The technical capability is here today and the *Bridge* could be set up even before the eighteen months required to build a computing backplate, as designed by the Bridge founding committee. We are ready to go.

The design of new technology in VWs is in line with work force development. If the *Bridge Project* is successful, some of our children may return to an agrarian society. This group will pioneer in the development of small decentralized, off the grid, farming communities. There could be exploration and settlement of parts of our world where we have not gone before. For example, the design and building of deep-sea communities,

where the community will use the stability provided by deep sea water pressure. Underwater communities may be designed, and models created in the three dimensional immersive virtual worlds.

The real world will be modeled in VWs. In one model remote farming communities, high in the mountains, are connected by light rail, and monorail. All aspects of life in the high mountains valleys of the Rockies, or the cold plains of Montana, or South Dakota may be modeling in a virtual real world. This will be one objective of the training found in the Second School™.

Those who are employed by the *Bridge* will assist each young person in the development of a model of individual self. This self-discovery is the essential concept of a second school, the first school being what we have now. The two schools should balance each other and evolve into an educational system that is not in crisis.

### **Organizational Stratification, the Key Concept**

The glue that holds together the complex themes of this book is the concept of organizational stratification. This phrase will occur often. For example, from an understanding of this occurring in nature, we propose a new computing architecture be developed, and a specific methodology for learning. There are principles that are common to the computing architecture and the pedagogy.

We suggest that a powerful capacity be developed from a simplification of computer and information theory. This capacity is well aligned with natural science. The reason why the stratified architecture is simpler is because the reuse of code is not driven by a drive to gain competitive business advantage. Rather the design principles are derived from scholarship.

In a very brief hint as to what we mean by the phrase “organizational stratification”, the assumption is, that each human has a private interior that is separated by a “gap”. Some scholars call the gap the Cartesian gap<sup>16</sup>. The interior of the image of self has an organization that is hidden by the structural stratum that we are familiar with. We are familiar with this gap from our personal direct experience.

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<sup>16</sup> Prueitt, Paul S. (1996b). 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.

The advent of education based on scholarship about learning will assist the individual in understanding the inner self and how that inner self might be tuned within a healthy community.

## Preface Two

### How This Book Is Organized

**Chapter One: Our Purpose** develops intellectual constructions that we use to fully explore what is now called “demand theory”<sup>17</sup>. **Chapter Two, Shifting Paradigms and New Resources** provides a complete overview of the entire book. **Chapter Three: The Nature of the Problem to be Addressed** frames the difference between current educational policy and educational practice, and an alternative paradigm. These three chapters make the argument that current work in educational psychology may be corrected and a new paradigm agreed on.

The effort is to bring best practices forward through a deep philosophical analysis and then to ground these practices in modern natural science. 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. We will be selective in our choice of advanced knowledge management tools. Statistical models, the mythology of artificial intelligence, and hidden negative behaviors will be exposed. The new paradigm will be student centric, and controlled by the individual in a life long learning process. We will celebrate the unique nature of each individual, and through this celebration we will allow the individual to again become the center of our political processes.

We use a knowledge of management type technology, based on substructural frameworks, as discussed in **Chapter Four, Illustration Using a Focus Topic Framework** and **Chapter Five, Generalization and Application to Other Disciplines**. **Chapter Six, Technical Discussions** further develops technical issues.

The challenge we have in these three chapters is to motivate the use of current Virtual Worlds (VWs) based on consistent principles seen in the natural science. A new pedagogy and a knowledge representation approach is described that uses ontology formalisms. The case is made that principles seen in natural organizational stratification inform us as to how a virtual public communication infrastructure might be developed. We then propose to place very advanced knowledge management tools, such as those

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<sup>17</sup> Prueitt, Stephen (2011) “Systems Theory and Our Education System, submitted (July 5<sup>th</sup> 2011) to the Hudson Institute

described at ReverseTwitter.com, under the hood of a next generation 3D simulation world infrastructure called educationWorlds.com.

