

**BEYOND SUB-PRIME EDUCATION**  
**THE DIFFERENCE BETWEEN APPARENT AND AUTHENTIC PRODUCTIVITY**

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Investment in education is an extremely high priority across the political spectrum. Unfortunately, as noted in the *Report of the New Commission on the Skills of the American Workforce*, “we tolerate an enormous amount of waste in the system (p.xx).” That waste is likely to continue because education as a whole is extraordinarily unproductive. The larger problem, unfortunately, is that cause of the waste is generally misunderstood. That means that most reform efforts, including increasing funding at every level, are going to fund a mirage.

Let us begin with what appears to be a basic consensus about goals. Business and the community need students who leave school with the competencies to survive and thrive in current conditions. This applies almost equally to public schools, charter schools, independent schools, business owned schools and home schooling and, indeed, to most of the solutions that are advocated from both sides of the political fence.

My goal, here, is to frame the issue in terms of business 101. Not, I should add, in the conventional and inappropriate description of school study as being the “work” that students do for which they get “paid”, nor by examining the sometimes legitimate claim that businesses can organize schools better than can bureaucrats.

I propose to examine the issue in terms of the difference between apparent and authentic productivity. By authentic productivity I mean that services and products do what they purport to do. By apparent productivity I mean that the indicators of performance are substituted for the performance itself. This distinction can be illustrated through an analogy drawn from the current financial turmoil stemming out of the sub-prime crisis and so-called “toxic

assets.” The profitability of many banks, insurance companies and others, touted as indicators of success, turns out to have been largely apparent but unreal. They were profitable for some time, but it is now clear that much of that profit was an illusion. Many of the underlying products and processes were deeply flawed. Securities were not secure, and financial advice varied from being wrong to being fraudulent. And so an apparently successful and flourishing system lacked authentic productivity. And the results have been calamitous.

The situation in education today is similar. And, from the tenor of the current debate about educational reform, it is highly likely that the situation will continue to deteriorate, notwithstanding the inflow of billions of additional dollars to improve education.

I am not, however, pointing a finger and shouting “fraud.” Most of what is being done, it seems to me, is being done with the best of intentions. My argument is simply that education is failing because most of those in the “business” of education do not really know what business they are in.

### **The product**

The orthodox and traditional language of the objectives of education frames outcomes in terms of the knowledge, skills and (sometimes) values that we (society as a whole) want students to have when they leave school. That is what the mass of educational standards prescribe at district, county, state, federal and subject levels.

There has been a steady drumbeat of calls for more. For instance a cover story in *Time Magazine* (December 10, 2006) argues that

*Right now we're aiming too low. Competency in reading and math--the focus of so much No Child Left Behind (NCLB) testing--is the meager minimum. Scientific and technical skills are, likewise, utterly necessary but insufficient. Today's economy demands not only a high-level*

*competence in the traditional academic disciplines but also what might be called 21st century skills.*

More recently, the *Report of the New Commission on the Skills of the American Workforce* described what it thinks the workforce will require, at all levels:

*Strong skills in English, mathematics, technology, and science, as well as literature, history, and the arts will be essential for many; beyond this, candidates will have to be comfortable with ideas and abstractions, good at both analysis and synthesis, creative and innovative, self-disciplined and well organized, able to learn very quickly and work well as a members of a team and have the flexibility to adapt quickly to frequent changes in the labor market as the shifts I the economy become3 ever faster and more dramatic. (p. xix).*

All of this is sometimes summarized as “adaptive expertise.”

Of course there is and should be more. As Thomas Jefferson noted, for instance, the functioning of a healthy democracy requires an educated populace, and by education he was talking about such matters as being informed about the state of society, the capacity to make good decisions and more.

The problem is in the conversation about education, terms such as academics, social skills, emotional intelligence, learning skills, creativity, self-discipline and so on are all conflated as though they were the same type of thing. They are not. There are different sorts of capacities and they are developed in different sorts of ways. One reason why the business of education is floundering is that society, by and large, is using a technology (an instructional approach) that only produces one type of capacity (factual knowledge) in the hope that it will also produce a range of other types of capacities (such as creativity). That simply does not work.

Unfortunately, most of the proposed solutions, including those of the *Report of the New Commission* buy into the traditional model, usually without realizing it.

