

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

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Chapter Three

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Transformative Mechanisms

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. Our goal is simple. 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. We realize that new processes must be generative and supported by a grass roots movement. We have a role for entrepreneurs and business models. We know we need knowledge and change management tools, freely available to educators. A communication system and deep learning methodologies must be available to educators, and through them to hundreds of thousands of individual students.

Phase one takes eighteen months. If funding is provided, we will develop a next generation three-dimensional simulation environment. This software system is to be dedicated to education, and individual knowledge of health. It will 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. The technical details are sketched in our proposal.

The *Bridge* functions are to be defined as a public sector, protected by federal and state law. The right to education is deemed to be a human right, protected by the United States Constitution and our founding documents. These natural rights are violated on a regular basis. 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, that might be best developed using individualized knowledge management tools.

Most professional educators, today, judge 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 possibilities, which we explore in this book. Immediate steps are taken so that this alternative is demonstrated. What we propose is to provide an independent

measurement of learning, and to support universal transition from high school to college experiences. This transition is deemed of such great importance to our nation, that we the citizens of this great nation are willing to deliver public services supporting the individual.

The sum of all advanced parts of current social media is the avenue we take to achieve individual measurement of deep learning by high school students. The media is to be equipped with a learning theory that is participatory and constructivist. It will decentralize high school to college transition services to the individual, and their interactions with the *Bridge*. The student will develop an information base using this media, which will be owned by each person and thus may be used to demonstrate capacity.

A high level of information security will be provided, using an encrypting technology that is derived from 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*¹.

Fifty Private-public Partnerships

Because we have focused on pedagogy and technology, most of the social organization details are not worked out. Some goals are agreed on. It seems reasonable that a new communication system 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. In each state, the infrastructure is to be funded by a franchised speciality shop. Virtual worlds will be used to design new economic processes and to support innovations in new marketplaces; including manufacturing. These organizational details are only suggested because they are not fully developed. We have focused on pedagogy and the principles underlying open source digital technology. But the political and economic considerations are as important.

Certain things do seem to be necessary. We feel that private-public partnerships must

¹ 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.

be created in each state of the Union. The partnerships should focus on a community centric tea, coffee and baked goods franchised business. One or two teleconference rooms are to be included in the business model, where students will be introduced to the virtual infrastructure and to the principles of deep learning. The development of fifty state centered support structures is due to our view about enumerated powers in the United States Constitution, which play an important role in how we expect organizational details to be determined. The *Bridge* is designed to establish a strong presence in the education sector. But in order to do this, it has to be developed separately from the existing system, and has to find economic and public support via a business model.

What happens after the first year has to be considered carefully. A radical change in entering college students' perception about higher mathematics has the potential to change everything. Student employment after college will be enhanced because of the development of a new business sector and because students will know the technical details needed to participate in this sector. For example, Phase Two could create a new federal banking system designed to directly fund building and process innovations first expressed as design elements within the three dimensional simulation environments. This phase could involve the development of rural American farming and green technology sectors. Manufacturing of new types of devices associated with sustainable farming could snowball into a virally developed new economy. The national debt might be decreased as individuals pay back the direct federal loans and create new wealth that would not have otherwise been created.

In the previous chapter we addressed briefly the issue of ownership, particular the positive nature of a distributed ownership of land by the individuals living on that land. Virtual worlds could be used to encourage the spreading out of dense urban populations, while creating sustainable living systems. Designs for new living systems will be not only sustainable but will have the potential to clean the atmosphere and water. Somewhat like the Oklahoma land rush, a federal program might be designed to turn over federal land to build new communities. This process would tap into individual entrepreneurship, decentralize land ownership, and produce the expectation that the American Dream will be renewed.

The underlying thesis of the *Bridge* proposals is that our economic system, using the power of fundamentalistic notions, has directly harmed the great majority of individual citizens. There has been great value also created. However, we are at a tipping point in

history. State government is often the instrument through which fundamentalist power is expressed, often in the form of racism or simple egotism. The power of money corrupts the democratic process. The power to protect each citizen from the flag of one of the states is thought by some to be an implicit power of the federal United States government. Our systems analysis suggests that the states are often involved in a concentration of power that enhances various fundamentalisms.

The *Bridge* infrastructure must be immune from corruption by the current system. A type of predatory capitalism, as discussed in the previous sections, has subordinated the vitally important concept of American exceptionalism. This is why our economy funds pervasive pornography, television media that is sick and overly focused on the negative, and the war on drugs. Capitalism is used to concentrate wealth for a few, using any means possible; including the deceptive practices in which our government has taken us into one war after another war. This misuse of the, so called, free market place is most effective in creating an educational system, like the one we have in Georgia, that is designed to fail all students.

The pretense is that “average” students cannot learn higher mathematics. This pretense is what the child learns in school, in Georgia. Deep learning methods have the potential to assist the individual in rejecting this pretense.

