EDUCATION IN THE INFORMATION AGE

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Abstract

This paper offers a unifying approach to technology usage for educational purposes in our schools, their districts, and in state agencies. The intent of the paper is to move the technology dialogue from the domain of ed tech and networking to the province of policy, practice and performance. The paper is designed to help administrators, policymakers, agency personnel and legislators better understand the components, the context, and the broader possibilities in technology usage in schools for teaching, learning, and training.

The main thesis of the paper is that technology, as it exists in schools currently, is part of a broad shift in society from the Post Industrial Era to the Information Age. This general social transition has led parents, educators, administrators, and technology coordinators to create many different programs, projects, and policies in schools without a clear set of educational objectives about systematic improvement, cultural modification, efficient administration, or cost containment. It is hoped that a more thorough understanding of the overall forces in social transformation and technology adoption will help participants at all levels analyze school issues in order to improve the core mission of education, boost student performance and modernize administrative practice.

The first section of this paper, "Moving Beyond Technology," outlines the changes in the growth from education technology as an add-on in schools to Information Age operations that reflect the best use cases in other segments of the economy. The second section, "Delivering Mission-Based Education," focuses on how the rest of society has harnessed system-wide or enterprise technologies to manage their missions and looks at the six major disconnections in education that often preclude change, but are remedied by Information Age strategies. The final section of the paper, "Introducing Enterprise Education," examines how the electronic or eSchool variations of education differ from mainstream education and how they embrace what it means to be modern educational entities in the Information Age.

I. MOVING BEYOND "TECHNOLOGY"

Introduction: Think Mission, Not Technology

For the purposes of this paper, the following terms – *educational technology, online learning, virtual schools, cyberschool*, and *eLearning* – are going to be downplayed as the sole objects of discussion. In their place, *education in the information age*, or "EIA," will be substituted as a term that encapsulates thinking about how education and technology can evolve in the Information Age. The term *eSchool* will be used to define the many different curricular categories of technology-assisted education.

The notion of "EIA" is not just rhetorical. It is used to make the point that technology in education or educational technology is, by now, an overly generalized term that has so many meanings that it is practically useless, except rhetorically. Conversely, the list of terms above contains various types of eSchool that refer to something specific, but are so often interchanged that it is not clear what each

actually defines. For example, what is the difference between online learning and eLearning or between virtual school and cyber school? The point of *EIA* is that education, like every other segment of society, will develop its own methods of incorporating the Internet, computers, and distributed technologies into its actual core mission. This will happen in some form in education, as it does with any technological evolution, whether it is planned for or just happens.

We all know from our daily lives outside of school, that the Information Age is making numerous changes in what we do during the day, how we learn about the world, or how we entertain ourselves. This is obvious by what we observe in our jobs, by going online to shop or surf, by watching our children on computers, or by studying the changes in higher education, especially in the fully online universities, such as the ones operated by the University of Phoenix or Capella University.

In K12 education, there is a full range of activity occurring from just Internet access and email to fully online virtual schools such as the publicly funded Illinois Virtual High School or the Florida Virtual School or the privately funded K12.com or Sylvan's Connections Academy. These our clear examples of *education in the information age*, both by the use of technology to assist in education and, more importantly, by the roles and methods of the individuals carrying out the core education missions of those entities.

Mainstream K12 education is just at the beginning of the process of determining what *EIA* means to its core mission. Fragments of activity are more and more common – more students and teachers are taking online courses and more and more schools are using back office, administrative software. This is the beginning of a long transition for education with technologies that are finally mature or maturing. Five years ago, some schools, teachers, and

administrators started experimenting with eSchool projects. Five years from now, educational delivery, data management, culture building, and performance monitoring will be in a new place, one that is standardized and is seamless from parent and student to teacher, administrator, and agency personnel – all part of a new educational infrastructure that exists alongside of the bricks and mortar infrastructure, just as the Barnes & Noble stores exist alongside of www.BN.com.

Thinking about Change

This paper is meant to outline a way to think about the process of change in education as a result of the technological information and knowledge revolutions. This is not about tinkering or experimenting or about isolated cases of excellence, but about what it is to be a student, teacher, school, administrator, or to be in K12 education in the 21st Century.

As this social-technical transformation occurs, the dialogue and the activity will shift from "technology" to the organizational structure and the optimization of the school mission. In the determination to fulfill their missions, schools, districts, and agencies will use blended – *physical, technical, organizational* – approaches to maximize every part of the educational enterprise, just like the rest of society has done in other segments.

The reason for the new term, *EIA*, is to elevate the conversation about education and technology to a level where it can be viewed as a phenomena that is occurring in many different ways, but is part of the same social-technical evolution that already affects most segments of society. By an analogy from the world of dining and food, we will go from a discussion about knives, forks, spoons and recipes to a discussion about what constitutes a full meal for educational consumption in society.

The outcome of this discussion is to point out certain trends that, when considered in the aggregate,

point to the evolution of a new reality for education in American: one that does not just add technology to the mix as we do now, but one in which the addition of technology changes education by improving it at its core. In simple words – think less about computer labs, networks, software packages, and, instead, think about the change that is occurring generally across society and how it will be visited, specifically, on school operations, education practice, and learning and training opportunities.

Such a change in valence, from technology-as-separate to technology-as-a-lever, requires administrators and teachers to think less about appliances that aid in specific tasks or single processes and to think more about new infrastructures that are there to improve what it means to educate and to have educationally supportive school cultures.

At one point in time, technologies were physical. Changing grades every year, separate classrooms for separate subjects, class periods, five-point grading structures, and the use of the chalkboard and textbooks were innovations, some of them technical, that changed the infrastructure of school. Prior to the application of "scientific management" in the early 1900's to education, school was simply a schoolmaster, a simple building, a chalk board, and a few "readers," many of them donated by parents. The curriculum at some of the best schools 150 years ago is, oddly, not that different than today's curriculum. Yet, the trappings, the technology, and the processes of education have changed with the

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times and often, in a delayed fashion, have mirrored the times.

The message is this: infrastructures change over time. Such a change is occurring now. Alongside of the school campus, the physical district infrastructure or plant, there will be enterprise, or system-wide, electronic infrastructures that better serve the education mission. In some places in the country, they are already operational and successful.

EIA Defined as Enterprise Management

To proceed in this discussion, *EIA* will be first defined and then examined as a general concept, after which the discussion and definitions of the specific curricular programs — *virtual education, cyber school, and eLearning* — will be introduced and incorporated into *EIA*. By defining the overall case, it is hoped that the separate phenomena can be placed into a social-technical context that is relevant and has utility to mainstream education.

Education in the Information Age, or EIA, is the change from the physical operations of school as the definer of education to the information about all aspects of school being its definer. Instead of the length of a school day or year, the capacity of buildings, and the differences in adopted textbooks, education becomes objectives, analysis, performance, management of the culture, and the implementation of change based on analysis.

Modern retailers made the transition to enterprise or system-wide thinking and acting over a decade ago. No longer are their issues simply the cost of real estate, the size of the inventory, and other physical variables. The real issues in those businesses are the ability for their market and product research to anticipate and lead the market based on analyzing multiple data streams. The data that is being collected on buying behavior, customer preferences, and the knowledge of the supply chain define modern retailing. Trends, expectations, and other social-personal variables define the matrix of retail. The objective is information about behavior that leads to spending money at the store, not necessarily how many red sweaters are sold. It is the application of the knowledge about their business that defines the business. The business is no longer simply the business, but data, information and analysis about the market and the relationship of the business in that market. It is a subtle, but far-reaching, change that is real in major businesses today.

Education, under the new Federal No Child Left Behind law, NCLB, mandates the same sort of change for the "education system" but does so without the years of management training and financial theory that led the business community to change itself into Information Age entities. In most cases, physical operations in the school or business are still quite real. Students walk into school, shoppers at the GAP still walk into GAP stores. However, if the GAP shopper does not want to go to a store or wants to examine the inventory that is currently available, they can go on the Web or they can make a toll-free call to another store. Each step on that journey is, by the way, data for the GAP.

Whatever route the customer chooses, or all of the routes, the same technical and data systems, or infrastructure, from a central location will be used in order to better and more consistently serve every customer wherever or however they use the system. The system constantly harvests their data. The central feature of the operation is the connection to the data about all shopper behavior and purchases and about those in particular regions, localities and by individuals. *A system that centralizes expertise and knowledge in order to serve many local situations in different or similar ways is a unified system that is referred to as enterprise-wide. The software, the organization, the training and the management principals are part of the management of the "enterprise." Enterprise means the whole operation and the constituencies that are involved with it.*

EIA Defined

The technology to support a full system of activities is referred to as an enterprise solution because it is designed as part of the management structure across the whole enterprise. Using a mix of central expertise and local customization via the Internet or an intranet, the enterprise infrastructure allows tasks to be carried out, to be communicated and recorded, and, as a result, to build-in internal efficiency and customer, and social value. It is this mix of centralized expertise, local customization, data analysis and storage, and feedback for improvement that is missing from schools.