In part this is because of the reliance on, the uses and abuses, of test scores. As will be seen, and as others have noted in different ways, test scores are indicators of apparent productivity, but much of the time they do not reveal much about authentic productivity. Indeed, the obsession with raising test scores, like the obsession with increasing immediate profit, often interferes with the authentic results that we all want.

### **Reliance on test scores as a measure of success**

Most of society, and that includes much of the world of business and philanthropy, view test scores and graduation rates as the primary indicators of educational success or educational problems. Thus:

- The tacit definition of a child being left behind is one who does not score adequately on appropriate tests.
- A failing school is one that does not meet a minimum annual score, or that fails to meet annual averaged targets, assessed by the performance of all students on a variety of tests.
- Similar thinking applies to the achievement gap. Minority students tend not to score as well as white (and some other minority) students on test scores, and so the most popular approach to closing the achievement gap is to reduce the differences in test scores between different ethnic groups.
- Success of a local, city, regional or state program is also thought to be reflected in changes in test scores. Thus, in my local community in Southern California, 9/11/08 the front page of our weekly paper proudly ran the following story: “Idyllwild’s API [ *Academic Performance Index*] tops district.” And major newspapers such as the *New York Times* report and comment on education in terms of even incremental improvements in test scores. [e.g. “More New York Schools Get A’s”, Sept 16, 2008, By JENNIFER MEDINA and ROBERT GEBELOFF, online].

The primary instrument and procedure that is used to make these comparisons within the United States is the National Assessment of Educational Progress (NAEP), a department of education initiative that seeks to compare student

results across states in specific subjects (e.g. reading and math) and at different grade levels.

The issue of education quality is, of course, a concern in almost every country. Accordingly, there have been several sustained attempts to make international comparisons. The two primary international yardsticks are TIMMS [Trends in International Mathematics and Science Study] and PIRLS [Progress in International Reading Literacy Study]. And it is partly because of the relatively poor performance on these international comparisons that concerns are expressed about the quality of education in the U.S.

### *Some plausibility*

Several reasons are cited for the reliance on test scores as indicators of effective education. First, they are numeric and *appear* to provide a way of measuring results, and numeric measurements are extremely important if done the right way. Second, they appear to be useful as a way of providing feedback and some guidance to both students and educators on how to proceed (this is called formative assessment). Third, they *appear* to provide a moderately objective way for parents, schools, communities and states to compare the effectiveness of their systems and the capacities of their students. And fourth, by and large the countries whose students perform well on international comparisons are also regarded – often with good reason based on other criteria - as having good systems of education.

So let us assume that there is at least some correlation between test scores and what education systems produce. The challenge is to understand precisely what that relationship is. That calls for an understanding of the fundamentals of the business of education.

### **The fundamentals**

Every business is grounded in a research and/or experience base, and uses corresponding processes to convert that research or experience into goods and

services and capacity. This applies equally to a stockbroker acting on his or her understanding of how the markets work, a mechanic who has to service vehicles, and a software programmer who needs to master programming languages. All of these, of course, can sometimes get things horribly wrong. But each develops and uses technologies, ranging from working with people to working with materials, based on some core underlying processes and beliefs about processes.

Just like the examples listed above, education has its fundamentals. It has a research and theoretical base, which has to do with how people learn. And it has a process or technology for seeing that students actually do learn. And that is teaching.

The reason why so many people in the business of education do not know what business they are in is that much that is traditionally accepted about both learning and teaching is wrong. The theoretical base has changed radically, and the practical technology needs to change accordingly, but that is not happening. Almost all the effort at educational change operates at a very low level.

There are many exceptions, some of which are extraordinarily effective and successful. The problem is that they remain exceptions, whereas, for education generally to be successful and productive, they need to become the norm.

The reason why it does not matter, for the most part, whether we support public schools, charter schools, vouchers, home schooling, business operated schools and so on is that almost ALL the options are using low level technologies (low level approaches to teaching) based on misconceptions of the underlying processes (beliefs about learning). That is why most of the money – business, governmental and philanthropical – that is being spent on education cannot produce what is sought.

The accumulation of research and experience is now pointing quite clearly to the direction that education must take if it is to be lifted out of its current woeful state,

and if there is to be any reasonable return on our collective investment in the system.

### **Research trends**

Learning has been researched extensively for over a hundred years, and from many points of view, ranging from different branches of clinical psychology (with, for instance, interests in therapy and programming behavior) to cognitive science (with an interest in such phenomena as concept formation). In that time, there has been a wide, perhaps wild, swing in the scientific view of how people learn. In recent times there have also been at least two significant developments.

