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Education Cannot Get Where it Wants to Go Because it Cannot See Where it Needs to Go: Seeing "Learning" in a New Light

Geoffrey Caine
Caine Learning

Education Cannot Get Where it Wants to Go Because it Cannot See Where it Needs to Go: Seeing "Learning" in a New Light.

Geoffrey Caine[i]
Caine Learning

Begin with the end in view.
~Stephen Covey (2004)

The real voyage of discovery consists not in seeking new landscapes
but in having new eyes.
~Marcel Proust (2002)

Educational leaders and teachers are in a no-win situation. That is because most of the current tools and programs for improving education, ranging from the Common Core State Standards to iPads, cannot work. At least, as currently conceived.

One reason? It has to do with our enormous collective incapacity or unwillingness to re-examine fundamentals. Particularly the many meanings of the word "learning." I suggest that we will only be capable of dealing adequately with the vast range of issues in education, from standardized testing to how school systems can be improved, when we are really clear about what it means to learn. It is not a matter of more research. Indeed, as a person who has struggled to synthesize the various sciences of learning for more than 25 years, I take a deep breath when anyone promotes a program or strategy using the phrase "research says.

Science has not always been a friend to education. In part, "what the science says" has changed dramatically over the years. And in part, even today, scientists do not agree with each other, no matter how certain they all seem to be. (I have extensively examined the science of learning from the perspective of education. See Caine and Caine, 1994, 2001, Caine et. al,. 2008, Caine and Caine 2011).

The essential point here is that the word "learning" is overused, very poorly understood and multiply ambiguous. The issue has been examined in a variety of ways at both a theoretical and practical level. It's misuse is, perhaps, the single biggest obstacle to improving education because it means that the underlying purpose of what we are trying to accomplish is not clear, no matter how much we use terms such as "high standards" or "21st century skills."

I want to explore the issue by adopting an approach that goes at least as far back as the 1956 framing of Bloom's taxonomy (1984). It seems to me to be self-evident that educators need to be clear about learning objectives, and several attempts have been made over the years to unpack these. They range from the reworking of Bloom (Anderson & Krathwohl, 2001) to other efforts. These include the SOLO taxonomy (Biggs & Collis, 1982), Webb's Depth of Knowledge Guide (2009), and a variety of attempts to map these objectives onto differing ways to use technology (e.g. Carrington, 2013).

[i] **Mr. Geoffrey Caine** may be reached at *geoffrey@cainelearning.com*

Why, then, do these efforts not really "take" on a large scale? When educators, researchers, scientists, policy makers, the business round table, non-profits, and others use words such as "learn" or "understand" or "career ready," what makes us think that they – and we - are all talking about the same thing, or that they – and we - actually have an adequate understanding of what these words and terms mean?

My experience goes back to the publication of our first book *Making Connections: Teaching and the Human Brain* (Caine and Caine, 1991, 1994). It was a best seller that pioneered the synthesis of neuroscience and psychology as foundations for understanding teaching, and is still used around the world. My wife and I were extremely proud of what we conceived of as our contribution to education. And then reality set in. It slowly became evident that people who loved the book were using it to support fundamentally different approaches to teaching and education. They used the same words to mean totally different things and to support radically different practices!

The same words do not mean the same things. And what some say about what they do (e.g. "teaching for meaning" or being "learner centered") may be totally unrelated to what others say who are using the same words, and also be totally unrelated to what the science "says" as viewed through the eyes and ears of different scientists, and different educators with competing interpretations of what the science means. No wonder that it is extremely difficult to improve schools in the long term, let alone make good decisions about such matters as implementing new technologies.

There's More to Test Results Than Meets the Eye

One way to illustrate the confusion that is rampant in our taken-for-granted language is to look at how educators and policy makers assess educational success. Education, within and beyond the formal system, is largely driven by test scores, in the belief (sometimes) that high test scores represent high standards. For instance, the US often compares its scores on international tests (such as PISA or TIMMS) with countries that seem to do very well, such as South Korea and Finland, which ranked 2nd and 3rd on the PISA results in 2009 in reading and math (Organisation for Economic Co-Operation and Development, 2009).