EIA, in the best case, takes these very principles of enterprise management and imports them into education. If one examines the Florida Virtual School (www.flvs.net) or the University of Phoenix (www.phoenix.edu), all of these principles are in effect. This does not mean that public schools or mainstream education needs to become a business to succeed. It means that modern management and organization, customer and supplier orientation, data architecture, and the supporting technologies do need to be examined and incorporated centrally to carry out the local mission of education efficiently.

Enterprise software already exists in many mainstream school settings, but does so in its administrative form, not in a curricular form. State or district-wide registration, student record, or student information systems are, increasingly, enterprise software systems. Older or legacy software systems that were not enterprise or system-wide are beginning to be converted to a new system-wide Internet or intranet infrastructure across schools, districts, and states. Many large districts are expert in these operations.

While it is not uncommon for enterprise systems to be present in schools for administrative purposes, it is uncommon for them, or the mentality they represent, to be used in the teaching and learning and teacher training aspects of education. In others words, the enterprise software systems are not used at the core of the education experience, but at the support level.

By analogy, if the school philosophy were employed at the GAP, the enterprise solution there would only be deployed for management and inventory control and not for GAP customers interested in having multiple shopping options or having their shopping affect next year's design line because of data analysis at the center of GAP operations.

What, then, is the definition of *EIA*? One definition is the following:

> **"Technology," by which it is currently meant digital devices, distributed content and services, the Internet, websites, or server-based technology access by computing devices, is now ubiquitous in life, almost like the air we breathe.**

EIA is the management of the core mission of education – *teaching, learning, and professional development* – through the assistance of enterprise technologies designed to maximize central expertise and local delivery in order to obtain more consistent educational performance, administrative practice, and cost conservation.

An *EIA* system, then, utilizes enterprise philosophies, solutions, and personnel to achieve consistent educational goals through a mix of central expertise and central support for the delivery or augmentation of education, localized by county, district, school and student.

Moving Away from the Term, "Technology"

To further the discussion of *EIA*, it is important to consider dropping the word "technology" from our vocabularies. It is, by now, a practically useless term for describing any phenomena in education or outside of education. "Technology," by which it is currently meant digital devices, distributed content and services, the Internet, websites, or server-based technology access by computing devices, is now ubiquitous in life, almost like the air we breathe. By over-inflating the term, it no longer has specific meaning.

A century ago, the same thing occurred with the word, *machine*. Then, "machine," like "technology,"

was as a categorical term used to describe cars and other motor-driven appliances and conveyances. Cars, washing machines, and other electrical or internal combusted propelled devices were commonly referred to as "machines." This sounds ridiculous now. *Technology*, as a term, already sounds ridiculous to our children because they don't have a reference point for when "technology" was not present. They don't see *technology*, per se; they see, hear, and touch specific devices for specific uses.

Young people today are born into "technology," while many adults lived through the transition from analogue technologies to digital technologies. Our kids live in a digital world. The analogue world that adults watched mature used signals that were propagated "by analogy" to some other phenomena. Music, television programs, or data tables were turned into signals that went "up and down" as the original sound, TV program, or data did. Digital technologies, by contrast, are codes that carry assigned values from one point to another and are encoded and decoded in order to deliver their content. While some of us still cling to our LP records and their wonderful jagged groves in the vinyl, our kids download music based on digital signals, or strings of zeros and ones, directly from the Internet, on to their computers or MP3 player hard drives.

Dropping the term *technology* is not meant to be an educational conference exercise or a rhetorical gimmick for its own sake. Instead, the reason for dropping the term is sober and meaningful. It is done to remove obstacles or distractions from the discussion of real problems in education, specifically the education of students, the training of teachers, and the running of schools. The sooner education can drop the use of the term, technology, the sooner real solutions for very real problems can be sought without debates about "technology" obscuring the issues.

The other reason to drop the term "technology" from public and private education dialogue is that *technology* is no longer an *either/or* issue. Thus, it should not be used as a dodge to perpetuate, debate, or obscure attacking actual needs and problems with all the necessary tools or in place of solid planning using all the available tools.

"Technology" is here and here to stay. It is already everywhere in schools – in the back office, in the front office, in food service, on the website, on teachers' desks and in the homes of students and their parents. One trip into a Circuit City, or a Costco, a modern workplace, or a neighbor's house confirms the ubiquitous nature of the Information Age and raises questions about where education is in this picture.

eSchool Variations, A Difference of Delivery

Similarly, the specific terms – *online learning, virtual education, cyber-school,* and *eLearning* – are no longer revolutionary educational activities. They are just different methods of delivering traditional schooling that are gradually becoming acceptable to mainstream educators. While these forms of eSchool may look different or appear threatening or disruptive, they are simply different vehicles for the delivery of the same standards-based curriculum that occurs in face-to-face teaching, which, increasingly, involves the use of *technology*.

In many ways, the eSchool activities are modern and improved versions of correspondence education, tele-education, or Computer Based Training coupled with the ability to have real time communications with instructor and peers, to use different administrative and curricular functions online, plus the ability to exchange files. Thus, these specific activities are not different in kind. They are different in their methods to reach students using teachers and administrative staff in different ways. Likewise, digital content and support for the classroom is not different in kind from the use of textbooks, supplements, and

other printed material. However, the computer-based activities show real promise for integrating into one experience various different types of delivery for standards-based curriculum and for assessing and improving student work.

While it can be debated whether one form of eSchooling or a combination of forms is better or worse for certain subjects, certain students, or certain teachers, these debates are debates of delivery methods and teaching methodologies, not debates about the fundamentals of education or about "technology." They are also part of a larger picture of *Education in the Information Age,* where central expertise and local activity join up to create curricular and cultural safety nets across all schools for all students*.*

Solving Real Problems,
Not Creating More Projects

The days of dallying with technology and the networking for just email and Internet access or for idiosyncratic programs or projects are over. It would be wise, as we are swept deeper into the Information Age, to focus on how education can benefit from and contribute to what is already occurring in society and commerce, a world, ironically, of which most students are already firmly a part and, if not, will be, and a world that most adults work in.

Instead of letting mainstream education ignore, downplay, equivocate or repudiate "technology," the question for the mainstream should be, how can we better understand what is occurring, as part of the *EIA* phenomenon, in order to solve real-world education problems that do not, otherwise, have adequate solutions in the traditional world? From such questions models can be built that show how to assist mainstream administrators and policymakers in dealing with persistent problems in education. Similarly, legislators, Gubernatorial staff and Federal

agency personnel need to examine what it is going to take to manage the educational enterprise going forward as an enterprise.

EIA, in this sense, is not merely a boutique activity or a something that tech people do or something that that the No Child Left Behind law mandates.

Instead, *EIA*, is a set of levers and a means in the educational arsenal that is quickly going from a world of tools affecting classrooms to a baseline infrastructure affecting states, schools and districts. The object is for mainstream education institutions and administrators to have a common way of viewing the various eSchool activities that are occurring around the country, and the world, and to understand them not as anomalies or curiosities to be dismissed, but as part of something larger, something that state, county, district, and school administrators need to harness to solve real problems and meet real objectives.

Unexpectedly, the Federal government is already encouraging the use of eSchool options, but has stopped short of developing a philosophical base to support *EIA*. The Department of Education, in both the Bush and the Clinton administrations, and agencies like NASA and the National Science Foundation, NSF, are very active in exploring electronic options as a way to refresh policy, carry out improvements, connect expert content to teaching and learning, and to fund teaching and training options for school improvement and student learning. Federal efforts and universities, along with a few of the notable national foundations, have and are advocating electronic methods that already have been well documented in evaluations and assessments of pilot programs and reform activities. These efforts have created a body of knowledge of theory, practice, and research that is untapped, but very informative for weighing the value of *EIA*.

Such vanguard efforts from the past are beginning to have more relevancy as the technologies for delivery mature to the point of matching and exceeding the teaching and learning objectives as they are carried out in classrooms by teachers and students with textbooks. Yet, there is little effort being made to aggregate and share what is known from all the Federal and non-profit dollars invested in training, curriculum, and research and to examine what it can mean, outside of particular projects, to the mainstream.

However, with the advent of the No Child Left Behind (NCLB) law, which requires research-based educational options, qualifying teachers in their disciplines, use of measurement metrics, and the right of parents to find alternatives to failing schools, the body of grant-funded expertly developed eSchool programs and projects may now have more of a place in the mainstream educational scheme than they did before.

The contrast between the reform or expert grant funded projects and the NCLB requirements on one hand and the eSchool alternatives on the other hand, is that the eSchool forms are forms of *EIA* in action – in terms of enterprise technology use, in terms of modern organization development, and in terms of the orderly development of curriculum, assessment, and training. They are whole systems, not just temporary projects, that serve existing problems for which there are either none or inadequate solutions.

The various eSchool forms have moved from the development of project-based expert curriculum, training and research projects, to the augmentation, supplementation or replacement of mainstream education in electronic form. Such virtual program have jumped the fence between expertly developed materials that are part of grant-funded programs as proofs of concept to the use of technology infrastructures as "the school" or as augmentation for physical schools.

