Is it Possible to Reform Schools? Toward Keeping the Promise of ICT in our Schools

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"How many of us there are who have left the schools and university with scarcely a notion of true learning. I unfortunate man that I am one of the many, thousands, who have miserably lost the sweetest of life and wasted the fresh years of youth on scholastic trifles….Some people are certain to be indignant that there are men who find imperfection in schools, books, and methods in use and who dare to promise something unusual and extraordinary ….(but) it is possible to reform schools."

These are the words of a man who was born in 1592 in Nivnice, Moravia and who died in Amsterdam in 1670. He was a bishop of the *Unitas Fractrum,* the Moravian Church, and a contemporary of Galileo, Descartes, Rembrandt, and Milton. His name was Jan Amos Komensky but we know him best with his Latinized name of Comenius.

The quotation above is from his *Great Didactic*[1] that was completed in 1632. The *Great Didactic* contains Comenius' proposals for educational reform and involves ideas that have had enduring impact: universal schooling; group instruction; and a standardized and sequenced curriculum. The reader of the *Great Didactic* who can transcend the antiquated style of the prose finds themes which have as much currency in 2004 as they did 372 years ago when they were written such as the need to engage students in the learning process, formal education for women, learning as a lifelong pursuit, learning as a natural process, and the reconciliation of school learning with everyday life.

School reform is an old topic. In America, the emergence of school reform in America was almost coincidental with the landing of the Pilgrims at Plymouth in 1620. Ten years after Comenius completed the *Great Didactic*, the Massachusetts Bay School Law of 1642 was enacted and that Law, the first school law in America, was an educational reform law. It was intended to respond to the negligence of parents and apprentice masters in teaching the youth of Massachusetts to read and to know the principles of religion and the laws of the Commonwealth.

Down through the years since Comenius there have been a progression of great figures in Europe who have argued that schools were failing to provide an effective education for the students in them: Rousseau, Pestalozzi, Froebel, Montessori. In the U.S. the two towering educational reformers were Horace Mann who died in the 1859 which was the same year that the other great American reformer John Dewey was born. None of these individuals were naive about the difficulty of accomplishing educational reform, but they were driven by their belief that schools could be, and needed to be, far better places for children than was typically the case.

The Nature of School Reform

The term "reform" when used in common parlance and in the professional literature has three related but different meanings but they are often used interchangeably: change, improvement, transformation. I see the relationship among them in this way: Transformation implies change; change does not imply transformation; and, neither change nor transformation implies improvement.

In my use of the term "reform" I mean it as discontinuous change in the way that Nadler and his colleagues have written about it.[2] Discontinuous change represents a break with the way an organization has functioned in the past and the adoption of new organizational structures – policies, practices, roles, and rules. Discontinuous change is contrasted with incremental or evolutionary change. Discontinuous change occurs as a result of deliberate actions of people inside the organization, actions which will be disruptive and controversial. Those initiating the change will be seen as heroic to some and foolhardy to others. Discontinuous change in organizations can also be a consequence of external cataclysmic events which impel the transformation of the organization.

Since reform can mean incremental change to some or discontinuous change to others, agreement among individuals about the need for school reform may be superficial and mask a quite different sense of the magnitude of needed change. Also, individuals who agree that school reform is necessary may have a very different conception of what schools should be after they are transformed. One person's agenda for reformation is another person's agenda for retrogression or folly.

Although the call for school reform is perennial it generally is not popular. Comenius railed against all those who were satisfied with the status quo. Horace Mann, James Carter, Henry Barnard and the others who led the reforms – the discontinuous change - that transformed American education in the middle of the 19th century (reforms strongly influenced by the European school reformers) did not ride a wave of popular opinion on the need to create a new approach to schooling.

The price of school reform has never been cheap. Horace Mann, for example, was a seemingly inexhaustible champion for school reform, battling reactionaries in the Massachusetts legislature, riding from small community to small community to win support for his proposals, and at one point selling books from his cherished personal library to support the reform cause. He had to withstand a concerted attack from the Boston schoolmasters that was a result of his support for "whole word" rather than phonics to teach reading, his perceived diminishment of the role and authority

of the teacher, his abhorrence of corporal punishment, and his focus on the on the child's interests as a critical aspect of the pedagogy he was espousing.

In my own case, my respect for the difficult challenge of school reform comes not only from my study of the reform process but also as a result of six or seven years spent working as a co-director of a project to transform a secondary school a few years ago as well as in other efforts assisting colleagues engaged in school reform efforts over the past forty years.

Those of us who are committed to educational reform recognize, as did those seven great reformers, that many of our fellow citizens are generally satisfied with the status-quo of schools. In the U.S. support for reform is not mainstream. The 2003, Phi Delta Kappan/ Gallup poll on the American public's attitudes toward the public schools reported that seventy-nine percent rate the schools as either very good (A), good (B). or O.K. (C). Only five percent give the public schools a failing grade(F). [3]

It is an intriguing to speculate about the content of a report that those seven great reformers would author were we to be able to bring them back as a school examining board and send them to schools in Europe and the U.S. to assess the progress which has been made in school reform since they left Earth. They would also see many consequences in school programs and policies of the ideas and techniques they had promulgated, albeit in some places to a greater extent than others. Yet, they would also see the battle had not been won and Comenius would certainly visit schools where the "fresh years of youth" were still being wasted on "scholastic trifles."

If we view educational reform as a task to be undertaken and accomplished –"once and for all" - then we might conclude that school reform is not possible which is a conclusion that some have reached. In the words of one who has come to see it this way, "schools are unrevolutionnizable."[4] Many of the "imperfections" Comenius observed in schools nearly four centuries ago can still be found schools today.

In every generation since Comenius there are two perspectives on schools. One sees schools as places where a fixed body of information is placed into the minds of compliant students who accept the premise that the value of the information is primarily to pass tests given them by their teachers so as to win a credential. The other perspective sees schools as places where students become engaged in learning because of their interest in the content of the learning and the personal relevance of the learning for them, and where comprehending and valuing the knowledge is more important than merely being able to recall it.