The problem? The countries with which we compare ourselves are different! *Nations (and regions and schools and families) can generate similar results on test scores by operating in very different ways.* The scores on standardized tests represent the results of what the systems do, and the systems are doing different things.

South Korea uses a traditional instructional approach and a traditional way of managing education. The focus is on the transmission of information and the teaching of skills by direct instruction with some problem solving, intensive study and practice, and enormous family and social pressure on students to study, memorize, and intentionally aim for high test scores and "do well." The pressure is so great that a 2011 survey reported that South Korean children are the least happy in the developed world (Yonhap News Agency, 2011).

Finland focuses on equity – it cares for the wellbeing of students and provides them as much as possible, with a level playing field from the point of view of health and general welfare. In addition, a somewhat more experiential approach to teaching is favored. All teachers are expected to have at least a master's degree. The goal is for educators to use problems, projects, and other processes to teach for real understanding more than for memorization. The overall atmosphere and culture is both rigorous and relaxed. Results on test scores are largely a non-issue (See Wagner, 2013). And so when Finland did so well on PISA 2000 many people initially thought that the results were an error!

When results on tests can be generated in vastly different ways, it means that the same test scores don't actually reveal the same things. And so test scores are useful, but only in the context of the larger program of which they are a part. The reason is that all the variables of a program, both direct and indirect, work together to generate outcomes. If we miss some of them, we may end up shooting ourselves in the collective feet.

This does *not* mean that only experiential education "works" or that direct instruction is "bad" or that standards and tests should never be used. It means that everything that we do in schools is grounded in a set of ideas about how to get from here to there. So this is an attempt to generate some more clarity about where we are, where we actually want to go, and about what it really takes to get there from here.

Learning Objectives Reframed

In 1956, a committee of colleges led by Benjamin Bloom (Bloom, 1984) suggested that there were three types of educational domains. These, it was believed, would clarify the learning objectives that educators set for students.

- The *cognitive domain* dealt with mental and intellectual functions. As initially formulated these were a sequence of knowledge, comprehension, application, analysis, synthesis and evaluation.
- The *affective domain* dealt with feelings and attitudes. And
- The *psychomotor domain* dealt with physical skills.

These three domains are loosely thought of in terms of *knowing/head*, *feeling/heart* and *doing/hands*. The domains were reworked in 2001 (Anderson, & Krathwohl, 2001). Nouns became verbs. And the sequence for the cognitive domain was remembering, understanding, applying, analyzing, evaluating and creating.

The first weakness in the system was in the separation of the three domains. They are separate in some ways, but they are also connected. In my view, the best way to view the science of learning is to see that the body, brain and mind function as a whole system. Thus neuroscientist Damasio (1994) said that each of us interacts with our environment as an "indissociable whole." More specifically, in addition to cognition being an intellectual process:

- *We think with our feelings* (Ariely, 2010; Damasio, 2010). That means that the way one feels about any idea or process impacts what it means and how deeply we understand it. So one of my favorite headlines of all times was in the Los Angeles Times many years

ago. It was about a Nobel winning scientist and was titled "The man who loved molecules."

- *We think with our bodies.* Scientists call this embodied cognition (Shapiro, 2010). That means, in part, that sensory and physical experiences impact understanding. So students may gain a deeper sense of both friction and gravity when they are pulled along a corridor on a blanket and are then asked to compare that with being pulled along on a skateboard.
- *We think together*. Scientists (Lave & Wenger, 1991) call this situated cognition. We all make sense of things through the ways in which we talk about and deal with them socially and collectively. A classic example is the way that the behaviors and symbols used in texting have been co-created by the millions of people for whom texting is now a way of life.