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. There is a self-deception of the American public by our system of education. Those in charge, habitually focus on a positive view of the education system. There is much to focus on in this respect. There is also a blind eye that is aided through the presence of various forms of collective fundamentalism; economic, religious, national, racial. Selfishness and egotism rounds out the powers that re-enforce this blindness. Educators have habituated a perceptual avoidance of root causes, and do not see own their 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. This interaction is individualized and virtualized. It is aided by advanced knowledge management tools and by the renewed hope that education will matter to the individual. It will empower the individual 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 higher learning will be in place. The infrastructure creates an independent measurement of learning and will place pressure on the existing curriculum to affect deep change.

The transition period between high school and college is not acknowledged by the current system, and is where a great disconnect exists. This is where the current system is the weakest, as measured in its ability to prevent reform and renewal.

A federally funded infrastructure will be designed to support the individual directly. The technology will be developed based on an existing framework and on pure mathematics. Continuation of federal support, beyond the eighteen months of the Phase One program, will arise from local control and use. However, the student is the focus of a grass roots use of the new social media. The software enables a communication medium to exist in a lawfully protected mode. The medium changes the nature of the game by allowing the individual to demonstrate academic success independent from the system.

The accommodation of status quo is so deep as to allow schools to function as if they are wildly successful. If an alternative means is developed, so that the individual might learn and develop evidence of understanding, then these individuals will make direct market pressure on schools, colleges and universities. The reasons include the fact that the system has failed, and the pressure for change is not expected to arise from it. Change will arise from the students, themselves.

We need advanced tools to model what has happened and why. For example this focus on the positive is essentially a "best practice" in education, so much so that clearly ineffective circumstances are not discussed ever. There is a shallowness that has persisted in the face of the obvious facts about the failure. This singular focus on the positive is accompanied by a deepening self-deception. The educational system has become clever at avoiding the obvious and persisting denial that there is failure. Thus the possibility of the system evolving out of the failure mode cannot occur. The utility function for system evolution is captured in this protective mode.

System dynamics is really interesting and may be studied using differential equations, (as will be discussed later), where models will describe and predict its behavior. Using these models we see that a system may reach stable behaviors that are products of

deeper levels of causation. A mature natural system will develop protective mechanisms. These mechanisms can be discovered and once discovered can be the point at which change management tools are to be employed. The analysis we have completed suggests that the protection mechanisms are so powerful and pervasive that only a concentrated power from outside the system will be effective. Of course one never knows.

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. This is one of the mechanisms that must be avoided. In fact this mechanism also protects the current system from serious outside tutoring programs. The system creates the impression that only it can address the problem “faced” by the student. This problem is then re-defined as “passing the course”. Over time, this mechanism is being undercut by the call for outcome metrics. An increasing number of students are not passing objective tests. And those who do pass the standardized tests do not retain learned topics. This fact can and is all but ignored. A second mechanism works to explain why there is failure. This mechanism creates the false belief that “most are simply not interested in higher mathematics”, by creating a false perception about what is higher mathematics.

The inquiry about why there is a crisis is re-focused by mutual admiration and accommodation. 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, and is hidden. A self-congratulatory nature is expressed in social trends and in a continuing high level of social acceptance of commercialism and powerfully expressed intentions of public media and education corporations. Self-deception has become systemic. Power reinforces power. Those employed by the system finds ways to require co-workers to recognize a positive focus while ignoring social reality. The pressure not to rock the boat is extreme because the system has shifted into a defensive mode.

Who Owns the Problem?

One central feature driving the deepening crisis is the nature of our social concepts about ownership. However, dangerous waters are entered in talking about this concept. We may explore a number of the concerns, but with care. Feelings run deep. Let us start with some agreement. Land ownership has intrinsic social value, of course. However, this notion also has a profound negative impact on many aspects of individual life. For example, ownership over the resources required to prosper can become overly concentrated. Moreover, the justification for this concentration is often well supported by moral arguments based on positive cultural traditions. We see here one of the dangers. These arguments sometimes hid certain deeply held racial, nationalistic, egotistical or selfish perceptions.

One finds a moral argument associated with an exceptional view of reality. The argument justifies a monopolization of ownership over resources. On the surface this viewpoint feels correct to those who have economic power and this sense of being exceptional. But does the viewpoint take into account everything that should be taken into account? Or does the moral arguments let the mind make exceptions that deny real consequences.

The concentration of economic power may also be accompanied by intellectual agreements that serve both the concentration of wealth as well as various similar senses of exceptionalism. For example, the power may be aligned with the wealthy through a common agreement regarding racism. History may reveal many instances where the poor accommodate the belief that wealth and Godliness are the same. This contradiction might be explained by the power of exceptionalism to hide some types of truth.

The principles of neuroscience may be used to understand the sense of exceptionalism. This science tells us that a phenomenon arising from brain function is involved in making individuals feel comfortable with a sense of coherence. There is; however, a possible distortion of individual perception from the phenomenon of coherence itself. Coherence excludes facts that do not cohere with the central belief system. Separating positive and the negative facts is a difficult challenge, and when an extreme sense, when exceptionalism controls the mind, this challenge is obscured. In the extreme case, we believe something because we exclude evidence to the contrary. We may make

inferences that are not consistent with external reality, but is consistent with our belief.