Reform versus Infrastructure Change

What has been learned by researchers and curriculum developers on one side of the fence and eSchool alternatives – *virtual schools, online education, eLearning* and *cyber charters* – on the other side of the fence is not crossing the unseen barrier between the mainstream and the alternatives. The alternative knowledge is landlocked in local pilot settings or, in the case of eSchool alternatives, tied only to single entities, which are poorly understood or little known by the mainstream. The reasons for this are complex.

Both cases of educational operations — well-researched reform measures and the eSchool options — may appear to be self-contained, distant, academic and, therefore, are evaluated by the mainstream not by what they can contribute to general education, but by their differences from mainstream education.

Such projects and programs are seen as outliers and not as evidence of things to come. This is one of the unfortunate aspects of mainstream practice and viewpoints. Best practices are not easily shared from school to school, nor is there widespread intellectual and practical curiosity about what can change education for the better. Ironically, this is a problem that could be solved, in part, by *EIA*. Curious administrators, agency personnel, board members, and teachers could easily observe what others are doing without having to make the time to physically inspect other options or to cross an unseen social or psychological barrier.

EIA is as much about culture and information as it is about processes and methods. For education to change and to solve persistent problems, information culture needs to permeate schools and to assist in forming larger communities of schools and schooling dedicated to solving common problems. Without such changes in curiosity about options and solutions, without the use of the Internet to explore options and

to find evidence of best practices at work, and without leaders — *teachers, administrators, boards* — advocating such cultures, there cannot be real change or progress with persistent systemic problems.

II. MISSION-BASED EDUCATION

Catching Up with the Rest of Society

Most segments of society already utilize Information Age organization and methods to accomplish multiple ends in the delivery of services and products to social and commercial consumers. Almost all banking, financial services, medical information, retail shopping, procurement of tickets for air travel or entertainment, and foundation and non-profit administration is, or is soon to be, organized almost entirely by Information Age organization, methods, and interactions.   Such organizations integrate the use of server technologies for the management of transactional, informational, human resource, and consumer and user information. They also use enterprise methods to manage how people interact and work together. The early aspects of this are already in operation in schools in email, listservs, and web portals.

Schools and education systems will deepen their Information Age involvement in the next decade to the point that their operations will be similar to those of Wal-Mart, American Airlines, Barnes and Noble, the GAP and many US Government agencies. Such commercial and governmental operations maximize the collection of centralized information in order to facilitate local distribution, measure user satisfaction, and build knowledge bases to support their enterprises and their enterprises' constituencies.

How will the transition to *EIA* be made? It will not happen through normal higher education channels. Most schools of education conform strongly to the status quo as it was defined before technology was

a ubiquitous part of society. While many programs teach classroom technology skills, only a very few touch on the complex issues of enterprise technologies or information culture. Likewise, modern management theory may be touched upon, including systems theory, but these are not likely part of most graduate education, let alone undergraduate education. There are just a handful of combined MBA and EdD programs. Unfortunately, they mix individual courses provided by existing separate MBA and EdD programs at the same institution and are not truly blended programs.

Hypothetically, if a teacher, administrator, or agency employee went to a new joint MBA/EdD program designed from the ground up to marry modern Information Age management with modern education objectives, what would be taught? Such a program would likely contain equal measures of the following four areas: information and data strategies, organization and leadership methods, analysis and action capabilities, and return on investment, or ROI, reinterpreted for the school environment as curricular and training success. A graduate student, in such a program, would be asked to look at education from a systems point of view using a range of analytic and prescriptive tools in order to fulfill a clearly defined educational mission.

In addition to learning how to manage a set of buildings, build a standards-based curriculum, manage classrooms or students, these graduate students would be looking at a number of variables that represent the various systems in the school, district, or state – administrative, curricular, operational, performance, and training.

These graduate students would not be detached, as many school personnel are today, from the actual knowledge in the fields in which they teach. Nor would they be separated from what is learned and practiced in high performing schools or from the data

and analysis that describes these activities and their best practices. If this were routine for teachers and administrators, the missions of school administrators and teachers may turn more to what it takes to prepare students for lives in the Information Age than to dwell on the past.   The missions may have both tactical and strategic objectives at all times.

While no university yet teaches a course or program devoted to *EIA*, it is conceivable that one could occur in the near term. Organization and technical infrastructure, along with mission and curriculum and training development, financial analysis, connection to sources of expertise in curriculum, instruction, and development, and return on investment would be part of a modern MBA/EdD degree designed for *EIA*. Such a degree program would concentrate on fulfilling the education mission through a systems approach that attacks the prevailing problems with analytic tools, expresses answers and solutions in terms of qualitative and quantitative data, manages from a strategic plan that anticipates tactical issues and diversions from the central mission, and mixes central expertise with local delivery. Such a program would bring each constituency, including students, into positions of empowerment.

Enter No Child Left Behind
NCLB is actually promoting *EIA* goals without defining or providing a map for their implementation or a system for their management. NCLB requires

school improvement that can be tracked through reporting of data and the upgrading of teaching skills. Failing schools get recorded and their students are eligible for transfer to higher performing schools. Whether NCLB is seen as a carrot or stick, the school systems must respond in order for districts, counties and states to be eligible for Federal funds, a necessity in operating a school under tight economic and budgetary constraints.

The Department of Education, as part of its NCLB activity, is encouraging schools, without saying so, to enter the Information Age. Certainly, the data analyses and reporting requirements, the training requirements, and the alternative school programs will hasten the transition of schools to *EIA*. NCLB poses a challenge in this regard.   Schools and administrators can look at NCLB as a burden and "yet another thing" to do that gets added to the "and this, and this" mentality of school operations, or they can look at NCLB as the beginning of a systems approach to education, on the road to EIA.

In other words, NCLB can be looked at as the first strategic opportunity in a long time that promotes a new form of education management and analysis or it can be seen, narrowly, as another tactical burden, required to receive Federal funds.

The crux of educational issues exists at the intersection between tactics and strategy.   Schools

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are, essentially, organizations that manage other peoples' agendas. Generally, the education strategy is created at the state level, while its tactical implementation occurs at the local level. The curriculum is devised by the state and the school is obliged to carry it out, thus making school management mostly about assigning teachers to classes and managing those classes, rather than managing the performance of individual teachers or students. The system level disconnections between the "state" and the "school" are everywhere.

For example, adopted textbooks are developed by publishers in conjunction with state agencies. State testing, now mandated at the Federal level as part of NCLB, is devised state-by-state, and carried out at the local level. The education "system" in this regard is organized as a rigid hierarchy, the way industrial era corporations were. Schools, which are "free" to manage their local program, in reality, have little control over the program and a great amount of control over local teachers and staff.

EIA can play a role in turning the hierarchy of education policy, strategy and tactics into an Information Age system in which there is participation, feedback, and improvement at all levels. It is not as if those at the top of the strategic hierarchy at the state level today posses superior knowledge to that of a highly performing superintendent in the field: it is that they serve different functions diligently and, as a consequence, spend little time interacting or understanding how the different levels of the educational worlds link together. Ironically, highly competent teachers, who are on the frontlines, teaching to state standards, with approved textbooks, and measuring with state approved assessments, have their hands tied in terms of superlative interpretive teaching, while teachers with poor skills and inadequate knowledge of their discipline are propped up by such Federal and state mandates.

Old World — New World

EIA can play a role in bridging the old world order to the new just by having exemplars in teaching available online, by having online access to approved teacher development courses and to advanced degrees online, through programs that direct teachers region by region to the resources that could make a difference in their teaching. While much of this is on various websites today, it is not deployed as part of school culture or of educational practice; it is not sanctioned officially. So, gathering the information is part of the battle, but having school people go to it as part of their routine is another matter, a matter of culture, or information culture advocated by the hierarchy.

The days of the lone school on the prairie are long gone. So, too, should be the days of extreme top-down administration. The reason we are in an information age is to facilitate the improvement of functions at every level. The kind of facilitation that *EIA* espouses, consistent with NCLB, that uses enterprise and systems management, also causes the education mission to be focused more strongly on the actual outcomes of education: motivating students to learn and to learn to learn and having teachers advance themselves professionally as a constant and consistent activity. All too often, education confuses the means of education – *administrative practice, policy promulgation, and standards development* – with the objectives of actual student achievement.

The danger in No Child Left Behind is not in the notions of *EIA* and the orientation to data, or the enforcing of testing regimes, or the backdoor to school choice, but something more fundamental. NCLB looks backwards in its objectives, improving the legacy education "system," and looks forward in its methods to achieve something akin to *EIA*. By using modern methods to enforce the school of the past is not good enough.

NCLB needs to force leadership in the future by helping schools find the new education paradigm and adopt it in order to grow real cultures of learning for which reporting performance, advancing teachers, and fostering excellence is part of the modern school.