The first is the dramatic increase in brain research with a corresponding torrent of advice to educators from the researchers and those (myself included) who interpret the research.

Second, has been a growing realization that the many different fields of study that impact learning, ranging from neuroscience and cognitive psychology to stress theory, the development of expertise and creativity research, should be seen as deeply interconnected. My wife and I have been advocating a synthesis of research for almost twenty years, since the publication in 1989 of our brain/mind learning principles. That synthesis is now heavily underway.

The fundamentals that are slowly being revealed, describe and explain the process of natural learning, a capacity with which every human being is endowed, and which was going on quite comfortably in the 30,000 years before modern schools were invented. The essential problem is that much of the learning that occurs naturally has been excluded from schools, so that learning from life and learning in schools have, to a very large extent, been divorced.

### **How people learn naturally**

Each person is an integrated living system. We are not just lots of bits and pieces of muscles, tissues, blood, and brain regions each with a separate function. The body, brain, and mind of each person forms a unity. In this unity, everything is interconnected to everything else and everything influences everything else in multiple ways. The neuroscientist Antonio Damasio (1994) spells this out more formally:

*(1) The human brain and the rest of the body constitute an indissociable organism, . . . ; (2) The organism interacts with the environment as an ensemble: the interaction is neither of the body alone nor of the brain alone; (pp. xvi–xvii)*

So every child is, in fact, a “whole” child, surviving by adapting to its world, and it does that by developing new ways to perceive and act. In essence, a human being is a learning system. Body, brain and mind are all involved and all participate. Here are some findings.

- *The search for meaning is innate.* There are several different aspects of this statement. One is the fact that every human being is born with a drive to make sense of experience. Gopnik and her colleagues (1999) call it “the explanatory drive.” Thus people are much more willing and able to master material when they have a passion to understand it. This is elegantly captured in the LA Times story (Cole, 1999) about Nobel Winning scientist Ahmed H. Zewail which had, as the title, “The Man who Loved Molecules.”

The drive to make sense of things results in part from the fact that in the real world all human beings (and every living organism) have to do two basic things in order to survive. They have to gather and organize information about their environment and themselves (perception) and based on this information, they have to develop ways to manipulate their environment, and themselves, in a way that is advantageous to them (action). So at the heart of natural learning is what biologists call the perception/ action cycle (Fuster, 2003). We all have it because learning at this level is indispensable for survival. In fact education could be described as the way in which society helps its members to develop new ways of making sense of and acting on experience so that they can all survive and thrive.

In practice this means that every student is more likely to want to learn, and is more likely to learn effectively and in depth, when his or her own intrinsic drive to understand is engaged.

- *Cognition is affected by emotions.* It was once thought that the rational mind was an unemotional mind. That is simply wrong. Neuroscientist Candace Pert (1997) suggested that every thought—without exception—is accompanied by the secretion of some “molecules of emotion.” So thinking and feeling are always deeply interconnected. The theme has also been explored quite vividly by Antonio Damasio, quoted earlier. He elaborates, “emotion is integral to the processes of reasoning and decision making, for worse and for better” (1999, p. 41). That means that the way that a person feels about an idea or process or body of knowledge impacts his or her understanding of it. These findings lie at the core of recent work on the neuroscience of economic and political decision making. See e.g. *Predictably Irrational* by organizational theorist Dan Ariely (2008).

In practice, this means that every student is equipped with substantial capacity to learn when their passions and interests are aroused, and that includes mastery of high level abstract content. And so asking students to just “sit ‘n git” without any personal connection to content is the functional equivalent of trying to build an economy without any concern for what people want or demand.

- *Learning is physiological.* It had been believed for almost 400 years, ever since the time of the philosopher Descartes, that body and mind are separate. That is now also known to be wrong (Lakoff and Johnson, 1999). Every one of us learns with the body, and whatever we learn is structured in the physiology because the wiring in the brain changes as a result of our experience, a property called neuro-plasticity. Cognitive scientists call this process embodied cognition (Thompson and Varela, Thompson).

By way of example, Tim Corbin, the Vanderbilt baseball coach, uses an annual routine with incoming recruits, one of whom was David Price, a very mature

first year pitcher for the Tampa Bay Rays who went to the World Series for the first time ever in 2008.