We are aided in overcoming this challenge if more of the population actually has access to a higher education experience that works for the individual. An understanding of higher mathematics could serve this purpose, if the curriculum in college mathematics were shifted away from what most individuals see as useless topics. The nature of the curriculum might be changed in certain ways, which we will discuss in a following chapter. A direct focus on the foundations and philosophy of mathematics might be more useful intellectually. This focus would convey what abstraction is, and how formal systems serve the individual and society by creating means to reason about specific instances of relevance. Creating, or re-creating, barriers might result in a deeper motivation.

Mathematics is now most often taught as a means to exclude individuals from gaining insight into those things that have powerful economic consequences. We feel, and have evidence to this conclusion, that wealth is used to exclude under served communities from actual understanding of higher mathematics and the sciences. The foundational principle of the Bridge is that a transition should open access to a perception regarding the value of abstract thinking. In other words, we see a liberal arts study of mathematics an introduction into cognitive science, social science and economics.

Educational experience should open the eyes to the reasons why many different cultures have a sense of exceptionalism. For example, much of what is positive in the American experience comes from the consequences of American exceptionalism. But the failure of the system also arises in part from a false belief in extreme exceptionalism. The understanding we hope to impart is that there are many cultures and that there are many views about what good culture is. The positive value from respect and advancement of one's own culture can be lifting up, while exposing negative values from racism or nationalism. Multi-culturalism is properly celebrated when we are able to appreciate other folk's values.

Exceptionalism may create a perceptual blindness to true value through selective memory. For example, the mechanisms of exceptionalism will sometimes create a sense of positive self-esteem regarding one's artistic capabilities, while defining higher mathematics as something that "naturally" one is not interested in. Mathematics avoidance becomes part of the sense of being exceptional in artistic talents. We can

illustrate this in several other ways. “American” exceptionalism may be seen in a positive light, while a nationalistic tendency turns a blind eye to the damage caused by our many wars. The exceptionalism of an entrepreneur sometimes does not see harm caused by the business process. In these illustrations, as in all others, the feeling of being exceptional creates a boundary between what one judges to be correct and what one judges to be not correct. This judgment is often illusionary in nature.

Before retuning to the notion of resource ownership, we should develop a simple rationale for specific educational experiences leading to an understanding of mental coherence. The topic will be addressed in later chapters, also. The rationale is seen in a simple statement. We believe that the ability to shift attention is curtailed by too much “exceptionalism”. When exceptionalism becomes extreme, the person becomes a fundamentalist. Fundamentalism can and does lead to social actions that are very harmful to the self and to human society.

The need to overcome all forms of extreme fundamentalism is identified with a learning objective. A specific part of the *Bridge* transition curriculum is designed to expose the nature of multi-coherence by increasing the skill and understanding of elementary number theory over number systems having more than one positional notation base. Simple algebra problems are solved with the arithmetic rules governing one positional notation base, and then we compare how this is done with the arithmetic rules governing a second, and different, positional number base. Shifting from one coherent perception to a different coherent perception, about simple accounting type problems, leads to an informed perception about how the brain system supports human perception. This informed perception is then one of our learning objectives.

Shifting from one viewpoint to another actually creates an ability to make judgments based on reasoning skills. For example, the idea of land ownership, in the United States, 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 Two the individual who has qualified by obtaining a college degree, is allowed to design some part of a virtual world. The purpose of this virtual world is to develop prototypes that if built in the real world would, in a measurable fashion, increase the quality of life and do this in a sustainable fashion. A distribution of land ownership then becomes a social objective, and a ideal which works against an aggregation of wealth into the hands of a very few.

The role of the individual should not be controlled by only by current economic private interests. Some sort of “public sector” has to balance the current over concentration of wealth. The marketplace should have a role in selecting economic value, but only after there is a leveling of the playing field.

Leveling the Playing Field

Having the *Bridge* in place begins to level the playing field for the many minority communities who until now still suffer from purposeful economic displacement. 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. We are already very close to having this type of social resource in the social media marketplace. The next step is a small one. It 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. However, we have a technology framework that is not currently integrated with this 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, as employees, for time spent coding pure computer science. An existing framework derived from an existing design spec. These are based on pure mathematics and are thus exempt from private ownership. The details will be discussed in the following chapters. A strategy is seen, however. The *Bridge* proposals will bring into question the ownership of publicly used software, while establishing a connection to increased private ownership over productive land.

While necessary, the nature of ownership creates layers of private and public concern. We must be clear in how we place value on the pure concept of ownership, which is often the cause of positive social value. For example, owning land, by human individuals, creates the sense of community cohesion. Much of the harm experienced by us 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 togetherness. The only viable position to take is that the way that the *Bridge* software is developed must not

allow third parties to perpetually own the social media.

There is a clear demarcation. We separate the social and cultural issues related to physical land ownership from owning of 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 abstract concept or ownership is more complex than the simple notion of property ownership. Many concerns are structural in nature, and is the same in each circumstance, and different from one to another. We just have not yet developed the scholarship in a clear fashion.

Our concerns are often seen in debates regarding software ownership, which extend similar concerns from the nature 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 ideas about American exceptionalism in a positive way. The *Bridge* makes a proposal to convert some areas of “federal” lands to private ownership, while governing the nature of its use. A distributed 3D simulation world will copy the real world.