Combining the Puzzle Pieces, 2 + 2 = 5

Many of the back offices of school districts utilize and have utilized web-based or network-based software applications for enrollment, HR, student records, and, increasingly for informative purposes on school or district web pages. The same is true in the classroom. The use of software and the Web for learning, not just for reference work or constructing assignments, is increasing. However, these uses are still largely idiosyncratic and not part of the systematic re-organization of the total school environment. Nor are they presented to the public as unified approaches to education. Instead, they are add-ons, part of the "and this, and this" tactical nature of education where successive innovations are grafted on to the main trunk of education.

In his book, the *Tipping Point*, published in 2002(*), author Malcolm Gladwell introduced the tipping point as the point where the "and this, and this" approach gives way to an unexpected evolution carried forward virally by word of mouth and other grassroots mechanisms. While Gladwell's book came at the tail end of the largely failed dot-com experience, it captured the enduring change that came out of that large experimentation of venture capital and new Internet technology. While all of society did not jump on to the Internet bandwagon and change centuries of behavior and practice in the space of two years, the winners from dot-com experiment were a handful of new businesses such as eBay, Google, and Amazon that used the technology to create new social and commercial capabilities. However, the real winners were not new, but the traditional corporations and organizations that understood the benefits of the Web to their already established businesses.

What Gladwell captured was how a tipping point occurs — what kind of people and settings can start a small change that leads to large change. Certainly when, and it will be *when* not *if*, education changes toward *EIA*, more than likely it will be a combination of mandates from the top of the state hierarchies and small changes that are already occurring at a local level that begin to propagate locally without direction from the top. After a point, in any system, there are a new series of activities that represent a new way of thinking that becomes a singular way of thinking and doing something, supplanting what existed before. Hopefully, the redefining and the aligning of *EIA* in schools with a new broader movement can assist in finding education's larger tipping point.

The now classic example of a tipping point might come from examples in the financial world. Consider the Visa Card or the ATM Machine. The use of the Automatic Teller Machines, or ATMs for those of us who have forgotten what ATM stands for, is now part of the landscape. ATMs are part of life. It would be impossible to think about the world, anywhere in the world, without them.   The ATM movement started small and then created a tipping point that led to a full electronic makeover of the consumer banking industry that prepared consumers for the many changes that came afterward from Visa cards to online banking.

Today, we get our banking data whatever way suits us – online, at the ATM, in person, or by phone. We don't doubt or wonder about this. It is simply what banking is in the Information Age, but the seeds for this change or its corollary in the credit card business, Visa, all came about by a simple disruptive idea that radiated into the rest of society.

Education as Infrastructure

Education's *EIA* tipping point is a ways off, but its reasons for being are present right now and are exemplified in the particular activities of virtual

schools and online learning and in pockets of exceptionally well-organized and forward-looking schools. Thus, there exists an opportunity to look at educational transformation – *the systematic addressing of persistent systematic problems* – as part of the *EIA* tipping point and not as "one more thing to deal with."

Education in the information age, EIA, looks at the direction education infrastructure is moving as the management and organization of the other social and commercial sectors in society transform how they market their purpose, transact their business, record their interactions, and track their improvements. In practical terms, this means that schools, districts, and counties are increasingly becoming, and soon will become fully Information Age organizations. As performance data is passed into student information systems and evaluated in real time in assessment systems that pass information to state and Federal agencies (and to the teachers, students and parents) which, in turn, make policy decisions that effect administrative and teaching practices, the schools will take their place alongside manufacturing, retailing, financial services and government agencies in the Information Age.

Similarly, as students, who are comfortable with computers almost immediately, begin to use computing and the Web as a growing part of their education without second thought, teaching and learning and administration and reporting will need to join forces with these students leaders and not leave them out of the equation or alienate them. But this will take significant shifts not just in how technology is deployed, but how thinking changes so that students and the education system work together.

Ultimately, the transformation at the level of the student is about the creation of a new culture of education, an information culture, that does for education what has been done for other segments of society, including gaming and entertainment. The modern student is looking for this culture today, but the school is a long way from providing it.

By example, if we like it or not, cars have become very complex information/mechanical devices that are beyond home repair. Modern mechanics, with their banks of diagnostic computer tools, look at the car as a system and conduct analysis to fix individual problems as part of the operation of the whole system. Individual parts inside the car that report their status electronically to a central computer, no longer require disassembly of the car to determine where the problem is.

At the same time, as diagnostic and repair data is passed back to the manufacturer who owns the systematic knowledge of all problems for all of their cars, a database is established that is used for vehicle improvement. This capacity also allows the manufacturer to centrally hold information that can be distributed to local dealers or mechanics as updates, procedures or information, and to the manufacturer to improve their new vehicles. If this systems approach has occurred in auto mechanics, and it has because the manufactures designed and mandated it, it can happen in education.

What They Teach in Business School
As any MBA program would describe society today, the best businesses or non-profit institutions are driven by change management, customer orientation, financial and organizational analysis, and supply chain management. These changes came in sequence, prompted mostly by specialized business consultants/professors, social thinkers, business gurus, and best-selling business books. Until the *tipping point* or the transition in the whole definition of a corporation, business, like education, was traditional, highly structured and directed by its history, not its future.

Today, modern corporations are, by design, customer-driven, process-managed organizations that are capable of changing who and what they are based on customer and market feedback. Such corporate giants as GE or Motorola or new line businesses like Barnes & Noble are examples of corporations fully inside the Information Age, even though they have very firm footings in the physical world.

The history of the revolution in corporate conceptions and management began with several key books and key thinkers. The most durable and sound advice on thinking outside of the box in business is the grandfather of them all, Peter Drucker. Drucker has a winning way of lifting the veil on the actual practice of business and its role in the future definition of markets and society. Drucker's books are legion, spanning more than seventy years. His recent *Managing in a Time of Great Change* (*) contains many of his primary thoughts on business that also provide sound thinking in running any purposeful organization, including schools. The two other anchors in changing businesses, but also signaling the changes in society in general, are Peter Senge and co-authors Michael Hammer and James Champy.

Notably, the publication in 1993 of the best-selling business book, *Re-Engineering the Corporation* by Michael Hammer and James Champy (*) shook the world by re-conceiving the notion of what businesses individual corporations were in. This book revolutionized

Re-engineering, in this sense, could mean changing a business from its traditional activity to a new activity based on understanding what core business expertise the corporation actually possessed, as opposed what it professed or produced.

corporate management and organization processes by creating a new understanding of exactly what the corporation is. For example, a company like Federal Express on the surface is a package delivery service, while, in fact, their actual business competence may be in logistics and transportation that could be applied equally to many other businesses. What Fed Ex does with packages could easily be applied to any logistics issue to support businesses or organizations requiring systems to move goods, people or information from point to point in specific time periods. They are in the time-management business. Similarly, it may be that Ford may be less in the business of making cars and more in the business of selling parts and managing customer financing.

The term business re-engineering came to mean thinking less of a corporation as a pre-defined machine tied to one purpose and one way of operating and more as series of expert processes built on top of incentives and motivation for every person in the value chain, including the customer, to work toward common financial goals and values. Re-engineering, in this sense, could mean changing a business from its traditional activity to a new activity based on understanding what core business expertise the corporation actually possessed, as opposed what it professed or produced.

The complimentary or follow-on book to *Re-Engineering* was Peter Senge's *The Fifth Discipline*

published in 1990. *The Fifth Discipline* did for human resource and organizational concepts what *Re-Engineering* did for business mission and transformation. Senge who, from his position at MIT, researched how businesses adapt to change, became interested in what he later popularized as the "learning organization," the dynamic process of establishing organizations almost as sentient beings, where everyone learns as they do their jobs and, as a result the missions is owned and improved by the employees.

Senge recently adapted his 1990 best-selling business book into a book for education and published it in 2000 as *Schools that Learn*, (*). The author said that the demand from the education sector for *The Fifth Discipline* was so high that he and his team created a book just for educators. It was the first true crossover from the subject of business management to education without attempting to re-make education in the image of the corporation. Senge understood that, at its core, businesses and education are different, but that each can learn from the other and that all of them are organizations that must learn to survive and prosper by becoming learning organizations and not hierarchical systems.

The problem with the hierarchy is that the people at the top can no longer have all the knowledge or experience necessary to guide a large organization or business. Today, expertise and knowledge is spread throughout the organization and must be harnessed collectively to create success in a complex, fast moving world.

Similarly, the customer-facing focus, championed by another consultant and business best-seller, *Customer Intimacy* by Fred Wiersema (*), described the efficiencies, PR value, and satisfaction that came about by focusing on the customer as the way to orient, build and maintain businesses. This book, along with the *Discipline of Market Leaders* by

Michael Treacy and Fred Wiersema (*) led to the thinking that is now common in businesses, MBA programs, and in the next generation of books on topics from self-help to education: orient business and business process around customer needs in order to have flexible businesses that can anticipate and change with the market.