The "warp and woof" of educational reform is the continuing contest among proponents of these two perspectives, a contest that is as evident in the twenty-first century as it was in over the preceding four centuries. Recognition that school

reform is a cause that is, as Mann saw it, to be won schoolhouse by schoolhouse does not imply that the more systemic issues of structure and policy are irrelevant since the specifics of overarching structures and policies which provide a more or less congenial context for one or the other of the two perspectives. What it does imply is that the effort to transform the school as a social institution is more like transforming the family as a social institution than it is to the transformation of a corporation.

This paper is based on three assumptions. The first is that school reform is critically needed. The second is that ICT is provides an array of resources for schools that would have been beyond the wildest and fondest dreams of those of us who began teaching a few decades ago about what we could have available for our students in their classrooms and the learning environments we could create with these resources. Thus, ICT can and should be a critical element in efforts to reform schooling. The third is that school reform cannot be expected to be a natural consequence of the introduction of ICT to schools. Putting the technology into schools, even when teachers are trained to use it, will not in itself lead to school reform.

My purpose in this paper is not to try to win converts to these three assumptions but to offer some thoughts which I hope may be useful in the dialogue among those of us who share these assumptions and whose professional lives are dedicated to achieving the concrete actions and policies which these assumptions prompt. My commitment to this work springs from my deeply held conviction that our schools are generally not the educational environments they need to be and that ICT can be an extremely valuable element in transforming our schools into far better places for the educational nurturance of our children.

The Promise of Technology

The belief that ICT would provoke school reform has been a standard element in discussions about ICT in the schools. This was particularly true in the early eighties when microcomputers were introduced into schools. At that time, there was much written and said in professional circles and in the popular media about the "computer revolution in the schools." Earlier, some of the same things were being written and said about the other communications technologies. As we reflect on twenty-five or so years since the computers began to be deployed in schools and on the more than fifty years of other forms of ICT such as - radio, television, film, filmstrips, slides, phonographs - there have been proponents of ICT in the schools who tout ICT and make exuberant predictions about how ICT will transform schools.

In 1970, the Commission on Instructional Technology reported to the U.S. Secretary of Health, Education, and Welfare on their evaluation of educational technology in the U.S. The purpose of the Commission was to evaluate the use of educational

technology in the U.S. schools. The title of one of the chapters of the report gives a sense of the findings, "The Causes of Technology's Lack of Impact on American Education." The report enumerated a number of causes for the lack of impact such as teacher and administrator attitudes, poor programs, inadequate equipment, lack of accessibility, and inadequate training of teachers. One statement from the report is particularly striking:

> Examining the impact of technology on American education in 1969 is like examining the impact of the automobile on American life when the Model T Ford first came on the market. The further ahead one looks, the more benefits technology seems to hold out for education. The Commission weighed future promise against present achievements and examined the discrepancies between the science-fiction myths of instructional technology and the down-to-earth facts. Obviously, the problems that confront education have no one solution. But learning might be significantly improved if the so-called second industrial revolution – the revolution of information processing and communications – could be harnessed to the tasks of instruction.[5]

Thirty years later the commentary on the impact of ICT reflects the same tone of disappointment. Despite substantial investments in ICT in the schools, it is difficult if not impossible to find many close to the situation who claim that the technology has generated reasonably broad or deep change in the nature of schooling. Larry Cuban characterized the consequence of computers in the schools in this way:

> Securing broad access and equipping students with minimal computer knowledge and skills may be counted as successes. Whether such intended effects lead to high-wage jobs is unclear because the outcomes may be due more to graduates' skills picked up outside of schools or to their paper credentials. When it comes to higher teacher and student productivity and a transformation in teaching and learning, however, there is little ambiguity. Both must be tagged a failure. Computers have been oversold and underused, at least for now.[6]

Cuban is *persona non grata* in many educational technology circles in the U.S. since his work is considered to give "aid and comfort" to those opposed to ICT in the schools. Yet, his work provides a clear picture of the reality of life in schools and is valuable in understanding the forces and factors in schools which constrain the use of ICT as implements for reform. Cuban's thesis is not that computers are intrinsically valueless in schools; rather, it is that there is no reason to hold hope that just adding more computers, providing more Internet access, or even providing professional development to teachers about how to use the computers will cause school reform.

In 2004, as in 1969, a substantial quantity of the rhetoric advocating the use of ICT is based on a promise of what it will do for the children in our schools at some future time. Yet, ICT has not been, at least in the U.S. situation, a generally significant factor in reforming the nature of schooling. Many of us involved with ICT continue to promise a brighter future for the children in our schools through the use of ICT. Will people in another thirty years read about our promises with the same bemusement with which we read about the promises of our predecessors? The cynic might contend that the horizon is an apt metaphor, since no matter how far we travel, we never reach the horizon!

With this in mind, let me return to the question in the title: Can we reform schools? And, more specifically, can ICT become a salient factor in school reform? It is right, from time to time, to stop and consider the future but am wary of "futurists." I find the interest in futurism peculiar since I do not believe it is possible to "tell the future." I like J.B. Priestly's observation: "Solemn prophesy is obviously a futile proceeding, except insofar as it makes our descendants laugh." I believe it is difficult enough to "tell the past" or to "tell the present" with any degree of accuracy, let alone to predict the future. My sense is that there is less to be gained by trying to guess what the future will be than there is from learning from the past and understanding the present as we try to make schooling a better experience for our young people. If we learn from the past and contend effectively with the present the future will take care of itself.

In the following, I will offer my thoughts on the four topics which, I believe, are the critical components to the reform of schools involving ICT. They are: the curriculum, pedagogy, organizational structure, and technology. In this paper I can only provide a brief overview of these topics and outline the implications of each of them for reform. The paper will conclude with some comments on school reform in the broader context of educational reform. Along the way, we will meet several mantras, which are popular among those who work with ICT in the schools each of which is flawed or vacuous. These mantras steer us in the wrong direction which school reform is the goal.