There is more than this, as we have demonstrated over the years with our brain/mind principles of natural learning (Caine and Caine, 1994; Caine et. al. 2008). However, there is enough here to show that learning is not a mechanical nor only an intellectual process. It is partly like what happens in a chemical factory. Or, indeed, in the complex and messy dynamic inside each one of us as we digest a meal. All the parts of the system play a role – the mental part of it is in a constant interactive dance with physical movement, emotional energy, and the ongoing connections with other people and the larger world.

So what is the practical implication? On the one hand, the entire personal, social and physical system of any individual is engaged in learning. On the other hand, the various aspects of these systems interact in different ways and in different combinations. So the sort of outcome that is generated depends on how, more precisely, head and heart, brain and body, individuals and groups, interact. And because so much of that happens without being noticed, or is almost invisibly shaped and manipulated by the system in various ways, we end up with outcomes that may be totally unrelated to what we think and believe we are achieving.

Objectives and Outcomes Viewed Through the Lens of Natural Learning

Without going in depth into the details, I want to spell out a set of learning outcomes that vary according to how the different subsystems of body, mind and context work together. These will be presented in linear form, but they are not linear as will hopefully become evident. They vary, rather, from simple to complex. I will also describe some of the processes that go into producing them. That will lead to some brief observations about how to assess teaching, and so to some suggestions about what is needed to use technology effectively and raise standards.

Some learning outcomes:

- Memorization, acquiring information, and shallow understanding.
- Getting it! Solid understanding.
- Developing situation lenses and real world competence.
- 21st century skills: Some of these are timeless executive functions of the human brain.
- Creativity and generativity: Developing *new* knowledge, n*ew* skills, *new* lenses.

1. Memorization, Acquiring Information, and Shallow Understanding

Much information can be grasped superficially, which is why we called it surface knowledge. It consists of facts, routines, and the skeleton or bare bones of concepts. So one can talk about who invented peanut butter (Fisch & Mcleod, 2007), exports and imports, the plot of a novel, how to measure the speed of a falling stone, or the three branches of government.

This can be shaped and presented in ways that map onto some predigested patterns in the minds of learners. So the notion of "government" makes some sense to anyone who lives in a place where other people make the rules and decide between right and wrong.

What Do and Can Teachers Do to Generate this Outcome?

Material can be presented creatively using all the senses. Stories can be told that are interesting or worrying or heart warming. Students can play games, both traditional and online, and use other strategies ranging from mnemonics to visualization, as aids to memory. Videos, applets and a host of websites can be used to present information and processes graphically and entertainingly. There are a multitude of ways for students to connect in the physical world and online, discuss things and study together. Different versions of the flipped classroom can be used. And a significant amount of time can be spent in explanations, organizing material, trying to solve problems and generally just working through the first layer of understanding. There is practice and rehearsal of various kinds. And all of this can now be supplemented by a host of applications and additional uses of technology.

In general this is a teacher directed and controlled process, with two points of note:

- What is personally meaningful to students is usually irrelevant. Irrespective of what might be going on in the hearts and minds and lives of students, when it's "time for math" in school, that is what they do. Some processes, such as the flipped classroom, allow for a more self-paced approach, but this is still within the confines of what teachers are asking for. So emotional engagement is generated artificially by the amount of fun that can be built in, by how much students and teacher care about each other and so on. The various subsystems of body, brain and mind are harnessed in the aid of memory.
- Memorization and the building of knowledge scaffolds can, nevertheless, be immensely valuable *in a larger context*. So students may memorize the bones of a skeleton as a basic scaffold that becomes absorbed with more subject matter expertise in biology, and actors have to memorize their lines as one aspect of their job.