Customer centered management is able to find its way into the online education entities at both school and higher education levels. It could be argued that the Florida Virtual School or Capella University are online educational entities that are customer-centered by definition and by objective and design. Their management teams study both the methods and process taught in MBA programs and they incorporate modern management as practiced by modern corporations and modified for their particular educational entities.

The other major business management titan, Tom Peters, author of *In Search of Excellence*, writes on the keys to successful business management. Like Drucker, Peters has become a household name and has many produced books, but has not published directly in education. However, many of the general concepts of business management can be applied to education in terms of strategic direction setting, organizational flexibility, change management and keeping the customer and the employee happy and productive as the keys to success.

The reason these management books can be applied to education is that good business management books contain a rare mix of common sense combined with the latest thinking from technology, economics or other disciplines that lead society into new ways of thinking and acting. They are closer to refined common sense than to alchemy, polemics, or self-aggrandizement.

By now, the business best-selling books are part of business and organizational history and, as a result

of their success, are part of the social history of the US and the world. What they characterized, reflected, or amplified ended up influencing many organizations beyond business. They also led the way to business automation or enterprise-wide software applications that electronically systematize business operations and organizational processes first detected and espoused by these consultants and others.

Today, such automation or system-wide technology is present in all large corporations, in all universities, in the military, financial services, and the military. It is also present in some large school districts, some county school organizations and in some states. In schools, such automation, process management, and customer orientation is everywhere in pieces, but in the core business of teaching and learning. As we shall see later, that is what the virtual schools do – they take the enterprise technology and enterprise management processes to the teaching, learning, and training worlds.

What Business is Schools In?

Simply applying the re-engineering paradigm to education, as practiced by the management gurus, will not yield a clear picture of what business schools are in, but it will start the process.

It may be that schools are in the business of facility and personnel management with a sub-specialty of the management of interactions between government agencies and local operational centers. Maybe they are in the business of managing the interactions between the generations or in the distribution of content from publishers and regulations from state agencies.

Universities are clearly in the business of knowledge production and education; they create curriculum out of their research in the disciplines of knowledge they are experts in and they pass that knowledge, through education, to their students.

Schools, on the other hand, manage curriculum, which is designed elsewhere via state or Federal standards, codified in textbooks published elsewhere, and modified by lessons plans suggested elsewhere but designed locally to package information and disciplinary knowledge for students that is based on state standards. There should be no illusion about the expertise in schools, or an expectation, that school history teachers will be historians or that school math teachers are mathematicians.

One of the main reasons that adaptation to changes common elsewhere in society has been so slow in coming to K12 education is that education, unlike the other sectors of the economy, is composed of an unusual set of circumstances and phenomena. These circumstances point to schools as places that concentrate their time on managing facilities, budgets, and personnel for the public good of educating young people. Yet their product is not education per se, but managing the flow of students, teachers, and staff through the school that has adopted state standards in order to receive state funding.

NCLB and state efforts are, increasingly, arguing that schools are in the business of managing and growing performance of students based on test instruments. This is so much the case that, under NCLB, schools can fail, or become educationally bankrupt based on lower performance.

The common sense point of view of the social good schools provide is a common baseline vocabulary for life and work, a sense of the prevailing values in American democratic society, and providing a place to be while parents are working. In this sense, it is not clear whether the student is a customer of the system or a charge of the state. In the newer eSchool variations, it is not so much that the school is virtual or the course is, but that there is focus on each learner. They are customer-centered and that

customer is not only the student, but his or her parent or parents. This is not the case in many mainstream school settings where challenging numbers of students in a time of declining budgets has meant a waning of core services and the management of the class as the smallest unit of focus by administrators. The only deviation to this is students who cause trouble, are falling behind, or trying to accelerate forward.

By re-thinking schools as businesses that have to be re-engineered, some interesting issues come to the surface. As a business or organization aligns its objectives with its capacities, it looks for obstacles or obstructions that keep it from obtaining its objectives as efficiently or as cost-effectively as it could, consistent with its overall mission. Applying this type of process to schooling, as an exercise, could produce the following points inhibiting educational goals and fulfillment of the school mission.

Impeding Change by Historical Design

Six key points that inhibit change or even the search for excellence in processes and management leading to high performance in schools are listed below.   It is argued here that six reasons, or disconnections, that make it difficult to change schooling to accommodate the times:

- One, the delivery of education is very decentralized and localized school by school, where the classroom is the dissemination site, making consistency in product and efficiency in process very difficult. It would be as if the GAP stores in California were isolated from each other and from the central national hub.

- Two, what is taught is actually determined in a highly centralized and authoritarian way at the state level with very little input or interaction from localities. Again, the GAP analogy would

be strict top-down policies, without deviation and without input from the individual stores or their aggregate data flows.

- Three, K12 education does not generate the knowledge it teaches, but out-sources that function to textbook companies which, in turn, contract with college professors as the authors and experts in their disciplines to create the textbooks.   K12 does not consult developmental psychologists and education researchers in the universities; they do not participate in the process of creating user-friendly textbooks that reach high marks for customer satisfaction.

- Four, the methods of teaching are determined without customer (student and teacher) input in the same way curriculum is developed at the state level. Students are not part of the process of developing, delivering, or improving their education. They are seen as non-players or perhaps antagonists to the process of their education. In the modern world, focus groups, feedback, and performance data would determine the best methods and practices for customers.

- Five, teachers and schools do not share with other teachers or schools as part of their mission or mandate. Therefore, valuable information is landlocked and schools are cut off from the exchange of information and the competition that would lead to the promotion of best practices. The hallmark of modern business is the gathering of information from competitors and allies and competition is based on that knowledge, which is sometimes freely shared to stimulate the whole market.

- Six, the funding of schools is not part of the school. Public schools are not funded by the

people who use them, but by state agencies, local and state property taxes, or by bond measures. While, there is no suggestion that this should change, it is a fact of life that causes a disconnection. Parents paying private school tuition are tied to their children's schooling in a different way than those who are not economically committed.

Finally, an historical anomaly that has been deeply inculcated (item five above) is that schools, districts, and states do not share what they learn or what they cannot solve. They do not work on common problems in common. While there are exceptions, the norm is for schools to be isolated like ships on a large sea with infrequent communication. Not only is this inefficient and highly questionable, it is also very expensive. Duplication in solving similar problems times the number of school sites equals a large number. There is no "network" effect wherein more than one organization solves a common problem or defines the common issues. Every school is, in fact, an island. This makes the *Tipping Point* phenomenon difficult because reforms that stick in schools are rarely invented in schools by school people.

History is Dynamic, In Motion, and Not Inflexible

When online learning, eLearning, virtual school and cyber schools, the eSchool variations, are looked at in light of *EIA*, they are no longer anomalies or aberrations, but are predictable outcomes of social and commercial transitions that would be expected as organizational and administrative practices comply with changes in the social-technology base of the Information Age in which we all live. Changes in industrial methods in the 1920's led to "scientific management" of business, which was visited on schools and, as a result, the methods of schools and school administration were adopted from the prevailing commercial methods of "scientific" management in large manufacturing facilities with assembly lines and heavy industrial and clerical operations. These methods are still prevalent although we are no longer in the industrial era.

The mirroring of education to the prevailing workplace was no accident in the 1920's: the captains of industry in the early 20th Century intervened directly in the form, composition, and funding of education. They did so with an eye toward producing workers who no longer were tilling fields or working in dry good stores, but were preparing for industrial or clerical labor.

Today, such top-down manipulation of education is unlikely to come from industry directly, although, ironically, many modern industries want more highly skilled, flexible, and educated workers, and often go overseas to find them. The industry no longer wants workers who were educated with assembly line educations — they need smart, nimble Information Age workers — but schools still exist largely inside a system designed for the Industrial Era not for the Information Age. This means that while we need centralized expertise, like the examples from the GAP, ATM machines, and the automobile industry, we do not necessarily need centralized administration that exercises authority divorced from expertise.

Industry, commerce, and the economy need students who are part of the Information Age and all that that means. In fact, all of us in the older generations — including teachers, administrators, and agency personnel — are dependent on these students creating and maintaining an economy that can sustain our retirement plans, social security and Medicare. This, alone, is a sobering fact for educators. It may be that our collective adult meal ticket for our "golden years" is going to be supplied by the students our teachers face today.

While industry no longer dictates to the education system, as it did a century ago, state and Federal governments have a far larger hand in what education

is through law and regulation. State and Federal standards, NCLB, and other laws or regulations are enforcing a systematization of education, insuring that education is uniform through standards and that it is brought to all students in society through equity and access, still a utopian dream in our current society with its fifty-one different state-level school systems.

Industry, for its part, looks at employees as a cost of operating its businesses. If better or cheaper labor is available elsewhere, companies will go to global labor markets. In time, American students will, and are today, facing Chinese, Indian, and Vietnamese competition for jobs. During the dot-com heyday, skilled computer technicians received special immigration status to work in Silicon Valley on one hand and, on the other, companies are now outsourcing offshore and taking advantage of the labor prices in Asia tied to well-educated workers.