Curriculum

Mantra One: Curriculum integration is the key to effective use of ICT in school.

A substantial proportion of ICT proponents have taken as their task that of getting computers into schools and encouraging or persuading teachers to use them. They commonly use two arguments. One is that computers and allied technologies are an important – or *the* important - 20th - 21st century technology and as such they belong in schools since the graduates of our schools will need to know how to use them in their work lives. The other argument is that computers will improve student achievement. The key point is that often persons advancing those arguments take a

neutral stand on the issue of the specific instructional goals that should be served by the use of the computers.

For those whose purpose it is to get computers into schools and to get them used – either computer proponents or computer vendors - neutrality with regard to the instructional goals of the technology is a useful tactic. "Curriculum integration" becomes their slogan and professional development for teachers is directed to helping teachers make use of computers for whatever the teachers have as their instructional objectives. Those in the U.S. disposed in this direction in the U.S. can take satisfaction in statistics showing that the ratio of students to multimedia computers in the U.S. improved from 1 – 21 in 1996 to 1 – 3. 8 in 2002, and the percentage of schools with Internet access rose from 70% in 1996 to 94% in 2002. Also, the percentage of U.S. schools where at least half the teachers used a computer daily for planning and/or teaching was 83% in 2002.[7]

Computer proponents who believe that the *raison d'etre* of computers in schools is to increase achievement promote the need for research to show the benefits of computers on school achievement. Curriculum neutrality often is the case here as well and the promotion of research on the impact of computer use on achievement scores is frequently done with little apparent concern about the content domain of the tests.

The issue of whether computers and other allied technologies yield increased student achievement is secondary. The primary issue is the validity of the curriculum itself. Improving the effectiveness of instruction on content that is irrelevant, antiquated, or trivial is hardly a commendable goal. Thus, curriculum – what to teach – takes precedence over pedagogy - how to teach it. When the curriculum as it currently stands is accepted as a given, school reform is stillborn.

The framework for the curriculum in U.S. schools originated in three committees established by the National Education Association in the last decade of the 19th century: the Committee of Fifteen on Elementary Education; the Committee of Ten on Secondary School Studies; and the Committee on College Entrance Requirements. As Pinar and colleagues put it, " These reports cast a mold for the school curriculum out of which it has yet to break free."[8] All three committees were dominated by subject matter specialists and they focused on administrative aspects of the curriculum such as the subjects to be studied, the duration of the courses of study, the age at which each study should begin, and the gradation of content according the age of the student.

The result of those three important committees was, in effect, to provide an answer in the form of a curriculum framework to the question posed by Herbert Spencer's in his famous education essay: "What knowledge is of most worth?"[9] Subject matter specialists bring both their expertise and their biases to their answer to Spencer's

question. Decisions made by subject matter specialists about which facts, concepts, and skills should be included in the curriculum, the relative importance of the various aspects of the content, and the proper sequencing of the facts, concepts, and skills, those decisions are based on the conventional and presumptive (at least for subject matter specialists) logical structure of the disciplines. However, it does not follow that the structure of the curriculum should have a one-to-one correspondence with the conception of subject matter specialists about the structure of the disciplines. A subject matter curriculum framework may be adequate when the purpose of the school is to challenge students to achieve the content of the curriculum as a means of gaining credentials that are awarded based on scholastic achievement. This approach is far less useful when the task of the school is to enable students to have knowledge, skills, and dispositions whose functionality is external to schools.

Thus, the starting point for school reform is curriculum reform and Andrew Sutton summarizes the curriculum change that is needed:

> There is growing consensus that education must extend its traditional goal of student mastery of subject-centered scholastic knowledge, to include the development of individuals who can prosper in complex and changing social, cultural and economic worlds. The 'inner intent' of reform efforts being made and advocated widely, could be characterized by these key principles: (1) emphasis on exit outcomes (prospering in the real world); (2) active learning for intellectual quality (constructivism); (3) personal responsibility for own learning and behavior (genuine engagement); (4) individual meaning and relevance (not one size-fits-all); (5) real-life purposes, roles and contexts (integrated curriculum); (6) links with community for mutual capacity building (productive partnerships in a learning community)….[10]

Rejection of the subject matter framework for the curriculum is not *per se* the rejection of subject matter. The worry of some that a curriculum such as that which conforms to the specifications in the Sutton quote may be vacuous and may coddle and entertain more than educate is legitimate. It even may be that a subject matter curriculum may do less harm than a constructivist and integrated curriculum which focuses on outcomes when it is badly designed or executed.

The solution for a rigid overloaded subject matter curriculum is not a fuzzy, loose process curriculum. Domain specific or content knowledge is a critical aspect in intellectual development. So the answer to the curriculum framework reform question does not lie in either the subject matter camp or the process camp but in a hybrid of them that is consistent with what is now understood about the constructive intersect of domain specific and general or metacognitive strategies.[11]

The disinclination to "take on" the issue of curriculum in school reform is not difficult to understand. Curriculum reform involves the consideration of the totality of knowledge and skills, all of the arts, sciences, and technologies of the culture and what from that totality is to be included or excluded in the curriculum, and how and when over the school years the student will encounter all that is included. Since the decision about what not to include is more difficult than the decision about what to include, the curriculum is generally bloated. Alfred North Whitehead's two "educational commandments" would serve us well, "Do not teach too many subjects, and again, what you teach, teach thoroughly."[12]

Not only is the reformation of the curriculum substantively difficult, but also the curriculum issue is laced with political land-mines. An article by Michael Jacques a "concerned parent" in West Allis, Wisconsin on the Website of the Arizona Parents for Traditional Education conveys the tone of many involved in the curriculum battles. I quote at length from an article called, "Whats (sic) wrong with higher order thinking skills?" since the quotation illustrates the nature and tone of opinions that commonly confront curriculum reform efforts:

> In the past schools would teach about 70-80% Lower Order Thinking Skills by teaching facts and covering a broad base in education. In the past schools would teach 20-30% Higher Order Thinking Skills. Today schools claim that rote memory as in Lower Order Thinking Skills is mundane, boring and a waste of time, especially since information is constantly changing and rapidly increasing. In some circles learning to spell correctly is a waste because we now have computers which can correct spelling. In some circles learning the math facts is a waste because we now have calculators.