The central conjecture is natural capacity for learning is strongly inhibited by the current mass education system in the United States. Movement to universal life long learning is provisioned by the pedagogy, the representations of curriculums and by infrastructure supporting the use of virtual classrooms with avatars. A new pedagogy is based on rebuilding the capability as children matriculate in the current K-12 system. The pedagogy has its roots in the R L Moore learning method<sup>18</sup> and in Prueitt's study of cognitive neuroscience and systems theory<sup>19</sup>. The two traditions are merged in the form of a "lifting pedagogy", as discussed in Chapter Seven.

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. The perceptual system itself is interfered with as the humanities, science and mathematics are, often poorly, presented without acknowledging individual creativity and interests. We suggest that evidence for this conjecture is measurable, using methods from neuroscience, in the majority of Americans. The results of decades of educational crisis affect our capacity to remain competitive in evolving global marketplaces.

**Chapter Seven**, *The Lifting Pedagogy* develops 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. We may regain lost national capacity. **Chapter Eight**, *Applied Research on Mechanisms Known to be Involved in Learning*, outlines the natural science and mathematics preliminary to the application of science to educational theory.

## **Self-directed Learning and Cultural Identity**

Local governance and local control over education is a part of our national sense of health. Localization, in turn, is not merely geographical location. Tribal American culture has been dispersed, for example. Virtual governance systems have potential application to establishing secure cultural repositories. So the concept of local control over education takes on some new meanings. What do we mean by "our" community? We

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<sup>18</sup> Parker, J (2005) *R. L. Moore: Mathematician and Teacher* (Mathematical Association of America)

<sup>19</sup> 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

have a new answer.

The proposed infrastructure is to be based on a secure, self-monitored, and locally controlled immersive Virtual World (VW) platform. To achieve 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.

Public ownership over decision-making is a central objective. This objective 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. Demand technology 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 created by the community as a whole. 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 and thus that the results may be examined and understood without theoretical detail.

There will also be a bricks and mortar infrastructure, based on a market based business model. The Second School Community Center <sup>™</sup> 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 conception may not be precisely how things work out. We consider the development of the Second School <sup>™</sup> 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 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 VW secured? What does it mean to have monitoring and how is local control to be expressed? These are important questions that will be answered. The text of the chapters to follow will describe how new Internet based 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.

The principle is that a non-owned communication platform itself 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 specific fashion. 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. These networks 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 individual student is conducted within well-defined norms. Regulatory rules govern information exchanges within the community of professors and administrators.

It is expected that an 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 not proposing something that is not already happening. And in fact there may be a certain type of inevitability to dedicated virtual education worlds. Essential world platforms dedicated to education are rapidly being developed. Each month new groups begin to make partnerships involving K-12 teachers and college professors<sup>20</sup>. In 2009, the activity related to college, university and school activity in Second Life<sup>21</sup> 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.

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 public sector? Will this be good for our American society? These many issues are identified and will be

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<sup>20</sup> Kapp, Karl; O-Driscoll, Tony (2009) Learning in 3D: Adding a New Dimension to Enterprise Learning and Collaboration. Wiley publishers

<sup>21</sup> We will discuss at a later time the limitations if we were to use Second Life.

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? It is not 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 the 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. These models can and should leave behind much of the specifics of the instance. The analysis of particular instances produce a reified ontological model, as will be discussed in Chapters One and Two of the *Bridge* proposal. The positive use of this technology would insure 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 Constitutional principles, 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 here is that human nature would trend 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 transition will produce overall positive results. However, we can 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 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.

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 prototype a class of individually centered e-governance services. **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 world<sup>22</sup> 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 logic. We 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, particularly in Chapters One and Two. 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. The paradox between these two qualities is embraced only with a profound knowledge of nature.

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. A direct current circuit operates at only one temporal scale.