*Corbin takes a marshmallow, a jelly bean and a rock, and, with puzzled eyes upon him, places them under a flame. The marshmallow melts from the heat; the jelly bean holds up briefly before disintegrating; and the rock – well, the rock is a rock. (NY Times, SportsTuesday, p. B14. No Experience Necessary, Alan Schwarz.)*

The coaches were using a kinesthetic metaphor: a physical image and experience to help players “get” the insight they needed into how to handle pressure.

*Price is an admitted former marshmallow. He said that it was Corbin and his assistant coaches who turned him into the stone-faced presence he is today. (Schwarz, op.cit.)*

Great teachers do the same thing. They capitalize on the fact that the body is part of the learning system by using it to help students come to understand complex ideas. That is what a colleague of ours does when she helps students grasp the nature of friction by having them dragged along a hall on a rug and then pushed along on skateboard.

In practice, this means that every student is equipped with substantial capacity to use their bodies and senses as a tool for learning, and that includes mastery of high level abstract content. Suppressing physical engagement while teaching students so that they understand what they are studying is roughly like sending a team out to clear a very large area of brush by hand instead of using a bull dozer.

- *The brain/mind is social.* Biologically, no one is an island. Even for people who love to spend most time alone, some aspects of learning are intrinsically social. The social nature of people is behind what is sometimes called “the longing to belong.” In fact, it is not possible to master a language or grasp the meaning of any concept without these being embedded in some type of social relationships. Cognitive scientists call this “situated cognition” (Lave and Wenger, 1001; Gee, 2007).

Situated cognition underlies one of the most powerful modes of learning now being used in the corporate world, what Wenger et. al. (2002) called communities of practice. It shows up everywhere from gangs to social networking and the power of Facebook and other sites to networking with players of video games to the power of teams to solve problems in a way that no one can accomplish alone.

One major underlying biological basis for the social nature of human beings has recently been confirmed by neuroscience in the form of mirror neurons. These are neurons in the brains of observers that fire in a similar way to neurons in the brains of others who are being observed. So one person CAN feel another's pain; and imitation is more than just skin deep. These findings have confirmed the importance of role models, imitation and peer group in social behavior and learning behavior. (Cozzolino, 2006; Rizollatti, 2008).

There are many practical implications. One is that people learn by being immersed in worlds where the subject matter that is being taught is also being lived. That is why the kids who are best prepared to learn to read when they enter school come from homes where everybody reads regularly and naturally, so that reading is both modeled and shared. Another is that material embedded in scenarios and stories in which the learner can participate is, for the most part, much more readily mastered than material that is presented in an abstract form without connection to a social context. (Advertising agencies and the designers of video games know this). It is no accident that many children who are said to be unmotivated and poor learners will voluntarily spend hours playing their video games each night, hungry to master more and more compelling challenges.

In practice, this means that every student is equipped with substantial capacity to learn through conversation and interactions with others, and that includes mastery of high level abstract content. While it is vital that each student develops individual proficiency, it can be better accomplished by helping them to work and learn together than by obliging them to spend 12 years in the splendid isolation of unconnected desks in sterile and impersonal classrooms.

### And there's more . . .

There is much more to all of this than I have alluded to here. Research is showing, for instance, that:

- People who are stressed to the point where they feel helpless literally lose access to some of their own higher order functions (e.g. LeDoux, 1996). This means that the use of rewards and punishments to compel students to “learn” is largely counterproductive;
- Learning is both conscious and unconscious (Lakoff and Johnson, 1999). This means that a great deal of processing involves what is called the cognitive unconscious (which is somewhat like the incubation that is essential in the creative process). It also means that it is possible for students to take charge of their own learning by accessing what are called the executive functions of the brain/mind ( ).
- There are multiple memory systems, which include both the capacity to learn by rote and the natural recording of one's own life story (Schacter); and more.

There is, now, a wealth of research in support of these developments. Researchers and practitioners do not always use the same terms, nor do they always agree about it, nor is there a general taken for granted organizational frame that puts it all together. But the frame is coming together, and the basic message is becoming louder and clearer. People are learning systems. The whole person in relationship and in context learns. So the key to mastering anything is immersion in the appropriate sorts of experiences in which content is embedded and processed. This is NOT to discount lectures, presentations, direct instruction, practice and rehearsal and everything else with which we are familiar. It is simply to say that they need to be a part of something larger and more sophisticated so that the natural learning capacities of all students are more fully engaged.