Assessing teaching. *If the processes described above adequately represent the sorts of things that teachers or the school spend most time doing, then they are teaching for the acquisition of information and shallow understanding. It simply does not matter what else they say or think that they are doing.*

2. Getting It! Solid Understanding

Grasping concepts and underlying ideas is extremely important, as Resnick (2009) suggested in her notion of the *Thinking Curriculum*. These ideas are the foundations upon which genuine competence and expertise are built. As a minimum, getting there calls for sustained rigorous thinking. This involves going in-depth into the various features and elements of a concept or idea or body of formal knowledge or process. There might be:

- Ways to organize information and material;
- Summaries;
- Ways to compare and contrast concepts and ideas;
- Use of analogies, metaphors and different perspectives;
- Socratic questioning;
- Problem solving;
- Seeking and receiving explanations from others;
- Using and testing models and simulations;
- Conversations and discussions;
- All supplemented and sometimes driven by a vast array of technological tools and resources such as videos, multimedia presentations, social networking, and more.

It used to be thought that rigorous intellectual processing was enough, but following from the science referenced above, it is now known that more is needed. For instance:

- *Personal purpose and interest matter*. The brain/mind organizes meaningful and meaningless information differently. Passion and purpose aid intellectual understanding. This means that the student's authentic questions must be allowed, voiced, heard, and dealt with. What, specifically, do the students themselves find interesting and which to explore further? What do they find confusing that needs to be unpacked, clarified and reframed?
- *The brain/mind processes parts and wholes simultaneously*. That is one reason why incorporating content into meaningful and interesting projects is a powerful aid to understanding. Whether a student is writing an article for a local paper, test firing a rocket on the school grounds, or simulating an election, a coherent and meaningful context contributes enormously to understanding.

What Do and Can teachers Do to Generate this Outcome?

Teachers guide and facilitate all this activity. They support, lead, challenge, process, ask questions, set and orchestrate contexts, introduce and monitor projects, and generally push and encourage students to go beyond their current understandings. It is in the context of doing all of this, sometimes in the flow of the event and sometimes in more focused and rigorous sessions, that the intellectual and analytical processes described above should be brought to bear. The key to success lies in the balance between orchestration and going with what happens. The power of good project based learning supported by direct instruction is that the project itself becomes a natural organizer for all the processes as well as all the content.

Assessing teaching. *Teachers and schools that engage in most of the processes and practices listed above are, if they are doing it well, teaching for solid understanding. This is one of the strengths of the Finnish approach. However, if there is no rigor, if authentic student questions and interests are disregarded, if projects are fragmented and too tightly packaged and controlled by teachers, if there is little or no active processing, if there is no emotional engagement, if there is no physical action other than talking and writing, then for the most part, solid understanding is not developing, no matter what teachers and administrators think they are doing.*

3. Developing Situation Lenses and Real World Competence.

When a person grasps a concept deeply, it can be used in routine real world contexts. Thus, a student would be able to use a spreadsheet, write an article, and assess at least some of the forces acting on some ice as it is thrown against a wall.

Real world competence calls for more. It is the ability to spontaneously see larger patterns play out in unexpected and complex environments. It is all well and good to be able to explain how racism and power have played a role in political events. It is a different thing altogether to see racism and power play themselves out in a current election in which one might have a vested interest and be involved. Similarly, one might be quite good at explaining how an economy works according to different theories. Something profoundly different is needed to see, say, the complex current of market forces, regulation, and media spin in the economy to which one is subject, particularly, say, if personal career or investment decisions have to be made .

Traditionally these differences are thought of in terms of transfer of learning, and so the advice to educators is to teach for transfer. This has a semblance of truth but misses the larger point. Real world competence is dynamical knowledge, and is different in its core from theoretical understanding. You cannot transfer what has not yet been adequately grasped.

The key to success in the real world is being able to *read* that world, to see what is happening. So every subject, in essence, can provide a new set of lenses – these could be called situational lenses. In everyday language, a person will start to "get a feel" for a subject or skill or occupation. When a felt meaning (Caine, 1994, Gendlin, 1981) develops, a person not only knows some math, he or she can think mathematically; not only know some history, but thinks historically.