The principles of stratification create a new order of scale. The change is barely anticipated unless one looks carefully. We believe that total world economic flow might increase an order of magnitude, while reducing the unnecessary side-effects that create an imbalance in so many social and environmental structures. What we see is that **power and control might be decentralized while at the same time the individual**

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<sup>22</sup> Education Worlds, under development (2010) [www.educationWorlds.com](http://www.educationWorlds.com)

**might be aided in finding fulfillment in activities that are less consumer oriented and more oriented to healthy living.**

We have thought a long time about how to represent this possibility. Metaphor is sometimes used as well as simple models. Perhaps the reader will visualize a circle with energy all going one way. This is a simple model of direct current. An historical parallel may be used to illustrate a principle. Edison attempted the task of lighting a city with direct current, until Tesla showed that this could be done far easier with alternating current<sup>23</sup>. The difference is the same as what we are proposing when compared with the existing supply side educational system.

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. 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 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 to an 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. Empowering the individual creates additional capacity, and if this capacity is channeled towards individual fulfillment the results may be a reduction in over all conflict. If capacity is not recognized then an increase in conflict 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 not

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<sup>23</sup> Margaret Cheney, Robert Uth, and Jim Glenn, "Tesla, Master of Lightning". Barnes & Noble Publishing, 1999. ISBN 0760710058.

sustainable. The potential for non-sustainability 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 theories<sup>24</sup>. 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 enlightenment<sup>25</sup>. The problem is that economic theories are often extremely polarizing, and the truth if one can say there is a truth is difficult to get at.

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 capacity<sup>26</sup>. Achieving greater capacity for supporting human population is only one aspect of a more complex consideration, since population growth may also swamp any potential capacity.

Education that is humanistic is a necessary component of a decentralized economic system. A new social/economic reality may be on our near term horizon. 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. 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 educational system.

## **Education, Communication and Democracy**

In the Bridge proposals, we state a strong assertion. Underlying that assertion is a working principle. In a democracy there is a critical role for a well-focused pure public

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<sup>24</sup> 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](http://adsabs.harvard.edu/cgi-bin/bib_query?arXiv:cond-mat/0002374)

<sup>25</sup> 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

<sup>26</sup> Daly, H. and Farley, J. 2004. *Ecological Economics: Principles and Applications*. Washington: Island Press

sector, and in particular a sector that serves the goal of universal education. **Our problem has been that the public sector has not had the tools needed to perform its job.** Inadequate tools are only part of the problem. We have not educated the educators well in mathematics. Our social system has inequalities that impact most of us. 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.** Teachers might 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. This possibility is in particular very exciting, because the individual becomes more independent from the system and is able to take responsibility for life long learning. There is a history to the circumstance, and this history brings us to a new point. New communication mediums are now possible and with this possibility is a means to improve or degrade ongoing social transformations.

The requirement, it seems to us, is that a virtual public communication infrastructure be developed. We propose that this arrangement is already under development as open source software. Such software supports business activities such as Second Life. What we are seeking is the means to focus and refine an effort to extend and perfect this technology. 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 education 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. We understand 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 developed<sup>27</sup>. 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

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<sup>27</sup> This task requires less than eighteen months, with proto-types available immediately, and a code development budget of sixty million dollars.

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 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. The individual is 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**

Underlying the *Bridge* technology is a realization of the type of stratification one sees in the natural world. Data structure is represented as components and computer applications are compositions. The relationship between a small set of components and all possible compositions mirrors the relationship we find in physical chemistry between atomic element and all occurring chemicals. This has two important properties. The first is that physical processes are represented in natural ways so that the modeling of complex processes, such as ecosystems' support for living processes, is as easy as can be. The second is that the component information assists the owners of the virtual realms to look into the supply chain in natural worlds. This could be achieved through the use of BIM (Building Information Model) standard<sup>28</sup>.

Pedagogy is revealed in the chapters of *The Education Bridge*. The foundation for it is seen in a new information technology and in natural science as having a Tesla like feature, involving stratification into focus topics and compositions. This brings the individual into a communication medium where learning and the exchange of knowledge is not controlled, except in ways that serve public values. This interchange is instrumented in various ways, including self-monitoring using intelligence tools now only used by corporations and governments. The selection of what social values are, is via democratic processes.