### **Natural learning and learning outcomes**

The rule of thumb is that the fewer aspects of natural learning that are engaged, the more superficial is the knowledge and skill that is acquired and the less real world capacity is developed. Here, in slightly artificial form (because things are not really as neat and clean as this) are five different sorts of outcome. There are others, but these are sufficient to illustrate the relationship between different aspects of natural learning and the development of different sorts of human capacity.

*1. Surface knowledge.*

Rats and pigeons can be programmed to change behavior by the manipulation of rewards and punishments. So, to a large extent, can human beings. In education, this is found in the rote memorization of facts and procedures, even when accompanied by teacher or textbook based explanations. Examples include memorizing the names of all the presidents, the procedures for solving equations, the causes of World War II, the structure of a letter seeking an employment interview, and so on. This sort of knowledge consists of facts “about” things. It can be recalled in different contexts. It can be copious. But much of what is remembered in this way tends to be only shallowly understood. So a student may have quite a good storehouse of facts about, say, how a democracy functions or the procedures for solving complex equations without actually understanding much in any depth.

*2. Technical/scholastic knowledge*

Almost everyone is familiar with and appreciates the “aha” of insight. That “aha” might be large or small, unconscious or conscious, and it may be instantaneous or emerge over time. It is, however, absolutely crucial to grasping new concepts and coming to understand things in new ways. There is, then, a fundamental difference between knowing a fact and understanding a concept.

Among other things, for understanding to develop, students need many opportunities to:

- Work on issues of personal interest to which they relate;
- Solve adequately difficult problems using the material in question;
- Experience material in alternative ways (e.g. physiologically, metaphorically);
- Talk and work things through with others;
- Experiment and try things out; and
- Make mistakes and process them without fear of failure.

There is a corollary. In the course of learning for understanding by working through complex material, there will still be a significant degree of practice and rehearsal, but it will be much more meaningful – and more powerful - than sterile rote memorization. So learning for understanding includes a mastery of facts and procedures.

### *3. Performance knowledge*

Even when there is a substantial degree of intellectual understanding, research confirms what everyone already knows from their own lives, and that is that intellectual understanding and skills mastered in a classroom tend not to naturally transfer in major ways into real world competence (See e.g. Bransford and Schwarz). The reason is that real world performance calls for the ability to use new knowledge and skills in order to see – to read – what is actually happening in a situation and to respond appropriately in real time. This is fundamentally different from just having a theoretical understanding.

Performance knowledge, therefore, depends on there being a perceptual shift so that a person can see in new ways. The knowledge becomes a lens with which a person can “read” the context. He or she acquires what Goethe called “a new organ of cognition.” A student moves from understanding math to thinking like a mathematician, or from understanding history to having a feel for history such that he or she can actually learn from the mistakes of others.

For this capacity to be developed, continuous experience is necessary. The reason is that it is only through ongoing complex experience that all of the underlying capacities of natural learning can be engaged in recurring ways, such that new material is mastered in context and new cognitive lenses can be developed (See Prietula and Simon, Handbook on expertise).

4. *Maturity, self knowledge and the capacity to self-regulate.* The ability to plan ahead, regulate one's emotions, work well with others and take charge of one's own learning are being called 21<sup>st</sup> century skills. They are essential for survival and success in the coming century but there is absolutely nothing 21<sup>st</sup> century about them. They are all aspects of the executive functions of the brain, the brain that humans have had for thousands of years! The learning process that is critical to the development of these skills and capacities calls for the engagement of the higher order aspects of natural learning. These include what Goldberg (2001) calls learner centered adaptive decision making. In essence, students need multiple opportunities – in the course of their projects and activities – to ask real questions, make real decisions, get real world feedback, and deal with real consequences.

5. *Creativity and the capacity to deal with change.* Creativity is often characterized as a skill. That is partly true. It is also contingent on the actual knowledge base that a person has. But creativity is also the byproduct of a state of mind. This is the message, for instance, of cognitive psychologist Guy Claxton who wrote *Hare brain/tortoise mind*. In essence, the sort of learning that produces creativity requires the occasional unrushed, enthusiastic exploration of possibility (sometimes called “play”!) in such a way that new insights or ways of seeing can emerge. And there is more. Real creativity includes a capacity to resist being attached to a point of view (another way of saying that a person can think outside the box). I call this open minded expertise. For this capacity to be real, a person must have a substantial degree of inner strength and the capacity to *withstand* the pressure of peers and context. One example is those who could see an economic meltdown ahead of time (e.g. *Empire of Debt, Debunking Economics*) although their

assessment flew in the face of most others. And so there is a constant tension between learning with others and being able to detach oneself from the opinion of others.