Those situational lenses have to be generated inside a person. For them to develop, all the subsystems of body, brain and mind need to interact while content is used in the course of many, complex, real world experiences. That is because, as mentioned above, a human being - body, brain and mind - interacts with its environment as an indissociable whole (Damasio, 1994). The power of experience is that it reshapes and reforms and transforms intellectual knowledge into perceptual knowledge – the situational lenses mentioned above – by engaging all the subsystems interactively and simultaneously. It takes a lot of complex, ongoing experience, with many iterations and variations. There needs to be real world feedback, and detailed guidance and coaching in real time. And the experience needs to be processed, both informally over, say, a cup of coffee and more formally with a coach or teacher.

What Can Teachers Do?

There are three critical elements. One is to ensure that students are immersed in projects that are adequately complex. There must be enough time for events to play out realistically; there must be enough space for events to be experienced adequately; there should be enough social interaction for the multitude of small details that occur in everyday life to be present and to impact the projects; and the project should be complex enough for hard thinking to be needed and tough decisions to be made. A second element is to ensure that there is adequate reflection and processing so that the experience can be "mined" for all that it contains. And the third is to maintain an atmosphere of relaxed alertness because high functioning is virtually impossible when students and educators are in survival mode (Caine et. al., 2008).

One example is great service learning where students embark on, say, community projects over weeks and month. Another is one of ecological and environmental projects, such as growing gardens to feed students and the community, promoted by the Center for Ecoliteracy (2013). A third consists of the complex blends of arts, science and humanities used in multiple ways by High Tech High (Wagner, 2008; Caine & Caine 2011; High Tech High, 2013).

Within the context of these projects there is the need for analysis of ideas, reading of research and texts, sessions of rigorous thinking, guidance and coaching in the art of doing lab work and acquiring other skills, recording results, and making authentic presentations to others (because sometimes the key to developing understanding and showing it lies in the capacity to explain things to others and deal appropriately with their responses).

One further point needs to be made about the use of technology. Teachers who are teaching for the development of situational lenses do not primarily look for applications and tools to support student thinking *about* content. Rather, the technology is now embedded in the project itself, as students generate databases, communicate in multiple ways as part of the path of discovery, and develop models and simulations to help them accomplish their goals. So by and large technology is not used at this level as a teaching tool but as an essential ingredient in the project itself.

Assessing teaching. *It may not be necessary for every single teacher to embark on all of these activities. However, if a school, and teachers working together, do these sorts of things described above, then they are working towards generating real world competence and dynamical knowledge in students. If the sorts of experiences and processes described above are not taking place, situational lenses are not being developed, and real world competence is not being created. Naturally there are huge variations. There are differences between novice and expert performance. And so on. But the overall dynamic is very clear.*

4. 21st Century Skills

Some skills, particularly having to do with information technology and navigating through an overabundance of information and opinion, are 21st century in essence. Others, such as the need to plan, work with others, delay gratification and make good decisions, have no business being called 21st century skills. They are timeless. They have been essential components of mature

human functioning for millennia, and are part of what are now known as the executive functions of the human brain. It is an indication of how dreadfully primitive education has been that they are now being touted as something new.

The way to look at these skills and capacities is in terms of the different sorts of outcomes mentioned above, specifically the last one. There is simply no point in talking about 21st century skills if they are not available for use in unanticipated events in real time. That means that for them to be adequately developed, students need to be involved in authentic, adequately complex situations, in which the skills are naturally called into play, and where authentic feedback is received in meaningful contexts. Within this context, there will also be a need for classroom sessions with discussions, role playing, processing of experience and so on. But for living skills to be developed, they have to be lived.