> Schools now believe that we should devote 70-80 percent of our time to the teaching of Higher Order Thinking Skills. Schools are accomplishing this type of teaching through thematic teaching (teaching to a common theme in all subjects). That is integrating subject matter across a number of different subjects. Instead of studying specific subjects we have children participating in groups (called cooperative learning) in the performance of a big project which includes multiple disciplines. Each group of children in a class performs one phase of the project. This is very limiting in an overall knowledge base since all of the groups have only participated in a small part of the overall project, and each individual child has participated in an even smaller part of the project. This is also very limiting in knowledge because it does not cover an in depth study of the individual subject matter as has been done in the past.

> Teaching Higher Order Thinking Skills Sounds like a great idea. Participating in cooperative group projects can be fun and exciting. But, there will be a terrible lack of in depth study of a broad range of subject matter. Consequently children will do poorly on the norm reference

standardized tests and thus there is a call to replace the standard norm reference tests with what is called the new "authentic assessment tests".[13]

Perspectives such as the one above are not rare and those who hold such perspectives are tenacious in their advocacy and often prone to the stridency that is evident. Even a small number of persons holding such views can suppress reform efforts.

Any curriculum embodies a conception of the nature of knowledge and the answer in the form of the curriculum to Spencer's question. It is especially ironic that so many who are closest to ICT in our schools seem to fail to recognize the revolutionary impact that ICT has had on the nature of knowledge and what that means for the nature of the school curriculum.

The literary tradition, and particularly the technology of the book, profoundly influenced the way in which people have thought about knowledge for several centuries. Print tends to make knowledge seem like a historic product.   In this formulation, knowledge is something that comes from the past work of scholars and scientists. The structure of the book was a dominant metaphor for the structure of knowledge. The book is linear. It is divided into chapters, each of which contains a cohesive segment of the whole of it. The order of the presentation is governed by a logic which has a semblance of immutability. The book has heft and the words printed on a page have durability and permanence. The nature of the book as the vehicle for disseminating knowledge has had strong influence on how we think of the nature of knowledge. The characteristics of the book become the characteristics of knowledge.

The most obvious implication of the information revolution is the expansion of knowledge. Walter Ong estimated that at the beginning of human history knowledge took from 10,000 to 100,000 years to double. Later it took from 500 to 1000 years to double. Currently, it is doubling in 15 years or less.[14] Information technology permeates the contemporary conception of knowledge. The computer screen and the Internet are replacing the book and library in where and how knowledge resides in our culture. The dissemination of knowledge using print has obscured the dynamic and even disorderly nature of the process by which it is created. Knowledge becomes a network of concepts with many connective pathways with more recognition of the dynamism and non-linearity of knowledge. The electronic tradition, like the oral tradition, is much more congenial to a communal approach to the construction of knowledge than is the print tradition.

At the heart of the difference between a literate and an electronic culture is the shift from a contemplative to an experiential method of acquiring information about our world. In a writing culture, human beings learn by pulling away from what is happening around them and reading about events, concepts, facts which another person has abstracted and structured. An electronic culture, on the other hand, puts the person in the midst of the experiences that often are raw, unprocessed

and, to use computer lingo, real-time. The orderliness and "one step back" character of reading is in contrast to the untidy and "plunge into it" nature of electronic experiences. Our own preferences on the literary vs. electronic culture are less important in terms of doing what is best for children in our schools that contending with the realities of life as it is. Schools and the curriculum they contain ought not be museums dedicated to preserving a form of the culture that no longer exists. Yet, the presence of computers in schools can, and often has been, merely cosmetic and did not reflect a deeper recognition of how ICT has affected the way in which we now encounter our culture.

The need for any particular skill is contingent on life situation. Few people in our society rely on their ability to hunt for food to feed themselves. Today, for many, skill of being an effective shopper at the local supermarket are more valuable than the ability to kill an animal for food. Information technology causes some skills to become less valuable at the same time that new skills emerge. Many factory workers who worked with their hands using wrenches, drills, and welding tools no longer require skills with those tools but must now acquire keyboarding skills. The value of being able to spell by memory every word a person uses in writing is less important when the individual writes on a word processor with spell check. While the availability of spell checkers does not mean that we should stop teaching spelling, it does mean that we need to recognize curricular implications of spell checkers in considerations of what to teach about spelling. The task of searching information bases did not exist in any significant fashion a few decades or so ago; it is now a skill of great value.

What we as humans need to know and be able to do to be productive members of society has been affected in deeply pervasive ways by ICT. The pace at which knowledge is created, the way that those who create knowledge create knowledge, and the way that knowledge is diffused though the culture have been affected in deeply significant ways by information and communications technologies. It would indeed be perverse if schools are the one place in our society which are bypassed by the transformation impact of ICT on the creation and dissemination of knowledge. When there is understanding in our schools of how ICT has affected the creation, dissemination and use of knowledge, we will see consequences of ICT in the curriculum even when we do not see students using computers since this understanding will affect the nature and structure of the curriculum. The subject matter curriculum will give way to a curriculum structure that reflects the dynamism and "work in progress" quality of the production of knowledge along with the recognition of the linkages and intersections among domains of knowledge. The skills which are embodied in the curriculum will reflect the changes occasioned by the role ICT plays in our world.

Pedagogy

Mantra Two: From sage on the stage to guide by the side….