For this capacity to develop, people - students - must have multiple opportunities to be in positions where independent thought is called for AND have extensive opportunities to reflect on and process both how they responded and what it was about themselves, their inner strengths and weaknesses, that led to those responses. Argyris was getting at a little of this with his notion of the reflective practitioner. And brain research and cognitive science are coming together in unpacking the foundations: Cognitive scientists talk of metacognition (thinking about how we think) and neuroscientists talk about the executive functions of the human brain).

We need to generate all of the outcomes discussed above. It is not possible to do that using the traditional model of teaching being used in the education system at this time. Nor is it possible to generate them individually. It can be done however, when a model of teaching is used that combines and integrates all of the processes listed individually above. In essence, the academics need to be dealt with in the context of a rigorous, experiential program that also develops the capacity of students to make decisions, persist, work together, produce results in the real world and take charge of themselves and their own learning

### **Examples**

The right sort of education can be found at every age, in private and public endeavors, in many countries around the world. Some are very long lived. Some examples:

- One of the best early education programs in the world, working with children between the ages of 6 months and about 5 years, can be found in the Reggio Emilia province in Northern Italy. More than 20 “schools”

participate in a community wide program, in which children are encouraged to think, research, problem solve and express themselves using a wide range of the arts. One American observer wrote about the program as follows:

*It seems to me, then, that a first lesson from Reggio Emilia practices is that pre-primary school children can communicate their ideas, feelings, understandings, imaginings, and observations through visual representation much earlier than most U.S. early childhood educators typically assume. The representations the children create with such impressive skill can serve as a basis for hypotheses, discussions and arguments, often leading to further observations and fresh representations. Using this approach we can see how children's minds can be engaged in a variety of ways in the quest for deeper understanding of the familiar world around them. (Hundred Languages, p. 25)*

- The Macomb Academy of the Arts and Science is a superb high school in Michigan with which we are working and which has used some of our materials and approach for several years. The students blend a rich, project based approach with a very rigorous curriculum. For instance, all students begin independent research projects at the beginning of their 9th grade year. Each year, students design and implement a research project that can focus on mathematics, science, technology and/or the arts. Students present their research projects to fellow students, faculty and administrators, parents and other family members, community members and experts in the field in late April or early May of each school year. (<http://www.armadaschools.org/ma2s/>). The school also has teams participating in FIRST!, a program developed by Dean Kamen that conducts a robot building competition among school teams and their business and engineering partners, modeled after the NFL with a culminating event modeled after the Superbowl.

- When we wrote our book, *Making Connections: Teaching and the Human Brain*, (1991, 1994) we included a headline that appeared in the Los Angeles Times on December 31, 1987: “3rd Home-Taught Youth Off to Harvard.”

*The paper told the story of Reed Colfax, one of four brothers who were taught exclusively on a family ranch in Boonville in Mendocino County, California. Of the three who had been admitted to Harvard to date (the fourth was only 12), their first formal test was the Scholastic Aptitude Test for college entrance. The entire curriculum involved immersion in experience with ongoing performance assessment. For instance, they learned algebra and geometry as they and their parents built a house, and science, including genetics and embryology, while raising livestock. This was an example of exceptional home schooling. (Caine and Caine, 1994).*

The point is that some people know how to do it, and it is being done – well.

### **Assessment revisited**

In the world beyond formal education, the types of outcomes spelled out above have to be assessed. Standardized tests of various sorts play a role. For example, in order to become a cab driver in London, intending drivers have to master “the knowledge” – a huge amount of information about streets, traffic flow and so on in London. This knowledge is demonstrated on a test, and only those who pass go on to the sorts of performance tests that must be passed before a license is issued. This is not necessarily ideal, but it is one approach to balancing the need to assess surface knowledge with the need to demonstrate capacity to perform.

Clearly it is difficult to assess outcomes objectively, but that is just like the problem that faces us with assessing expertise in every profession. These are not easy questions to answer, but they happen to be the right sorts of questions to be asked. That is why some leading universities are discarding SAT scores, and why the students of some non-traditional and home school environments are functioning very well in higher education.