Today, entire blocks of the US service and technology industries are outsourced to foreign subsidiaries or overseas development centers. These facts are not fully absorbed by those who are conditioning education for Information Age management. While the strictures of NCLB are being enforced, they are, unfortunately, trying to get basic standards of education enforced, while other countries, far less constrained than ours are moving into the while collar and technical labor pool aggressively. This is not a distant problem, but a growing reality. It is so because education at the higher education level and at high school is no longer the province of the West alone. The education genie is out of the bottle.

Why Only in the Classroom?

In the prevailing prescription for uniformity of curriculum and inclusion of all students in the traditional education system, there is nothing that suggests that such an education is only confined to the historical practice of education — classrooms, lecturing teachers, blackboards, and textbooks. NCLB allows online or eSchool variations, yet most states do not. While most state laws require classroom attendance for schools to receive state funding, there are changes because of virtual schools, cyber charter schools, and online learning in certain states on an experimental basis or quasi-official basis. However, there is no sense yet of divorcing the core of education from its traditional delivery method.

In the world of EIA, the prescriptive nature of education — standards and inclusion – is not likely to change. However, the delivery of education – where and how — is less of an ironclad issue and more likely to be bent to match the mores of society, the needs of commerce, and the lifestyle of youth. This paper argues that changes in place and means are already transforming on the periphery of mainstream education and in some states at the center of the legislative and administrative systems.

Finally, the most likely mainstream school settings to adopt EIA as a systems approach to education are the administrative, assessment, and management components of schools. Educators, administrators, and policymakers need to carefully examine the eSchool variations and EIA for two reasons: one, to address curricular and delivery problems that persist in the traditional school environment; two, to examine how the administration of school can be remade using EIA methods to create learning organization that not only teach students, but teach themselves as an on-going community process.

With NCLB, the proliferation of back-office technologies, and state high-stakes testing using data analysis techniques, school administrations are being pulled into *EIA* without being fully aware that they are part of a general sea change. To captain a ship on these waters, the concepts of navigation must be married to the various routes available to cross the ocean based on the data about weather and the crew.

The idea, then, is to begin to socialize an approach described by *EIA* to create the "container" or context for the discussion and enactment of education's future, a future committed to the mission of education detached from particular ways of delivery, but part of a modern infrastructure, not dissimilar to what other segments of society do. *Simply better enforcement of the past is not the key to the future when most institutions and businesses work in a much more participatory way, yet are entirely focused on results.*

III. INTRODUCING ENTERPRISE EDUCATION

Singular Missions Fortified by Systems Thinking & Enterprise Management

EIA, it turns out, is alive and well in numerous locations in the US and, it like the original educational reforms that came about at the birth of our nation, are unique to the US. The state-funded virtual schools are examples of *EIA* in action and they are examples of transformations that address the needs of society today and today's students.   Virtual schools, like Florida's (www.flvs.net) seasoned effort or like the nascent effort in Colorado (www.COL.org), are addressing the six issues of disconnection and, in doing so, are defining *education in the information age* not just in the use of technology, but in the building of 21ˢᵗ Century educational organizations that are driven by missions of excellence in all aspects of education delivery, administration, and policy.

How, then, do the various forms technology-assisted educational delivery, management, and assessment fit into the overall picture of delivering the mainstream education mission in the Information Age? How does EIA counter the six points above and make education more about its central mission of transmission of social values and discipline knowledge and make this process more participatory and less top-down?

EIA at the state or national level can assist and in some cases solve intractable curricular and teacher quality issues.   Consider the issues of science and math, difficult subjects that represent scientific research disciplines and touch myriads of professions.

Schools, in the best of cases, can convey the basic concepts and students can perform to state or national standards as dictated by adopted textbooks and tested with state instruments. With assistance that is electronic, students who need remediation or need to accelerate can benefit greatly. The students "in the middle" can be accommodated for different learning styles. Such *EIA* activity can be used to bolster the classroom, augment learning at home, or can replace the classroom. Simply states, just like Google, learning can be everywhere, be ubiquitous to the student, so it can be accomplished any time, not just in the class. This is consistent with many jobs in America today that are performed by individuals who are members of organizations or corporations but who work independently some of the time and in physical groups other times.

The case for EIA is simply to get differential services to promote learning and training consistently, independent of delivery form. In the case of Advanced Placement, or AP ™, and honor courses, there is more rigor required in the teaching and there is a clear shortage teachers and funds in many schools settings. These courses are readily available online. Does *EIA* play a role in changing any of the variables that remove schools from simply managing buildings and people to supporting a truer mission of education?

The historical fact that school control is a local function is mostly a myth. Problems are handled locally, but the authority over what is taught and how well it is learned is not held locally. *By* allowing an erosion that split up local practice and state policy,

where the central office has control over what is taught and the local school concentrates on the management of how, when, and where teaching occurs, has made meaningful change difficult if not impossible.

Unfortunately, while there would be little argument over many of these points in theory, in practice schools, in the main, and the state administrative hierarchy do not do these things as a matter of habit, policy or infrastructure. Instead, schools support a culture that is built on a model of a set of fundamental disconnections from the key aspects of their education mission.

These disconnections, historically, were once strengths. Local authority allowed teaching and learning to conform to local community needs. As local focus of schooling no longer drove economic development in a community, states took a larger role in schooling, in preparing young citizens to bolster the state economy and populate the state with socially responsible and economically productive adults. However, in a global economy, local control is only meaningful in the sense of harmony with local policies and local fit within the community social norms. The content of teaching and learning are not the concern of the local board, though hiring and funding levels are.

What About the Student?

Today the mix of interests and the organization of the education whole is an anachronism that is so well entrenched by strong interests, it is unlikely that change will occur easily.   The only interests that are not secured are those, ironically, of the student. Their voice and needs are mediated by bureaucracies, textbook publishers, and are captive in the hands of local administrators.

The fact that schools can act locally with a great deal of spirit is shown in athletics and music programs. Here schools become community centers and, even, centerpieces of their communities. Many parents and teachers lament that the same energy cannot be present with respect to the curriculum and student achievement, but the reason is simple. The state does not intervene in local school athletics or music programs.

EIA, can address many of the educational disconnections that exist between state and local entities, between schools themselves, inside individual schools, and between both the state office, the schools, and the research community.

Because, information and networks are designed to assist in changing or directing interactions, communications, and the transmission of value, EIA can assist in building a paradigm that spans the key school disconnections. Think about what email and the informing aspects of the Internet have already done in the school environment. Now think about building on that base.   In this sense, email and the Web might be, by analogy, the one room schoolhouse version of *EIA*. What we build on top of the electronic "one room school" will be something consistent with where our young already are, online, and where our society already is, using enterprise methods.

Looking back at the changes in businesses and in organizations like the military service branches, and looking at the lessons of the business pundits, change is possible, but it will have to start first by deliberately changing the infrastructure of school at all levels of the hierarchies and, then, by organically changing the culture of education so it can understand and utilize the functions that are possible with *EIA*. Doing so has to be done through the infrastructure and done so that all the vested interests of the education community see the benefit for each of their activities, whether they are teachers, unions, textbook manufacturers, or state agency personnel and elected leaders.

Enter the eSchool Variations

The areas of disconnection, as we will shortly see, have been addressed in some of the eSchool environments. They, in their own different ways, have addressed some or all of the six primary disconnections repeated below in abbreviated form:

1   Overly Localized Control of the Learning Environment

2   Overly Centralized Control of the Learning Content

3   Complete External Development of the Learning Content & Assessments

4   Exclusion of the Customer from Input on the Environment or the Content

5   Isolation of Practitioners & Students from Greater Learning Communities

6   Separation of Funding from the Direct Interests of Education

These six disconnections can be used as the yardsticks against which to measure the implementation of *EIA* in the eSchool variations or, for that matter, to measure the introduction of *EIA* in the scattered efforts in mainstream education. From the perspective of modern business, these are unfathomable problems that are more social than operational. From the perspective of education, these are issues that have to be addressed over time. They will not go away, they will simply become larger and more complex if not dealt with.

The early outlines of EIA are easily observable today in school districts where separate technology solutions are powering HR, enrollment, student record, procurement activities and, at the same time, are increasingly supporting websites to inform parents, remind and advise students, and broadcast to the community school activities. These are shifts in using electronic infrastructure to support parts of the school culture, but are mostly administrative and communicative in function, not curricular. There are, however, exceptions where some of the six disconnections are being bridged in districts and counties and states around the country.

That such technology solutions are to be found in a few mainstream instances being used to assist with student learning, the training for teachers, and the measurement of learning that is fed back into the design of the curriculum and the methods of teaching should come as no surprise knowing how pervasive Information Age solutions affect the rest of society and codify the thinking of the business gurus. The fact that easy results are not easily communicable to either other districts or state governments is an unfortunate aspect of the culture of disconnections that characterize the education system today.

Where curriculum is being developed and delivered electronically, as it is in many different eSchool settings, in many different ways and in some mainstream settings, it is simply the extension of *EIA* to the core mission and to a new concept of a modern educational entity.