"From sage on the stage to guide by the side" is the often-quoted characterization of the pedagogical aspects of school reform with ICT. This expression means that the teacher should not give lectures but should be available to assist the student when she or he needs help. The statement also implies something of a conception of the relationship between teacher and student (albeit in a rather vague fashion) but, it really offers little that is useful in defining a conception of pedagogy.

The critical pedagogical question for schools is: Why do so many students fail to learn in schools and what can be done about it? Some of the answer to this question lies in the disconnect between the student and the curriculum but, that is not all of it. Just as the curriculum is based on assumptions, frequently tacit and unexamined, about the nature of knowledge, so also is the pedagogy based on assumptions about human learning which are just as buried and frequently just as dysfunctional.

There have been many answers to the question: What distinguishes human beings from other forms of animate life? For Plato, the human was characterized as a featherless biped. For the English essayist William Hazlitt, the human was the only creature that laughs and weeps. For Henri Bergson the essence of humanness was the ability to use tools. In biological terms, the human species is *homo sapiens,* man the wise. The capability of the human to think, learn, acquire and use knowledge was determined to be the characteristic that distinguished our species from other primates. Humanness resides not in the heart but in the central nervous system.

The ability to learn is not an acquired but is a natural capability of humans. The human being is a learner from birth until death unless such is precluded by some significant brain abnormality. Early in life the baby learns to discriminate his/her mother's face from other faces. The child learns motor skills such as eating with table utensils, playing with toys, and cognitive skills such as a language or two, and social skills such as acceptable and non-acceptable ways of dealing with others as well as distinctions in behavior appropriate for the different people with whom he or she comes into contact. Much of the knowledge, skills, and dispositions which are functional in our lives are acquired as a result of learning experiences embedded in day-to-day life rather than as a result of any formal teaching.   Children are continuously engaged in learning, and even though the learning which occurs in their life outside of school is less conspicuous than that which occurs inside schools, it is learning that affects their lives.

In thinking about the human as a natural learner it is important to keep three things in mind. First, "learning" is not an honorific but a descriptive term. To say that the human being is a learner is not *per se* to pay a compliment. People learn bad things as well as good things. Children learn language, mathematics, how to play the piano, etc., but they can also learn prejudice, how to hot wire and steal cars, and even, given the sad state of our world, how to be effective terrorists, among other anti-social skills and dispositions.   Learning the wrong things is not necessarily a less impressive task when judged from the complexity of the learning task.   It is easier to learn the occupation of a sales person in a fast food restaurant than to learn the occupation of a successful car thief.   Second, to say that individuals are natural learners is not to imply that all demonstrate this capability to the same extent. People can learn how to learn and can become more or less interested in learning and more or less effective at the process. Third, it is possible to hold this position in non-romanticized manner. We need not be Rousseauean and content that all would be well with the child were he or she unfettered from a repressive society. Children may not feel like learning when they should or need to do so. They will exhibit boredom, disinterest, a lack of motivation at times in any instructional environment no matter how well it is devised.

John Dewey, who had the misfortune of having his work become popular mainly in the form of distorted interpretations developed by his disciples (disciples whom he had not anointed), recognized that "school learning" is a form of learning that varies from the way learning occurs in setting outside of school:

> we exaggerate school learning compared to what is gained in the ordinary course of living.   We are, however, to correct this exaggeration, not by despising school learning, but by looking into that extensive and more efficient training given by the ordinary course of events for light upon the best ways of teaching within school walls. The first years of learning proceed rapidly and securely before children go to school, because that learning is so closely related with the motives that are furnished by their own powers and the needs that are dictated by their own conditions. [15]

In the past century there have been thousands of studies of human learning. The preponderance of these studies have focused on learning in schools or formal learning, and since a substantial proportion of school-aged children have problems learning in schools a considerable amount of research has been focused on learning pathologies. Much less attention has been devoted to understanding natural or informal learning, learning in those instances when the process is not structured and regulated by others but is woven into the life situation of the person.   In these situations, learning occurs even though there is not someone formally designated as teacher directing the process.

In recent years there has been interest in efforts to understand learning as a natural human phenomenon in work such as that done by Sylvia Scriber and Michael Cole,[16] Gardner,[17] and Bransford *et. al*.[18] Scriber and Cole's research helps to clarify the ways in which the set of specialized learning experiences in schools "promotes ways of learning which often run counter to those nurtured in practical daily activities."[19] Informal learning situations make much greater use observational learning in contrast to leaning which is mediated by language. Time weighs much more heavily on school learning than it does in informal learning situations where the demands of keeping the class moving forward sets rather strict parameters in the time any individual child can be allotted to accomplish the learning. Also, "passing the test" is the basis for determining if the learning has occurred. If the student answers the test questions correctly or solves the problem, the student will be considered to have the requisite understanding but, as Gardner points out, "No one asks the further question 'But do you **really** understand?'"[20]

The percentages of children who fail in our schools is unacceptably high and when added to those who are "just getting by" and those who are passing though schools mainly because the schools need to move them along despite what they are or are not learning, it is clear that we have a critical educational problem. Scriber and Cole's work points us in a better direction than many of the studies that attempt to define learner pathologies:

> It is not necessary to look further for explanation of the difficulties formal education may present to people who rely heavily on informal education as their base method. The problem does not lie "in them." Searches for specific "incapacities" and "deficiencies" are socially mischievous detours. [21]

The crux of the pedagogy issue for schools is to reduce the dissonance between the way learning happens within the school with the way learning occurs the everyday world. While this is needed even if ICT plays no part in school reform, there is particular relevance for ICT since ICT has the potential to make the school walls more permeable to the outside world than
has ever been possible. ICT has the potential of playing an important role in realizing the hope of generations of reformers that the gap between the school and the world be bridged. As this occurs, there should also be deliberate efforts to rectify the discontinuities between formal and informal learning.

Organizational Structure

Mantra Three: Increasing and improving professional development is the key to effective ICT use in schools.