Stratification may be discussed from many different points of view. The explanation will always be the same, the set of observables are described using descriptive words or phrases. This set of words or phrases are culled over as the community attempts to get a minimal set of focus topics, having the property that any discernible may be discussed using a subset of the topics. The discussion is then a composition from the components.

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<sup>28</sup> BIM wiki: [http://en.wikipedia.org/wiki/Building\\_Information\\_Modeling](http://en.wikipedia.org/wiki/Building_Information_Modeling)

We see this in the service-oriented architecture underlying the iVW grid, as well as in the nature of buildings that are designed and built in the virtual education worlds.

In fact, the reward for having an independent public sector could be an economic system where capital formation is allowed to work optimally. For example, the innovation of an individual arises from his or her understanding. This understanding might be enhanced by good education. However, the insight may in fact be something that is not understood by those in the educational business. Insight into how some problem, something needing innovation, might be resolved arises when an individual understands the problem and has the ability to follow through. Good governance enhances this ability by providing for means to declare an innovation as having unique elements and deserving of recognition.

In the virtual education world system, individuals or communities would develop separate iVWs where models of natural reality are available for manipulation, redesign, discussion, or marketing. Each of the dedicated iVW will have self-monitoring using an ontology extraction tools kit designed by leading scholars and made available.. Each will also use BIM standards for describing the supply chain creating the components used. The system will then also be connected by information flows and knowledge accreditation processes. The governing board will award certifications as well as university degrees.

In the American traditions we have both public and private universities, colleges and schools. Our proposal would not change this. However, a public infrastructure for all sixteen, seventeen and eighteen year old American citizens is proposed. This is the first functional objective of the proposal. However a number of steps are required to achieve this goal. Even partially implemented such a public infrastructure would be the great leveling of the playground and of innovation markets. This leveling is to be enhanced by focusing on minority communities in the initial work.

There is considerable labelling language around the concepts discussed in *The Education Bridge*. The grand vision presented is that all high school students would be entitled to come into a monitored virtual world, called the Second School™. It is then the governing body for the virtual education worlds. It will provide balance to the supply nature of the current educational system, what might be called the “First School”,

which is what we have now. The Second School arises from the application of three

aspects of a theory based on natural science. These aspects are, methodology, pedagogy and technology.

### **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 the assumption is correct this disability, once established, has neurological and immune system roots<sup>29</sup>. These roots, if the supposition is correct, 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 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 ignore 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 just 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

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<sup>29</sup> Prueitt, Paul S (1988). *Mathematical Models of Biological Systems Exhibiting Learning*, PHD Thesis, The University of Texas at Arlington.

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 not right 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-to-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 students<sup>30</sup>. 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

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<sup>30</sup> Nathan, M. J. & Petrosino, A. J. (2003). Expert blind spot among preservice teachers. *American Educational Research Journal*. 40(4), 905-928.

my early research<sup>31</sup>. The cognitive neuroscience is also discussed<sup>32</sup>. 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 literatures<sup>33</sup> may in fact enhance the harm being done.

When we have used the new pedagogy, a modified R L Moore method<sup>34</sup>, 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 is felt. Faculty members trained in the old ways, the First School, are always distrustful and are so 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

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<sup>31</sup> 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

<sup>32</sup> 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.

<sup>33</sup> 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.

<sup>34</sup> 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).

on students to not learn more than 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 overwhelmed. The nature of how students are confronted is 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 that 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. How this is proposed to occur will be developed in the main body of *The Education Bridge*.

The problem with grade leveling it 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 not capable 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 curriculum<sup>35</sup>. Some speak of the grade leveling as a financial issue, and point to the scarce resources society has to spend on education.

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<sup>35</sup> 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.

## 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 open<sup>36</sup>.

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, 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

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<sup>36</sup> Bloom, Allan. 1987. *Closing of the American Mind*. New York: Simon & Schuster. [ISBN 5-551-86868-0](#)

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.