Defining the eSchool Variants

What exactly do we mean by virtual education, cyber schools, state networks, online learning and eLearning and what are the differences, if any, between these terms and how to they fit into the concept of *EIA*? Below, the eSchool variations are separated and defined. From the point of view of this paper, each of these is an *EIA* variant.

Virtual Education has come to mean *state-funded* core, remedial, advanced, and college prep curriculum delivered entirely online to be used either in the school or, independently, in the home, workplace, or other institution (hospital, court school, detention center, military). Virtual education generally

takes place in virtual schools, which are education entities largely funded by state legislatures to assist in solving persistent educational delivery problems that traditional schools either do poorly or do not do at all and to address over-riding issues of equity in access to high quality education for all. Many of the virtual schools began by the need to address equity issues with students who did not have access to Advanced Placement, AP™, honors courses, or reasonably well taught high school general education curriculum.

This lack of equity in access to consistent education quality pointed out the deficit in teaching capacity in the states and, as a result it, became clear, in light of new solutions, that some percentage of students are put at a clear disadvantage in competing for admission to highly selective colleges and universities than other students, based on the inequities of local schools. It also became clear, as technology prices for hardware and access dropped and browsers became more powerful, that it is far cheaper to put a computer in the hands of a student and buy Internet access than it is to find qualified teachers and competent curriculum to fill every school room in a state.

Early virtual schools, funded by budget surpluses five or more years ago, were started in Michigan, Florida, California, Illinois, and Kentucky largely to address high school curriculum equity issues. New virtual schools have been established in West Virginia, Mississippi, Colorado, Hawaii, and Alaska to address both equity and access issues and to handle those students who are not in school for geographical, medical, or psychological reasons or because highly qualified teachers cannot be found in every small locality or in every urban school.

When it is understood that the fringe populations can effectively be reached online, then questions arise about using such e-teaching methods with normal, remedial, and accelerated populations within mainstream schools or to augment mainstream schools. Here schools are using eSchool variations to provide differential solutions to better reach their entire populations in a consistent manner. Yet, such schools and states still have problems thinking about remaking the infrastructure of education to employ such methods across their whole enterprise and to find consistent accounting and funding mechanisms.

In the virtual school states, it was easier and cheaper to bring computers to students or students to computers than it was to supply the missing programs to students in scattered and sometimes either small rural settings or impacted urban environments. The virtual schools took on a variety of forms and many have or had strong gubernatorial or legislative support and came into existence not as an organ of the state departments of education, but as separate state solutions. They all had certain things in common — computers, networks, centrally developed curriculum, customer orientation, development of learning communities, central teacher and staff training, and the analysis and flow of not only data but the methods and practice of delivery and management, reflection, and improvement.

Virtual School Examples

Florida Virtual School (www.flvs.net) was separately funded by the Florida legislature with the cooperation of Florida's state department of education, but now is a free-standing school that is funded with Florida's FTE funding, equivalent to average daily attendance funds in other states, but adjusted for the virtual environment. Today, FLVS provides a full, internally developed, online high school curriculum and assessment to students in home, school, or institutional settings. FLVS does not use textbooks, but relies on its development staff to develop its own content, courses, assessments, and resources to levels of rigor that publishing companies employ. In this case, expertise and

authority are clearly combined in FLVS's approach to curriculum.

This virtual school is the best example of a new *EIA* organization, an efficient, modernly managed education entity that works equally well with the traditional education establishment as it does with the alternate education community.

FLVS is a model worth examination by mainstream school entities for clues about modern education organization irrespective of delivery methods. Many of the six disconnections are overcome at FLVS.

Michigan Virtual School (www.mvu.org) was a governor's initiative supported by the legislature launched largely to circumvent Michigan's then perceived weak state department of education. Unlike FLVS, the Michigan Virtual School did not offer a full curriculum or offer the option of taking the place of school, as did Florida's FLVS. Instead, MVU, which stands for Michigan Virtual University, bundles services that it markets to school districts on an annual subscription model. The bundles could include a basket of services and products such as online AP™ courses, teacher professional development courses, student information system software and online content resources. MVU, like FLVS, develops its own courses and, unlike FLVS, also licenses third party online courses for distribution in its bundles to the districts.

West Virginia Virtual School (www.wvvs.org) provides a full out-source model of virtual school access to the State's schools, districts, and learners from the West Virginia Department of Education. This service is provided to augment curriculum and to reach students who for reasons of access, equity, or quality cannot find comparable course offerings. WVVS reviews and provides courses from for-profit vendors of courses and tools and from publicly funded sources, such as FLVS.

University of California College Prep (www.uccp.org) is a legislatively funded initiative managed by the University of California, not the state department of education, for the purpose of avoiding legal challenges to the state for not providing equal access to AP™ and honors courses uniformly for students competing for entrance into the University of California or other highly selective universities. UCCP utilizes University of California faculty to develop rich AP™ and honors courses as well as licensing courses that it does not have in its inventory. While the program started out as a free service to underserved populations and schools, the programs are now for sale to schools and students in the state and elsewhere.

Kentucky (www.kyvs.org), Illinois (www.ivs.org), and Colorado (www.col.edu) are all operating virtual schools that are coordinated with the their individual state departments of education for the same reasons that the other states operate their virtual schools. The newest of the three, Colorado, appears to be developing a model where Colorado Online Leaning will be an integrated part of the states educational delivery and thus begin the transition to a state *EIA* entity that could eventually influence Colorado's mainstream districts and schools.

There are large county offices of education and large districts that utilize virtual education solutions. The two Atlanta, GA counties (Gwinnett, www.gwinettk12online.net, and DeKalb) and the Fairfax, VA school district are examples of large counties or school districts using virtual school solutions.

At present, must virtual schools, with the exception of Florida's are servicing under 10,000 students per year in each of the virtual schools. However, the demand for these services and their acceptance by the mainstream is climbing and, in a matter of years, will not be seen as anomalies, but as part of the

education apparatus of the states or districts which deploy them. Every state with such capabilities reports student and parent demand in excess of what the virtual schools are funded to provide.

Cyber Schools and Cyber Charter Schools

Cyber/Cyber Charter schools, unlike virtual schools, are individual schools, charter schools, or Local Education Agencies (LEA's). They are not State entities. Many cyber schools in states such as Wisconsin or Pennsylvania operate under charter school authorization and are either entirely online, partially online, or provide support online for home-schooling parents. As education alternatives are sought by a broader constituency of parents and students, cyber schools are likely to get more sophisticated and may employ virtual school operations between more than one cyber school in order to raise the quality of their offerings and to defray costs.

Cyber charters and cyber schools are both publicly funded entities that parents or teachers have formed under charter school laws, funded by authorization of state charter laws, or some notable exceptions are for-profit education entities such as K12.com started by former Secretary of the US Department of Education William Bennett, the Connections Academy owned by Educate, formerly a division of Sylvan, a publicly traded corporation, and the Edison Schools, started by Chris Whittle with Benno Schmidt, the past president of Yale University, as chairman of the board.

The private, for-profit entities, are all using technologies for a variety of purposes to support their core missions just as any other any business would do in the Information Age.

State Networks

39 states have high-speed, statewide networks established for the delivery of education services to schools and higher education. These networks, often referred to as K-20 networks, were established without a clear sense of what would be delivered over their robust broadband networks. However, many states are now actively investigating and investing in curricular, content, and service delivery. Notable for such efforts are Washington's Digital Learning Commons (http://depts.washington.edu/lcommons/) operated in conjunction with the University of Washington, California's Digital California Project (www.cenic.org) operated in conjunction with that State's top universities and university systems, and Missouri's MOREnet (www.more.net/programs).

Online Learning generally refers to the online delivery of full courses and resources for students, teacher training, and leadership. The term is used to describe the course development, delivery, and monitoring activity of most virtual schools, higher education providers, and cyber schools. Online learning's for-profit vendors include www.apexlearning.com, www.aventalearning.com, www.class.com, and www.plato.com.

eLearning

eLearning generally refers the industry segment that runs the gambit from all uses of Internet and electronic delivery of online academic and corporate training courses, and online providers of technology solutions, supplemental content, and electronic tools. Investment analysts track this sector for its viability both as a consumer of corporate products and services by institutions and for the performance of for-profit educational service providers and technology and materials vendors, some of which may be publicly traded companies. eLearning companies could be in the training space, like Click2Learn.com or in the platform space, like www.eCollege.com or www.blackboard.com, or in the supplemental content space, like www.xanedu.edu.

Since the world of *EIA* is still in component pieces outside the eSchool variations, such as separate

solutions for administrative, training, and education and training operations in the physical school, it is difficult to imagine a school that is fully in the Information Age. But looking at the eSchool variations for guidance is a good place to start.

The Lessons of Virtual Schools

The subtitle of this paper could be, "The Lessons of Virtual Education." After closely studying state-funded virtual schools, several factors become clear, all of which are attributes of *EIA* entities. Foremost, is that the virtual schools and some of the cyber charter schools can bridge many of the six disconnections. From the six disconnections here are four *EIA* principals that come from virtual schooling that are core to *EIA*.