"Professional development" is the answer many give to the question: What needs to be done to get technology used effectively in the schools. There is a considerable body of opinion that deficiencies of teachers are the problem and professional development is the solution. Teachers are seen as fearful of technology, Luddites, inadequately skilled, too tied to their own past practices, etc.

On one level the need for professional development for teachers on the use of ICT is obvious. Teachers cannot use ICT unless they know how to use it. There have been many situations where equipment was handed to a teacher with little training on how to use the equipment and even less with regard to the instructional uses of the applications. Teachers often have been left to get what training they can get when and if they can get it.

One cannot argue with the need for more and better professional development for teachers pertaining to ICT. For those who believe that the schools are generally adequate as they currently exit professional development is the critical factor (assuming teachers have the ICT available to them) in use of ICT. For those who believe that transformation is needed, teacher professional development is best seen as an important element but in itself not sufficient to cause transformation. The belief that the tension between an organizational or systemic structure of the school that is discordant with and the teacher's newly acquired capabilities in using ICT will be resolved in favor of the teachers new found capabilities by causing the requisite organizational change will be found to be in error far more often than it is found to be correct. The particular nature of the nature of schools as organizations provides a special challenge for school reform initiatives.

The conception of "system" was of central importance to the school reformers of the 19th century. While it is not unusual to hear current critics of public schooling refer to the factory as a metaphor for the framework used by the reformers, such was not the way the reformers thought of it. In fact, the educational reformers adopted the popular metaphor of the time that was that of a machine. The reformers saw the invention of the system of schooling in much the same way as they saw machines with parts working in harmony to accomplish the purpose for which the machine was invented. The power of machines demonstrated how the use of a "scientific approach" and systemic thinking embodied in the machine could enable the creation of American public school system to function with the same predictable success in accomplishing the standardized objectives of the school.

The contemporary understanding of the nature of the school as organization as it now exists is at considerable variance from the organizational structure envisioned by the 19th century reformers. The organizational structure of the American public schools fits the description of what has been termed a "loosely coupled systems"[22] or even "decoupled"[23] systems. Organization coupling refers to the cohesiveness and coherence of various elements or sub-systems of an organization.   The

machine is a good example of a tightly coupled structure in that the one part of the machine can not "decide" to function in ways which are "out of sync" with what the machine as a totality is all about. In schools, however, administrators and teachers can be, and frequently are, to a considerable or even to a total extent disconnected. They are loosely coupled or decoupled. The formal structures of the school system, the policies and governance aspects of the school system as an entity are often disconnected from the day-to-day work of teachers in their individual classrooms.

People who build skyscrapers and bridges understand that the way to ensure their structure will stand in the face of environmental challenges such as high winds or earthquakes is not to make it rigid but to allow it to be flexible. Loose coupling of the school as an organization provides the flexibility and ambiguity that serve a useful function in an environment with many diverse and conflicting perspectives and demands. To say that the formal structure of the school is decoupled from the day-to-day work in classrooms is, however, not to say that the formal structures are irrelevant. As Cuban [24,25,26] shows, a number of curriculum and pedagogical practices of schools such as age grading, the fifty-minute class period in secondary schools, the self-contained classroom in elementary schools, Carnegie units, have been generated in response to the way schools have been organized. Policies and established system procedures can inhibit or facilitate actions of organization members but, the implication of understanding schools as loosely coupled systems is that making some changes in the formal structure of the school – changing some policies or adopting new system procedures may provide some benefits to individuals who are attempting to make good use of ICT but it is not likely to transform the school.

Thus, the reform challenge as it pertains to the school organization goes beyond making some changes in the organization as it exists but to create a different type of organization that conforms to what organizational theorists such as Margaret Wheatley [27] and Stephen Robbins [28] think of as organic organizations. The type of organization that Wheatley, Robbins and the many other organizational theorists who have promoted the concept of organizations that are built on low formalization, participation, relationships, and a flat hierarchical structure rather than on bureaucratic and steep hierarchical structure. This requires us to leave behind the wish for certitude with regard to outcomes, a wish that has never been fulfilled in the systems as they now exist. It also requires us to recognize that the effort to have a good educational system with mediocre teachers – if we only have the right rules – is chimerical. It has not been easy for me to accept this. It would expedite matters so nicely if we could reform schools simply by writing new policies and, as a constitutionally impatient person, that has always been appealing to me. Yet, I have come to conclude that reform will not happen in that way.

It is for that reason that I find the work of David Hargreaves [29] so appealing. His conception of developing organizational structures that enable teachers to "work

laterally" in innovation networks provides a thoughtful and pragmatic approach to a new organizational architecture for schools.

The Technology

Manta Four: It's only a tool.

The data on computer access which were cited earlier in the paper paint a rosy picture of access. Yet, recent and more careful research on the situation in the U.S. presents a different picture. Norris, Sullivan, Poirot, and Soloway report on a detailed survey of teachers in the U.S. Their data show substantially less availability of computers and Internet access than that which is more frequently citied. They found that one teacher in six had no computers in their classroom, and about two-thirds of the teachers had no more than one computer to be shared among all of the students in their classroom. Less than five percent of the teachers had more than five classroom computers available for use. Teachers with no more than one computer outnumber teachers with six or more computers by a factor of 7 to 1. Twenty-eight percent of the teachers had access to an Internet connected computer lab only once a week and thirty-nine percent have little or no access to a computer lab. The authors of the study say, "By combining the results of the two technology access questions (number of classroom computers and frequency of lab access) it becomes apparent that K-12 classrooms are a very long way from being 'wired.'"[30]

Putting computers into schools will not, in and of itself, cause reform but school reform efforts which are intended to make use of ICT will not be successful unless the ICT is available in sufficient quantity. If ICT is expected to be a natural and normal element in the conduct of schooling, students need to have access to the technology whenever they need it and on one-to-one basis when such is required.