The bottom line is that some types of outcome have to be demonstrated by real world performance and/or adequately sophisticated tests. That is precisely the problem with which business has to deal every day.

One key is to grasp the fact that good assessment does not just occur at the end of teaching. Really good teachers, using an adequately integrated process, have multiple opportunities to ask students questions, provide guidance, request revisions and generally coach them in an ongoing way. We call this Active Processing, and it is at the heart of what educators call formative assessment. In addition to making the learning deeper, it is a constant opportunity for teachers to find out – in multiple ways – what students do and do not know, and what they can and cannot do.

In addition, there are many precedents and a long history of developing performance assessments in education around the world. This topic has been addressed in the United States for at least a century. The process is not neat, clean and easy, nor can it ever be completely objective. There are many problems, ranging from test anxiety to the fact that people can demonstrate competence in some ways but not in others. Performance assessment is, however, the indispensable corollary of any system of education that aims to actually teach for the development of real world capacity. Performances of many types are integrated into the assessment programs of each of the examples of great education listed above. And, where results on standardized tests are also needed, the students pass with flying colors!

### **The obsession with test scores is suffocating education**

Unfortunately, and partly because the underlying theoretical base is not understood, the obsession with test scores is making education less effective and productive.

The core limitation of education is clear. The dominant instructional approach, and the dominant system structure, as supported by the dominant mode of assessment (performance on standardized tests) essentially ignore or suppress most of the inherent capacities for natural learning with which every human being is endowed. For understandable historical reasons, one of which has been the influence of very inadequate scientific views about how people learn, formal education has been stuck in slow mode. In effect, students have been treated like sophisticated rats and pigeons.

This has not been a total catastrophe in the grand scheme of things because life changes have been relatively slow and those aspects of natural learning that have been important tended to take place after the school years were over.

Times are now different. In essence, the massive changes in how life is currently lived, including the surge of information and the need to constantly master fundamentally new ways of acting and being, mean that the once modestly successful functioning of the old system has now reached its limit. And money that is poured into preserving it, even when couched in the language of “world class standards” and “accountability,” is largely being wasted.

Let us look at two aspects of this.

#### 1. Missing the link between test scores and genuine understanding

The fact that some people score higher on tests than others, and some countries perform better on international comparisons of test scores than the United States, is interpreted to mean that the goal of education should be to raise test scores by focusing on them directly. That is simply wrong. It confuses apparent productivity with authentic productivity. It is roughly akin to focusing on profitability without dealing with the underlying processes that make a business productive.

For the most part high test scores are the indirect consequence of teaching for depth of understanding. Most of the countries that score higher than the United

States on test score results do not, by and large, teach for higher test scores (South Korea being an exception). They teach for understanding, and use test scores as part of a set of useful indicators to help them along the way. Higher test scores are a natural consequence good teaching and powerful learning.

The financial analogy is again useful here. When a business functions correctly profit is the result, but a focus on profit at the expense of genuine productivity is usually disastrous. So the business technologies and practices are fundamental. Of course, one can seek higher profit and look for efficiencies, but not by ignoring or undermining the functioning of the core technologies on which the business relies.

In education, there is a difference between messy, project based, problem focused teaching that calls for the emergence of understanding, and highly structured, delivery models that promote memorization. The former are much less efficient in the short term, but are much more effective and efficient in the long term. That is because meaningful and meaningless information is organized differently in the human brain, and teaching for meaning leads to the storing and recording and registering of facts and procedures much more effectively and deeply than does straight memorization and practice.

One issue in the United States is that test scores have become an end in themselves. Test scores are treated as the product of education. The indicators (test scores) have been confused with the outcomes (authentic learning). This reveals itself in the way that teaching technologies are employed.

In effect, almost all the resources of the system are directed towards the production of indicators, the result being the suppression of the actual product – human competence – that is being sought. We have settled for apparent productivity at the expense of authentic productivity.

## 2. The tragic misdirection of instruction

The confusion over indicators and outcomes, and the inadequate grasp of the underlying processes and core technology, is driving the system to use the most basic and inefficient of all the technologies available to it. Specifically, the obsession with results on standardized tests has forced a massive move towards standardized instruction. State and district materials are being produced that call for all teachers of a particular subject in a particular grade level to be on the same page of the same text on the same day – in the name of efficiency. Other materials are spelling out precisely how and where a teacher should stand in a classroom at a particular moment in a lesson. And many are the school principals who march down school corridors and peer into classrooms to police the process.