- CENTRAL CURRICULUM DEVELOPMENT: The curriculum is identical to good school curriculum and, in fact, is more consistent in terms of standards, pedagogy, expertise in discipline and, in many cases is of a higher "touch" in terms of counselor, tutor, and mentor interactions in assisting the learning process. Virtual education, online, or eLearning curriculum is developed as a team effort driven by course developers who systematically supervise subject or discipline experts, instructors, resource managers, counselors, mentors, and students. This is a professional curriculum development process that has no parallel in traditional school settings and is highly valuable in terms of process, organization, and outcomes that can be transferred to traditional mainstream schools. *In other words, there is value to mainstream schools not only in using the online versions of courses, but in learning the organizational methods behind virtual schools – both together are what constitutes EIA. They are bridging the state setting standards and the school interpreting them.*

- TRANSPARENT OR VISIBLE OPERATIONS: The curriculum, lesson plans, assessments, student interactions, and data on attendance and performance are all manifest and clearly visible because of the information-based solutions used to develop, distribute, and assess student learning can be observed electronically via the Internet or through other electronic means. There is no "back of the classroom," no "the dog ate my homework", or "I lost my report card." This transparency in product, process, and results does not have a counterpart in entirely place-based education. Again, the mainstream can benefit not only from using online courses, but from the system of transparency that can be adapted for mainstream use.

- INTEROPERATIONS OF SYTEMS AND FUNCTIONS: Administrative, enrollment, transcripts, and training processes are consistently developed for interoperability and data reporting. The fusing of electronic administrative solutions and curricular and course delivery in the virtual school operations is a model for the mainstream. The message is this, technology use administratively and technology support curricularly are not separate phenomena, but part of *EIA*, which can be further synthesized in creating modern education management and delivery. Such practices need to be interpreted for the mainstream and can be by the virtual school administrators because those administrators largely came from mainstream schools.

- PROFESSIONALLY MANAGED ENTITIES: The management of virtual education tends to follow modern, business management techniques and practices. Best practices, unlike traditional schools, are sought from peers and perfected in a climate of

collaboration and sharing that is motivated by a common mission to provide high quality, high performance, accessible education. An examination of the organization, methods and practices of Florida Virtual School or Capella University provide needed insight for mainstream schools, schools of education leadership, and state agencies in looking at modern education practice.

- BEST PRACTICES SHARING: Best practices are shared freely among the virtual schools across the country. This process was fostered by the early vendors of the software that powered many virtual schools and, then, was taken over by a new national association – the North American Alliance for Online Learning (www.nacol.org). One of the most promising aspects of EIA could be breaking down the cultural and social barriers to organizing and sharing practice between schools, districts, and states. Electronic means can reduce the social distance between educational professionals determined to have better schools by building new information cultures across old physical and social barriers.

- EMPOWERING STUDENTS AND TEACHERS: Ultimately, education comes down to interactions between teachers and students. The weight of the state and Federal bureaucracies, the wealth and influence of the textbook manufacturers, and the measures of researchers and reformers are useless unless the interaction at an interpersonal and inter-group level works between teacher and student. Yet, an analysis of mainstream education would reveal that the level of support for teachers and students, individually, in mainstream education is quite low. Here EIA and the virtual schools play an important role in instructing behavior for the mainstream.

Online support networks have proven themselves for first line support that can be backed up by phone calls and in-person meetings, not as an occasional thing, but as part of on-going school culture.

Why Keys to Success are Not Transparent

When many mainstream education practitioners examine the individual, free standing eSchool variations, they appear very different from what the mainstream schools do. Yet, a state-funded virtual school, a cyber charter school, an online course or an eLearning program are all largely delivering curricula that adheres to state or national curricular standards, are using certified teachers, are passing the students through the official student record systems, are involving counselors and parents in the process, and are reporting out performance and other required data.

Therefore, it is difficult to see these activities as functionally different from their classroom analogues, although a child on the floor of his or her bedroom with a laptop, or in a classroom without a teacher, looks far different than a child at a desk in a classroom with a teacher in front of it. In reality, if one examines the performance data, analyzes the interactions captured in the system, or asks the participants, very different answers are heard. It's like school, but for some it is much better and for others it may not be as good. The beauty of *EIA* in curricular settings is that the amount of teacher intervention can be adjusted based on the student, the class and the subject.

The good news about past reforms – *strict use of standards and the collection and analyses of data* – is that they prepare the education system for the *EIA* changes that are to come. Standards and data analysis are hallmarks of enterprise management in corporate and large institutional settings. The fact that schools, state and Federal agencies have been preparing this foundation is a step toward *EIA*.

However, many of those participants, willing and unwilling, have adopted standards and data analysis as an end in itself and not as a means toward a larger more transformational end.   Thus, the opportunity exists to say that standards and data are part of a process to transition education to new levels of efficiency and management that are characteristic of modern businesses and institutions. In short, they are the first steps on the road to EIA.

By making *EIA* processes and eSchool variations more visible to the larger community, the school and the state can examine new methods in a much more open and transparent way that is both less intimidating in its newness, and less different in its functions.   Such transparency allows communities to form and grow in ways that their participation can encourage and help change. Ultimately, the culture of education is going to have to change and will change as the social tide gathers more force.

Efforts in the past to either make schools into businesses or to bring business people on to boards or into administrations to bring business processes to school have largely failed. Schools are not businesses. Profit and loss is alien to school environments and misleading to the overall aims of inclusive education. However, interpreting infrastructure, management, and HR practices to remake schools is not making schools into businesses, it is focusing schools on how to fulfill their missions more rationally and effectively given the mechanisms and methods of the times.

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Curricular education and teacher training solutions within the *EIA* framework use technology solutions with accompanying human re-organization to solve, promote, or maintain issues of education quality, education equity, education access, and education efficiency. For these reasons, they contain the seeds of change and the infrastructure schooling must adopt to be consistent with the information age and to service young people entering the economy in productive ways. These issues are no longer confined to how well our students do, but are indicative of how well our society and economy will do in the future.

CONCLUSON

Mainstreaming *EIA*

To review, the point of this paper is to define and differentiate virtual school, cyber school, state networks, online learning into a relevant and meaningful context, *EIA*, so that (a) mainstream school operators can better understand these phenomena, b) to promote meaningful dialogue by giving a name, *EIA,* to the larger social and commercial phenomena for which the eSchool variants are a part, and c) to examine the *EIA* options for mainstream state, country, and district operations that draw from the lessons of the state-funded virtual schools and are designed to meet persistent and challenging problems that have no other clear solutions.

Virtual education, cyber school, and eLearning are entities, businesses, or institutions that are full models of *education in the information age*, not as a series

of technology tools being used to solve traditional problems in a singular, sequential, and separate manner, but as a systematic use of enterprise technologies to create modern educational entities. They are entities that, in the best cases, embrace and practice most of the modern management precepts taught by the management gurus, that operate out of a clearly defined mission, and that take the notion of customer and constituency management seriously.

Finally, *EIA* is designed to make schooling and administration active, proactive, and reactive, all at the same time. All to often mainstream education is simply reacting with little time or money to be truly effective. As a result, little problems routinely combine and grow into big problems. *EIA* allows schools and systems to concentrate on mission fulfillment, the addressing of persistent problems, and the sharing of what is occurring with larger communities and, at the same time, being able to react to the many emergencies or contingencies that are part of education management.

Full *EIA* entities not only are efficient users of current technologies prevalent elsewhere in society, they are modernly managed organizations whose arrival in the Information Age provides a glimpse of transformational changes in education as measured by the performance of teachers and students and as measured by the change in the roles and responsibilities of each of the school constituencies — *students, parents, teachers, administrators, researchers, and policymakers*. For that reason, the virtual school solutions are wonderful time capsules from which to glimpse the future of where education is likely to go as education becomes systems-based and less ad hoc. As such, we have a great deal to learn from virtual schools on our way to *EIA* in the mainstream.

Instead of looking at virtual education, cyber schools, and eLearning as something to debate, contest, venerate, or embrace, look at these entities as glimpses of what mainstream functions and options may look like for the bulk of our schools and districts in the future. Also, realize that the eSchool variants are not perfect examples of overcoming the six disconnections. They, like the rest of education, have to make due with less funding than they would like or need and, unlike the rest of education, they have to do these things without as much support or direction from the state or district in which they operate, which may be why they have succeeded.

Developing Enterprise Education

It is hoped that the introduction of the *EIA* concepts will provide a framework to think about modern schooling and education change and that forms of *EIA* will begin to appear that can be characterized by its own variations. Enterprise education, based on these early principles of *EIA*, may be a form of education organization, administration, support and delivery that characterizes the modern mainstream institutions once they address the six disconnections in a unified and systematic way. It is hoped, in time, that education reform will be much less an issue of competing with traditional practice or contesting technology use, but that systems will evolve that support cultures dedicated to constant improvement and continuous inclusion.

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