It would generally be unthinkable to ask office workers to share a computer even if none of them use their computer all the time every day. Classrooms are no less complex environments than offices. Seasoned teachers learn to be wary about resources that they do not control (such as is the case with computer labs or computers on carts that are intended to be shared by several teachers). They are also cautious about making instructional plans that entail precarious logistical arrangements. A hundred years ago school personnel fought the battle to provide school books for students on a one-to-one basis. Ultimately, there was acceptance of the principle that in order for students to use books in school they had to have them. The same principle applies for ICT.

There is not only a need for more computers in those schools where there is a agenda for reform, there is also a need for better computers and software than we have at present - better in the sense of being more reliable and easier to use.

Donald Norman speaks of the computer as "perhaps the most frustrating technology ever."[31] Norman contents that what is needed is the "invisible computer" by which he means a computer that will:

> disappear from sight, disappear from consciousness, letting us concentrate upon our activities, upon learning, doing our jobs, and enjoying ourselves. The goal is to move from the current situation of complexity and frustration to one where technology serves human needs invisibly, unobtrusively....[32]

Recently, I was at a conference where an expert in educational technology was making a presentation about what could be done to increase the propensity of teachers to use computers. The session was delayed for several minutes because he could not get his PowerPoint presentation to work properly – a not unusual occurrence.   Several other technology experts came to the podium to help him get it running. The audience, of course, sat patiently waiting for the problem to be solved. In his presentation, he spoke about the problems of teacher attitude toward computers, fear and hostility, and the need for training of teachers on how to use computers and to integrate them into their curriculum. I wondered why it never occurred to him to extract the moral from his own episode with computers. Put his experience with the recalcitrant computer, which is certainly not uncommon, into a sixth grade classroom and one has the makings of a much less happy ending.

"It's only a tool" is misleading in a couple of ways. First, it may suggest that computers and other allied technologies are just a new way of accomplishing the same things we have done in the past. Certainly, this can be the way that ICT is handled in schools. However, ICT has led to – and will continue to lead to – many new ways to create and experience human culture. It is not too early to come to grips with what this means for the conduct of education. Second, the implication of "only a tool" notion may dispose us to put more of the responsibility for contending with the defects in the tool on the user rather than on those who create the tools. While the involvement and support of IT hardware and software companies in providing training for teachers is welcome, the best way they could help in expanding and improving the use of their technology would be in producing "invisible computers." Similarly, application developers need to design applications that enable the improvements in processing to be felt by the end-user. We should not be satisfied with faster computers which run slower because of the increased demand on processing of the software.

School reform efforts may find particular use for wireless computers and broadband. The hybrids that emerge from these three technologies – particularly as they become smaller, cheaper, more reliable, and easier to use - will doubtlessly provide those capable and imaginative teachers with resources that may really deserve the hyperbole so abundant in the world of ICT.

School Reform – Educational Reform

The terms "educational reform" and "school reform" are often used interchangeably, but there is a distinction between education and schooling which is useful to make. Education refers to the totality of the experiences by which individuals acquire the knowledge, skills, attitudes, and perspectives which they acquire through all of the people and information resources that function as their "teachers." Schooling refers to that component of the educational process that happens inside schools.

The 19th century U.S. school reforms established the school as the primary educational resource for children. This came in response to the diminishment of the involvement of the family, church, and workplace which had played such important roles in the colonial and early years of the Republic in the education of American youth. The American Public School came to be seen as *the* institution which was expected to accomplish the preponderance of learning outcomes for children from early childhood to later adolescence. Schooling and education became synonymous in the mid 19th century America. Yet, that is changing.

While the magnitude of the impact that ICT has had in schools can be debated, there is less room for debate about the impact ICT has had on education in the U.S., if by education we mean the process whereby young people acquire the information and beliefs which they actually use in their lives and if we speak of ICT primarily in terms of the ICT they encounter after the school day is over. The teachers who are teaching our youth history are people like Oliver Stone and Steven Spielberg, Their civics teachers are people like David Letterman and Jay Leno and their teachers of deportment (an area of much concern to the founders of the American Public School) are MTV, Eminem, Britney Spears, and other popular media figures. Some may feel that to speak about popular music stars, talk show hosts, and movie people as educators violates the term. They are educators, however, if we take the term to mean persons who, for better or worse are instructing our young people.

With radio, then television, and then computers, teachers and schoolbook are now again only one one element in the complete mosaic of resources which are used by young people to acquire the capabilities and dispositions needed to become functional in society. Recognizing and accepting this reality does not at all mean that that schools will or even should fold their tents and go away. What it means is that school leaders need to recognize and accept the fact that the hegemony of the schools in society as the educational force for our young has ended. Thus, we are actually in an era probably more like the 18th century than the 19th and early 20th centuries as pertains to the education of our youth because of the ubiquitousness and potency of ICT in the non-school hours of the day for our young people.

Formal education – schooling must adopt the posture of the wise parent who realizes that the best she or he can do for their children is to provide them with constructive independence. In an age of where there are such abundant educational resources disbursed throughout the culture, the ultimate criterion for success of schooling will not be the scores on achievement tests but the number of students who leave the school with a zest for learning, autonomy as learners, and the capability to use the rich and expanding resources of ICT for their own development as human beings.

In Conclusion

In this paper I have expressed my beliefs about school reform and the approach that needs to be taken in order to accomplish the much needed school reform with the important capability that ICT provides for us. In the U.S. our federal school initiative has the right name for the wrong program. Far too many young people in the U.S. are not being touched by schooling as they should and thus many are indeed being left behind. "No Child Left Behind" does not begin to deal with the issues we need to take on if we want to transform our schools and make schooling a positive force in the lives of our young people.

 My argument is that reform needs to take on the complexities of these four elements: curriculum, pedagogy, organizational structure, and technology. There is no reason to expect that providing training on how to use computer for teachers, continued campaigns to proselytize for ICT in schools, and continuing gradual expansions and improvements in the ICT we put in schools will do cause the needed reforms. It is also my very strong sense that reform requires actions pertaining to all four of those elements and that dealing with any of them in isolation from the others will not lead to significant school reform.