The possibility of types of economic and cultural reality in the real world will be developed and explored in a “virtual real world”. The simulation of proposed changes will be easily accessible to private parties. Individuals will navigate with knowledge representation tools so as to form communities and, therefore, will generate information that is protected by current law. The legal aspects of the proposal are explored in the chapters that follow.

Ownership over Human Knowledge

This section addresses a difficult problem. It is one that is hard to define. We may create an analysis about this problem by looking in two stages. The first stage asks the following question. Is there ownership over human knowledge? Seems like a simple question and the answer is yes. But this answer is conditional, since sometimes ownership is acquired as a public property or ownership is vacated. This is in particular true for something like the United States Constitution.

Because of the conditional nature of ownership over knowledge, we consider a second stage in our analysis. In this analysis we focus on the relevance of various concepts about ownership and related concepts about responsibility. Our analysis uses systems

theory about our economic and political processes. Specifically we look at a broad range of issues related to private control over certain types of exploitive economic processes.

When is ownership problematic for education? Does anyone own the literary heritage of humanity; for example, the branches of pure and applied mathematics? What about database algorithms? What about literature? When new literature is created, how long is it private property? When literature is appreciated, is there a partial transfer of ownership? What about the situation where discussion does inspires someone to see a new technical possibility. Suppose later a patent is filled. Can the patent restrict other parties from developing the natural consequences of the original insight first communicated by these other parties?

Responsibility arises because of some degree of ownership, and yet there is the possibility of disconnecting ownership and responsibility. We may, for example, create a corporation that legally owns properties but that has a limited legal responsibility. Public institutions also acquire both ownership and responsibilities. Schools in some sense acquire ownership over, or guardianship, of children as part of a social contract. With this transfer comes the requirement that responsibilities be defined clearly. Student codes of conduct and laws governing rights and responsibilities of schools arise from this guardianship.

Clearly part of the crisis in education has arisen from an incomplete legal address of rights and responsibilities. The development of clarity is restricted because of absence of a capacity to perceive as well as active inhibition of this capacity by a general class of economic markets. The public discussion of this inhibition is not in the interests of powerful entities where economic gains accrue due to the exploitation of addictive substance or processes, such as violent video games. Because of the economic gains for these entities a broad-spectrum war is engaged in.

The full analysis of this war can be found elsewhere. The authors of the *Bridge* have a positive purpose in defining how the crisis in education might come to a close. We have set the goal that universal education be achieved throughout all parts of American society. We do not wish to engage in details about exploitive economic capitalism and

associated economic complexes². Rather, we look at the general conditions that allow exploitive economic capitalism to separate ownership and responsibility. Through this examination we reveal significant causative forces associated with how the crisis is maintained.

Let us step back a little ways. Our public understanding is incomplete. Part of the reason why, we conjecture, is due to persistent negative cultural histories and the magnification of personal characteristics like self-centeredness and egotism. We conjecture that individual characteristics are aggregated, focused and refined into distinct social behavior. The conjectured mechanisms act on real physical aspects of reality, in ways similar to how natural language is acquired and participated in³. To be clear, we point out that these mechanisms are not well understood. We are not advancing a full general theory related to what we conjecture to be real physical mechanism underlying human cognition, and natural language use. Science is not yet to the point where we are able to make scholarly appeal to specific literatures. However, we need to use these conjectures into our analysis.

For example, because of egotism, one person might seek to acquire legal ownership over this or that. This ownership might not be fairly defined but the use of legal means creates and reinforces an avenue of potential action. Various mechanisms develop that reifies the means to produce ownership. As another example, addictive substance might be used to produce a means to extract money from those who have been addicted. We certainly saw this when movies were used to glorify smoking tobacco. The result was a lucrative market and the pre-mature and horrible death of millions of individual human beings. The addiction created an ownership over a process that lead to these deaths and yet the responsibility for this misery has been easy to avoid. We point to this example as a means to illustrate the fact that there are avoidable negative cultural histories. The mass media need not to have been allowed to use addiction to produce an economic market.

Now we come to the question of institutional ownership over the conveyance of human

² Franklin D. Roosevelt, "Recommendations to the Congress to Curb Monopolies and the Concentration of Economic Power," April 29, 1938, in *The Public Papers and Addresses of Franklin D. Roosevelt*, ed. Samuel I. Rosenman, vol. 7, (New York, MacMillan: 1941), pp. 305-315.

³ 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.

knowledge. It is not that human knowledge cannot be acquired without the help of teachers, but rather that the system for conveyance has been subject to control by negative, and positive, cultural reality.

Of course, there is individual and social need to certify individual preparation to work. We note that the need has become more acute due to the types of employment provided by economic sectors. Again, we suggest that the ways things have come to be is not deterministic. We evolve this system but could have evolved a different one.

One can examine the evolution of certification to see that several systems worked together to produce the notion that education should prepare for work and the work should require individuals to be certified as being able to perform specific work. The systems evolved together to produce a dependency on an educational system whose sole real purpose is to channel individuals into job slots.