By analogy, imagine every coach of little league being obliged to teach kids of the same age precisely how to throw a particular pitch at precisely the same time each week. The practice is inherently absurd, and makes it literally impossible for teachers to work with individuals and individual groups in anything like the sort of way that high level performance calls for.

There is, of course, no logical link between standardized tests and standardized teaching. The link is cultural and psychological: the pressure to produce, coupled with a lack of understanding of how people learn and what great teaching looks like, is generating a quite absurd and massively counterproductive type of education. In other words, as a nation, when it comes to education, we have no idea what business we are in. We in the United States simply can not get there from here.

### **Mixed messages from business**

Unfortunately, business is helping to drive this calamity. It does so in at least two ways.

- First, there are many businesses, both large and small, which profit from assembly line education. Complex teaching calls for the use of multiple resources – not single text books, and multiple modes of assessment – not

reliance on standardized tests. Yet there are huge profits to be made in a system which relies on the bulk buying of texts, computer driven, standardized modes of assessment and standardized techniques and modes of instruction.

- Second, business largely misunderstands the actual business of education and the underlying processes of learning and teaching. This means that much of the lobbying, e.g. by the business round table, for high standards and accountability (both of which are legitimate goals) actually promotes the least effective of all the modes of education that are available. The support for NCLB, for instance, is grounded in a very traditional belief in the way that standards should be developed and results assessed.

### **Turning this around**

The problem will not be solved by simply spending more on schools, nor by simply funding or abolishing *No Child Left Behind*, nor by adding 21<sup>st</sup> century skills to the prescribed standards (see ASCD brief).

This is a systems issue that is deeply entrenched in multiple ways. That system is expressed in an infrastructure, the preservation of which serves the interests of many stakeholders:

- A factory/prison model of education is not easy to manage, but it is simple to understand. The sort of education that leads to the results that are needed is messier, more organic, calls for a much greater understanding of complex systems and interpersonal dynamics and is much more difficult to control. Administrators at every level, therefore, benefit from the current model in tangible ways.
- The current model suits teachers who organize as a union and not as a professional organization because their salaries and benefits can be measured according to specific numbers of hours in front of specific types of classes. A messier model where time lines are organic and blurred would call for a fundamentally different way of assessing how teachers are paid.

- The model makes sense to parents who also need schools to function as baby sitters, and who need simple, clear and apparently objective indicators that tell them how well their kids are doing.
- The model suits politicians at every level who want to be seen as doing something to improve schools in quick, readily understandable and measurable ways. There is nothing easier than calling for higher test scores and for spending money in ways that look like they will work.
- The model serves all those in the business community who profit, as mentioned above, from assembly line education.
- The model serves those in the media who relish issues that can be addressed in simplistic, black or white terms by an audience of readers who are assumed to be functioning at the reading age of 8 year olds. Dealing with education by having to analyze the underlying conceptual framework takes a great deal of time and a lot of words.
- The model serves an academic infrastructure which spends most of its time researching the current model without questioning its underlying assumptions, and where teaching is geared towards preparing people to function in the current model.

### **Our solution**

The *Natural Learning Research Institute* attempts to face the problem by dealing with it at two levels.

On the one hand, our programs are designed for schools and districts, working with administrators and teachers, to help them grasp what is needed and move their system as a whole in that direction. One example is our work with one of the world's leading edge reform efforts in South Australia, with which we have been associated for more than ten years. Another example is our work with three school districts in Michigan, funded by a NIH grant, which is just into its second year. We research and disseminate those results, as well as the work and results of others who are walking the same path.

On the other hand, we have embarked on a program to work with business and philanthropists with the goal of inviting them to join forces and pool their funding around a common belief system. We want to leverage the efforts of philanthropy so that it can contribute to a change in the underlying belief of the community at large about how people learn, what good teaching looks like, what sorts of results we should aspire to and what conditions in the system are essential for allowing that to happen. We are not seeking a common approach to education reform: our goal is for all reform efforts to be grounded in the best of what is known about how powerful and effective education actually work.

In our view of systems, when enough of the stakeholders come to appreciate the ways that people really learn, and begin to demand that of schooling, then change in the right direction happens, even if its precise form can not be predicted.

It is not as though the process is easy or that all questions can be answered. The point is that we will only get the education we need when we start asking the right questions.

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