There are many who have given up on the schools, who find the probability of the needed school reforms too low. Ivan Illich spoke of the need for a divorce of education from schooling and said he "felt sure that it will soon be evident that the school is as marginal to education as the witch doctor is to public health."[33] To give up on schools and the possibility of school reform is to walk away from millions of children in our schools who deserve and need better than we are giving them at present. Yet, we must also come to grips with the hard issues of school reform and abandon any naive expectation of magical power in ICT to cause reform. In the U.S. the school reform that is needed will not happen at a national level, and I am not highly optimistic of it occurring at the state level. It can happen at the level of individual schools and even at the district level.

I write this as one who is deeply impressed with what ICT can mean for education but as one who is increasingly frustrated by the way we have approached the

implementation of ICT in our schools. Too many of the conversations within the ICT community are littered with clichés and too few reflect the degree of maturity of understanding that several decades of experience should have produced.   I write this as one who believes that the familiar words written by H.G. Wells in 1920 in his Outline of History have never been more important than now to take to heart – "Human history becomes more and more a race between education and catastrophe." I write this as one who feels that at the moment catastrophe may be ahead in this race and as one who fervently believes that it behooves all of us who have any influence in any of the venues where education occurs to do everything in our power to put education in the lead.

References

[1] Comenius, J. A. (1967). *The Great Didactic [Didactica Magna]*. New York: Russell & Russel. pp. 79 – 81.

[2] Nadler, D.A., Shaw, R.B., Walton, A. E, and associates. (1995). *Discontinuous Change: Leading Organizational Transformation*. San Francisco: Jossey-Bass Publishers.

[3] Rose, L.C. and Gallup, A. M. "The 35th annual Phi Delta Kappa/Gallup poll on the public's attitudes toward the public schools." *Phi Delta Kappan*, September, 2003, pp. 41-56.

[4] Luehrmann, A. (1985). "School of the future – school of the past". *Peabody Journal of Education*. 62(2). 42-51

[5] Tickton, S.G.(Ed.). (1979).*To Improve Learning. An Evaluation of Instructional Technology*. New York: R. R. Bowker & Company, 1979. pp. 10-11.

[6] Cuban, L. (2001). *Oversold and Underused: Computers in the Classroom*. Cambridge, Massachusetts: Harvard University Press, p. 179.

[7] Education Week. *Technology Counts 2003*. http://www.edweek.org/

[8] Pinar, W.F., Reynolds, W.M, Slattery, P., Taubman, P.M. (1995). *Understanding Curriculum*. New York: Peter Lang. p. 75.

[9] Spencer, H. (1860). "What knowledge is of most worth?" in *Education.* New York: Appleton.

[10] Seaton, A. (2002). "Reforming the Hidden Curriculum: The Key Abilities Model and Four Curricular Forms."*Curriculum Perspectives*. Vol. 22, no. 1, April, p. 9.

[11] Perkins, D.N. & Salomon, G. (1989). "Are Cognitive Skills Context-Bound?" Educational Researcher, V. 18 #1, pp. 14-25.

[12] Whitehead, A.N. (1949). *The Aims of Education and Other Essays*. New York, Mentor Books, p. 14.

[13] Jacques, M. "*Whats* (sic) *wrong with higher order thinking skills.*" http://www.theriver.com/Public/tucson_parents_edu_forum/us.html#Skills

[14] Ong. W.J. (1977) *Interfaces of the Word: Studies in the Evolution of Consciousness and Culture*. Cambridge, MA: Harvard University Press.

[15] Dewey, J. & Dewey, E. (1915). *Schools of Tomorrow*. New York: E. P. Dutton & Co. p.2

[16] Scribner, S., & Cole. M. (1973). "Cognitive consequences of formal and informal education". *Science*. 182(4112), 553-559.

[17] Gardner, H. (1991).*The Unschooled Mind*. New, York: Basic Books.

[18] Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds). (2000). *How People Learn: Brain, Mind, Experience, and School: Expanded Edition*. The National Academy Press. Washington, D.C.

[19] Scribner and Cole. (1973), p. 553.

[20] Gardner. (1991). p.6.

[21] Scribner and Cole. (1973), p. 558.

[22] Karl Weick, (1976). "Educational organizations as loosely coupled systems", Administrative Science Quarterly, 21. 1-18.

[23] Meyer, J.W. & Rowan.B. (1883). "The structure of educational organizations". In Meyer, J.W. & Scott, W.R. (Eds.). *Organizational Environments: Ritual and Rationality*. Beverly Hills, CA: Sage Publications. 233-261.

[24] Cuban, L. (1982). "Persistent instruction: The high school classroom 1900-1980". *Phi Delta Kappan*, October. 113-118

[25] Cuban. L. (1984). *How teachers taught*. New York: Longman.

[26] Cuban. L. (1986). "Persistent instruction. Another look at constancy in the classroom". Phi Delta Kappan. V. 68. 7-11.

[27] Wheatley, M.J. (1992*). Leadership and the new science*. San Francisco, Berrett-Koehler Publishers.

[28] Robbins, (2003) S. P*. Organizational behavior*. N.Y., Prentice Hall.

[29] Hargreaves, D. H. (2003) *Education epidemic: Transforming secondary schools through innovation networks*. London, Demos.

[30] Norris, C., Sullivan, T., Poirot, J., Solowar, E. (2003) "No access, no use, no impact: Snapshot surveys of educational technology in K-12.'" Journal of Research on Technology in Education, V36, #1, Fall 2003. p. 12.

[31] Norman, D. A. (1998) *The invisible Computer*. Cambridge, Massachusetts: MIT Press. p. viii.

[32] Norman, D.A. (1998), pp. viii-ix.

[33] Illich, I.D. (1969). Celebration of Awareness. New York: Doubleday & Co. Inc. p. 128.