The colleges and universities own the social process of conveyance of ownership regarding certain types of knowledge. This ownership is conditioned in several ways. It is true many experts argue that college is not for everyone, and that college or high school dropouts often find financial success. There are also marginalized areas of human knowledge that lay outside of college programs. However, in general we equate being knowledgeable with college degrees. With this fact comes the ownership that the colleges and universities have.

The *Bridge* is designed to release the individual from the education system's ownership. A focus topic oriented four-step method is used to internalize knowledge. A blank paper test is used to confirm that the knowledge has been deeply acquired. The tests are designed to allow the individual to demonstrate his or her knowledge of a subject. The "blank paper" tests have no questions. The individual must have internalized curriculum in such a way that he or she can outline what topics are. Then in each case he or she will demonstrate, using a four-step method, an understanding of the concepts and the applications of those concepts.

Individual ownership over knowledge is separated from the idea of certification. The individual assumes the responsibility, not for answering questions on tests, but for actually knowing central concepts. He or she is able to evaluate a curriculum and know how to pose questions that reveal in their answers an individualized understanding. As this responsibility is assumed, the system's ownership over the individual is removed.

The individual is given the opportunity to define him or her self through the re-alignment process discussed in the previous section of this chapter.

Ownership is central to many of the principles on which we have built our proposal. A separation is seen between the legitimacy of system ownership over the individual and the full range of assumed or implied responsibilities. This legitimacy is essential to the social contract underlying public education and is yet not fulfilled. The *Bridge* is designed to reduce this separation by assisting under served high school students in an alignment of their sense of what is expected from them in college.

We cannot change the long established behaviors of the system, except through a demonstration that certain concepts are falsely held. Central to these are the assertion that most people have no intrinsic desire to know the core principles of higher mathematics. The demonstration will occur if sufficient numbers of young people change how they perceive higher mathematics.

The *Bridge* proposes the development of new social media where the real world is simulated as a three dimensional virtual world. One can see that this recreation of the real world as a digital world will have various types of affects, most of them unplanned. It is thus essential that systems theory be used in our planning. The function of the education worlds is to be informed by real time measurement of outcomes, and by the separation of ownership. Each individual is encouraged to take responsibility for learning. One consequence of this principle is that all records about the individual are removed at the point that the individual graduates from the system.

The development of a simulation world supporting higher education has great possibility. Rather than simply copy the behavior of the current institutions, we seek specific transformation; one that reduces the separation between ownership and responsibility. The old mechanisms can be redesigned so as to support better our social need for universal education. Historical events may be examined to see that market sectors acted to produce a dependency so that control over the individual is exercised. This control over the individual is a system property not merely of the education sector but economic sectors coupled with it.

Control of student behavior is part of the design. Control is necessary if some regular concept of a classroom is to be propagated. However, even here the desired nature of control is altered due to certain legacy from the past. The existing intersystem

mechanisms produce many extremely negative cultural phenomena such as addiction to violent and behaviorally perverted video games, movies and books. This perversion of the system may be thought of as arising because the interaction between mass media and the educational system, including textbook and digital software production and purchasing. The Bridge has the potential to exclude most of this interaction and to provide a more perfect communication medium between *Bridge* professors and entering freshman students.

Our children are being recruited into perverse behavioral cultures such as illustrated by “Twilight” and “Hunger Games” where rich intellectual capacity is demonstrated within a peer rewarding game framework. The problem is that the subject matter is demented. Hundreds of thousands of individuals are involved. The schools on the other hand are sometimes either actually encouraging involvement, whether out of ignorance or because of a feeling of powerlessness. The dementment is intended to capture the attention and the pocket book of our children. Predatory economic processes undercut core responsibilities our society expects from the school system. These processes are consistent with an intersystem system need to exploit for the purpose of profit.

How is it that the education system has become entangled with market recruitment of our children into predatory economic processes? Why is the system not producing educational outcomes of the type that national political leadership calls for? The answers to these questions are important, but not as important as the development of a clear alternative. The current system has the capacity to protect its own perceived interests. So a description of actual problems is not an adequate strategy for ending the crisis. One has to use system’s theory to design a completely separated system. This alternative cannot be designed to replace the entire K-12 and college systems. The *Bridge* is designed only to re-align the expectations of graduating high school students to the reasonable expectations of quality college professors.

Entrenchment by management inadvertently feeds predatory processes by pretending to properly serve all positive social expectations. This pretense has become an art form, with promotions and tenure given to those who are good at pretense. Pretense separates responsibility over outcomes and allows predatory processes free hand at the exploitation. The blame is not on the administration of schools or on teachers. They are the first to say that the task is simply too difficult. Universal education is not possible under the current circumstances.

There are many cultural natures that contribute to the present properties of this system of systems in which the American education system is embedded. Aside from exclusionary social philosophies, we must contend with free market capitalism. We must understand that exploitation is systemic to the practice of “free market” capitalism. At the most crude level, one gets ahead by exploiting others. It is true that the exploitation can be used to deliver necessary products, such as food. However, a free marketplace with ignorant and enslaved consumers results in products like tobacco or predatory mass media products. In the presence of social ignorance, predatory markets will develop based on whatever addictive devices, such as the mass media, are available. Regulation of these markets has proven to be impossible, given First Amendment arguments, and the avoidance of responsibility endemic to various public and private institutions.

So what are we to do? The first solution is to provide a viable alternative to activity that is addictive and which is used to exploit individuals. Our designed next generation virtual world system has certain features that create measurable activity leading to a general freedom to choose more positive outcomes. The nature of a digital world allows both the monitoring and the tools needed to expose these positive alternatives to individuals. The second solution is to have a systems view available to the public regarding the consequences of exploitation using addictive phenomena. This cannot be approached without the general public being more liberally educated. We are faced with taking two steps.

Even now, buildings are designed in a virtual world and then built from these designs. This practice will change everything. However, the tools that could be in place are not yet in place. In the current generation virtual worlds we do not yet incorporate building component information such as regards manufacturing and disposal of materials. The *Bridge* infrastructure will integrate standards for such information. Some tools are in place. Economic flow is well supported in Second Life™. Paintings are displayed in virtual art galleries. Virtual clothes are designed and sold. Every object being digital means that manufacturing is inexpensive.

What we do not have in the virtual worlds, as yet, are innovative machines being designed in a virtual world and then sold to be manufactured in the real world. There is a new horizon. Machines designed in a virtual world might be built and used in the real world. This raises the ownership question in the context of a new ability to create

designs in virtual spaces. How are the intellectual property rights to be managed in such an amazing new world? How is the knowledge underlying these innovations to be protected? Again we see the role of ownership in our lives.

The nature of ownership has national and state consequences. State and federal laws governing ownership is often involved in structural difficulties experienced “socially”. Ownership laws create economic processes, such as employment, that depend on the continuation of specific structure. For example, unjust laws regarding ownership over property may receive public support because of perceived or real economic benefits. Arguments for slavery in the United States have always been based in part on economic arguments. In theory, employment produces value by creating a means to overcome difficulties. But theory often has evolved into a type of consistent mess.

The problem is that the social value generated by ownership is not always “universal”. Ownership laws create the ability to separate responsibility from the institutions that own the right to address the problem. This right is often strongly asserted, even by individuals whose agenda is other than the stated purpose of the institution. These individuals often develop professional status within an entrenched administrative structure. Other types of individuals find places within management, including those of us who have radical ideas regarding reform. The result is often a stalemate.

Sometimes value is captured locally in a way that is predatory. Ownership rights may not account for real but un-intended harm to others and thus have elements that are un-Constitutional in nature. A system sometimes develops where ownership enslaves people into an unjust circumstance. Over time, new structures are created. These often obscure root causes related to localization of value. The values become “hidden values”⁴. 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. Individuals must follow these rules to be successful. But these rules are not perfect. In fact, the rules may work against the under served individual. The system may be unjust. This injustice may be supported by an exclusionary selection that assigns ownership rights.

In the American academy, the institution of educational structure has created a self-

⁴ Allee, Verna 2002: *The Future of Knowledge: Increasing Prosperity Through Value Networks*. Butterworth-Heinemann Business Books. ISBN 0-75067-591-8, ISBN 978-0750675918.

sustaining reality. It excludes specific types of innovation and does so as a central feature of the system's structure. It is conjectured that exclusion acts to safeguard certain types of ownership. The central feature of this exclusion is a type of status. Being a professor is seen as conveying a status. The students dispute this status, as they deal with an often-unjust circumstance. The nature of what under served students feel is normal is addressed in a previous section. They feel the unjust nature and as yet are not able to reconcile private experience of social reality with an inner sense of purpose. A realignment of under served students' normative sense is part of the objective we have projected into the *Bridge* design principles.

Ownership also extends to ownership over responsibility. 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 an obvious failure. Parts of the problem are owned, but in a way that does not take into account the larger issues. However, the institutions do own the right to address the nature of educational outcomes. This right is then expressed in tenure contracts and in teacher certification. Part of the entrenchment is realized with the administrative function preserving the right to own the problem, but not fully acknowledging the extent of the failure.

This administrative entrenchment preserves a significant number of structural difficulties expressed in our society and seen also in our history. Systemically a separation has occurred in which the stated functions and actual reality have separated. Administrative entrenchment maintains this separation. Complex social argument justifies the separation. Economic reality controls most of the system responses. Philosophical arguments are rooted in various senses of elitism or self-centeredness. The door is effectively closed to realignment. In fact, one can make the case that education has always been a bit out of alignment. However, the current circumstance is revealing a possible outside force.

The need for system alignment between Constitutional readings regarding social justice and actual practice has become more universally clear. Far too many individual children are prepared in school to not go to college, to in fact not learn. They are shackled with a form of slavery. A significant part of all social and economic processes are involved, even while the good that the system does is showcased. And there is significant good achieved by the system. The separation is; however, deceptive. Ask the schoolteacher.

Look at the outcomes data.

It is difficult for one person to change anything. Systemic behavior often trumps individual intention. The individual educator's role is undermined, because society has not found a common agreement over basic questions about content or pedagogy. The individual is working with the practical aspects of everyday life. The system is entrenched in behavior that is protecting the integrity of the system.

A good example is the content and nature of freshman mathematics. All state systems require that the freshman mathematics program focus on materials which most under served student has seen before. These individuals, almost with no exception, have developed an immovable belief that this material cannot be learned. And yet any suggestion that we switch from that particular curriculum to something else is met with a blank stare and even anger. Administrative entrenchment is combined with tenured faculty resistance to change.

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. But the system still requires that students overcome a fear that is actually imposed by the system itself. Rather than looking for a way to go around, or otherwise acknowledge, this fear; we continue to confront them. The barrier has become resistant to any possibility of alignment.

We can unwrap the system dynamics a little bit more. A culture has developed in which the faculty members are allowed to "own" the effort to train mathematics majors, but they will not improve the service courses. This behavior is consistent with administrative caution and thus has become a hard reform target. The behavior is self-reinforcing. With decreasing mathematics majors, the service courses pay the faculty members salaries. A dysfunction is established and then become entrenched and associated with the philosophical view that most individuals cannot learn mathematics, anyhow. As in any classical entrenchment, administrative support for ignoring all relevant issues is generated. 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 this systemic analysis.

This section has focused in the general problems that the concept of ownership creates. We recognize that the kernel of everything economic in nature is created because of laws governing ownership. Our analysis is designed to make a specific argument. Most of the causes of the crisis in American education may be traced, in one way or the other, to humanities' enforcement of ownership. One root of the crisis may be traced to the experience of human slavery in the South in the United States. We make this case to partially contextualize how innovation in educational practice is inhibited by administrative entrenchment, particularly in the South. It is not a single issue, however. We point to layers of systemic causes preserving age-old ownership rights, and how these causes mutually support real processes. Unwrapping these layers is of the purpose of understanding what the developers of the *Bridge* must accomplish.

Overcoming Harm to the Identity of Self

We take the position that the continuing crisis in education is rooted in a social failure to guide individuals in developing a positive identity of self. The social responsibility for guiding our children is enshrined in many ways. However, we tolerate economic forces that usurp our stated sense of common social responsibility.

The failure has many aspects, and is manifest in many ways. In part the failure is one that is not fully informed about the nature of a human being as he or she matures into a young adult. Specifically as children mature, self-identity often becomes confused in a number of specific ways. Quality school programs often do moderate this confusion, sometimes resulting in very positive outcomes. So the failure should be measured as the degree to which positive outcomes do not occur. What is restricting success?

As discussed in the previous section, predatory economic processes exploit and amplify the failure. Many business processes increase the attraction that certain classes of non-positive video, books and movies create as fads. The media plays a central role in these fads. A significant part of our mass media is addictive and for this reason broad based economic processes capitalize on the addiction, much in the same way that tobacco use was capitalized on. The addiction often causes negative behavioral problems, but because of economic gains, by producers of these products, the mass media is all too often excused.

So now we turn to a critical point in our over all argument for federal funding of the *Bridge*. We point to our current decline in education outcomes. The declines are

occurring a time in which there are many kinds of critical need for increasing educational outcomes. The system is not responding to clear and recognizable demand. Our point is that mass media is part of a negative causative complex created in part because of specific mythology related to economic theory. The positive exaltation of pure market capitalism mythology has separated the mass media markets from the largest part of real potential responsibility for damage to the identity of self. This issue is subject to a great deal of controversy. We do not wish to engage in this controversy, only to state our viewpoint.

The role of addiction is to create non-transparency over behavior, whereas the notion of a free market invisible hand requires that all economic transactions have a pure form of transparency. If I buy cigarettes to smoke, I must know the consequences. If advertising and the addiction itself set-asides this knowledge, then functionally there is no transparency over the consequence of the purchase. Addictive substances and processes create a world of its own, where serious damage to the image of self can occur.

Confusion confounds many cultural issues and is presence at a time in which there is great economic uncertainty for young people. Our political processes are often not helpful. The period we are in, historically, has some very dark parts. Politically we accuse the other party for single handedly causing these dark ills. This is generally not helpful. The difficulties faced by our children are more complex than the political sphere has managed to address. The *Bridge* attempts to put into place a positive alternative to this darkness. We seek, in a sense, to increase the positive and decrease the negative.

Our analysis can be difficult to follow, so every effort is made to be clear and to help the reader see the issues. Our analysis started in the early 1980s with the awareness that college students were not appreciating mathematics education. We observed that this was not normal behavior. It was possible even then to see into the depth of a social complex that was arising and to see the damage that this complex was to impose. We feel that certain behaviors by our economic system have lead to across the board declines in educational outcomes.

We saw that there was something to be explained regarding how education was set up to function. Our analysis was at first incomplete, however. Clearly any flaws in our economic theory are only part of the causes of the crisis in education. Our theory of

education also shows weakness. This weakness is seen in an absence of predictive capacity. It has been hard to present evidence within professional communities involved in the educational processes. It would seem that the colleges of education are more astute at denying the reality of the crisis than in describing its causes.

The first statements about a conjecture on acquired learning disabilities were made in 1984. Prueitt was a graduate student teaching at University of North Texas. He could see how strange freshman student behavior was. Even in the early 1980s, almost all freshman students were not interested in learning the curriculum that opens the door to higher mathematics. For the mathematician, mathematics was something lovely and almost sacred, but this was not how the students perceived it.

Prueitt's conjecture is equivalent to the idea that the education system was designed to fail. Such an idea is not well accepted by the education establishment. However, systems theory creates ample evidence that the design of entrenched systems will preserve the status quo. This evidence is not welcomed. Denial is far easier, since to not fail was to cause great social upheaval. Continuing failure may be essential to the maintenance of the current system.

Denial is enabled by mythologies. To not accept these mythologies has often been the basis to disqualify an individual as a teacher, administrator or education professor. So the mythology serves as a utility function through which the system preserves itself. The necessary mythology is that higher education provides the potential for true universal liberal education. Mythology serves to replace a perception or true reality. The fact is that we are a long ways from having a society in which the great majority of citizens are educated. But if the system were to succeed that success would impact the social and economic realities enforced through various strong forms of the concept of ownership. We are caught in this dilemma.

The change caused by real reform is invariably resisted. The power of the systemic utility embodied in mythology stays in the background, controlling what ultimately will be recognized by the system as being part of itself. The possibility that everyone might know how to open the door to higher mathematics was "seen" by the system as a direct challenge to deeply held fundamentalistic notions about who we as a people are. These notions are often in contrast to idealism. The true nature of American exceptionalism is found in multi-culturalism; but this notion has become less and less a guiding force in

American education practice.

In the chapters of *The Bridge* we look closely at Prueitt's conjecture on acquired learning disability. We make some observations about why students are not interested in learning. For specific 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, it cannot be answered in a simple way. It is very hard to isolate and very easy to over generalize. However, we preset the viewpoint that most of the confusion arises from the complexity of these issues, is related to the various natures of this concept of ownership.

We have suggested that we must look to natural science if we are to understand the nature of the confusion. Science provides a possible view into system dynamics not controlled by self-limiting formative fundamentalisms. We see the possibility that the identity of self not be as harmed by the mass media as is now the case. Neuro and other regulatory mechanisms must be involved, of course; as well as social mechanisms. Our science opens the doors to understanding how to create digital processes as part of the *Bridge* infrastructure.

As 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. How does social interaction and knowledge of self work together, particularly during the formative years? These questions can be addressed in a new science of psychology. We must extend this science if we are to gain clarity.

How this extension might be done is then coupled with a general problem. How might the children of our era be provided with a sense of American exceptionalism and with the hope of a renewed American dream? We envision both this sense and this hope as being addressed by the proposed three-dimension simulation infrastructure. The infrastructure is first to be used to increase the quality of incoming freshman college students. The specifics of our methodology involve deep learning.

Deep learning⁵ is defined as learning that occurs through the development of a deep

⁵ Bateson, MC (1997) 'Understanding Natural Systems', in Zelov, C & Cousineau, P *Design Outlaws on the Ecological Frontier*, Knossus Publishing, Philadelphia.

structure, involving both memory and self-efficacy⁶. The *Bridge* proposal specifies an individualized human knowledge representation standard implemented as part of a digital avatar. This standard for representing human knowledge interfaces with some of the machine learning literature on deep learning methods⁷.

The *Bridge* standard follows our increasing clear understanding about human memory and awareness. Specifically individuals develop an abstract category based on common perceptions across multiple instances. These categories then become a deep layer and are represented as focus topics. Hand written compositions of student understanding of subsets of focus topics is then a means to demonstrate deep learning.

The three supporting pillars to our proposed national transition program are as follows:

- 1) **Normative Alignment:** Normative re-alignment is necessary between the expectations of an entering college freshman and a professor. A change in alignment should be from both sides, but currently the student must make all of the effort, else risk failing. At this point, there is little we can do about expectations by professors that are wrong minded. The situation is simply too complex to address. We first must correct the perception of the entering freshman.
- 2) **Deep Learning Methods:** The six principles of deep learning methods are developed with illustrations. These provide a methodology for the study of any subject. The methods are developed while learning significant college prep material.
- 3) **Foundational Concepts of College Mathematics:** Elementary set theory, a brief introduction of probability, nine laws of arithmetic, introduction of algebraic expressions is introduced using deep learning methods.

We envision that the infrastructure will provide glue to a grass roots movement. It may be that the current system will not become aware of the new system until the new system is independently established. The independent system will provide assess to the current curriculum, so that the current system will no longer be in a position to continue the practices of exclusion.

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.

⁶ Howard-Jones, PA. 'Philosophical challenges for researchers at the interface between neuroscience and education', *Philosophy of Education*, **42**, (pp. 361-380), 2010. ISSN: 0309-8249

⁷ Hinton, G. E, Osindero, S., and Teh, Y. W. (2006). A fast learning algorithm for deep belief nets. *Neural Computation*, 18:1527-1554.

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. This new science is to be made more relevant than the current science education, by creating an economically viable economic reward system. This is the Phase Two. 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.

Benefits to society would seem to support the idea of the start-up costs for the system, if the cost were kept minimal; it 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 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.