This is another reason why good project based learning is so important. Students have no choice but to work together, make a huge number of decisions along the way and receive real world feedback in real time, plan and be exposed to the strengths and weaknesses of their plans, and develop some capacities to understand themselves and develop some self-control. Indeed, it is partly because the executive functions are so fully engaged that solid understanding and situational lenses develop.

What Can Teachers Do?

A good teacher/mentor/ coach is a vital aspect of this aspect of personal development. The teacher sets or helps to generate a good context, models the skills and capacities in operation, provides some feedback (the situation providing the rest), and helps a student work through his or her own strengths (in the same way that student athletes work with coaches to examine tapes of their own performances). The key is that the various skills are modeled, coached and processed frequently across subject areas and in authentic situations so that students acquire the skills and the situational lenses necessary for seeing where the skills are needed. Knowing that one "should" plan one's time, for instance, is radically different from being able to plan one's time when a real deadline is approaching.

Assessing teaching. *Good teachers incorporate 21st century skills throughout their work in a school and beyond. They live them, model them, and coach them across subject areas in real time. (And, of course, they, like all of us, fall off the wagon regularly and simply have to climb back on).*

If there are no authentic opportunities for students to work with the skills, poor or no feedback in real time, little or no real world modeling of the skills, and little or no coaching in real time as well as in programmed classroom sessions, then for the most part, 21st century skills are not being taught or developed by educators, irrespective of what they think they are doing.

5. Being Creative and Generating New Knowledge

By and large, orthodox education looks backwards. It seeks to impart knowledge, skills and understandings previously developed by others and now incorporated into the standards. And

yet we should be preparing students for a world yet to come. As Fisch and Mcleod (2007) first said,

> *We are currently preparing students for jobs that don't yet exist, using technologies that haven't been invented, in order to solve problems we don't even know are problems yet* (min. 6:42).

Creativity and generativity refer to living into what is not yet known in ways not yet invented. In essence, students make real discoveries and develop genuinely new tools. This is not black and white, of course. When a new technology is developed, the developers use what they already know. For instance, in one science course at HighTech High, the students were using their school lab and online communication tools for the purpose of developing new markers for meat, in order to assist game wardens in Africa who needed more tools to defeat poachers. They used orthodox lab skills, relied on previously established communication processes, and blended complex but traditional fields of study, in order to create something new and useful (Edutopia, 2011)

The key is that the whole process is forward looking. Rigor and thought are applied to new problems with solutions not to be found in text books.

What Can Teachers Do?

The key here is teaching that blends the teachers' own real world competence with a sense of inquiry and a willingness to allow students to pursue *their* own interests, and challenge and question the taken-for-granted content of the standards and texts. Recently, for instance, a 14 year old made news around the world by discovering that the magnets in the ipad2 could stop heart defibrillators. Her father, a doctor, helped, but it was her idea and her research (Cortez, 2013). The philosophy that underlies the sorts of things that elite students do for science fairs needs to permeate everyday education everywhere. New means new, not the old dressed up as new. As part of this rigorous and experimental attitude, mistakes are welcomed as the basis for deeper learning. This calls for a huge shift in the view that educators have of what they are doing. And that means that the most important thing for educators to do is to do some deep self-examination.

Assessing teaching. Exp*eriments and projects with outcomes that call for new methods and new ideas are evidence of creativity and generativity. When there is an atmosphere of fear, of getting it "right" at all costs, of necessarily complying with what someone else has said and done, then there is not much creativity and generativity, no matter how much "fun" students seem to be having in class.*

Some Thoughts on Practical Implications

Here are some conclusions, that we have worked out in more depth elsewhere (Caine and Caine, 1997, Caine et. al., 2008).

1. There is a very rough continuum of instructional approaches that map onto the increasing complexity of learning outcomes. At one end is direct instruction accompanied by rote practice. Next is more complex instruction that calls upon students to act and think and think and move, but driven almost exclusively by what a teacher thinks is important or interesting. Beyond that are the complex learning environments calling for complex outcomes in which learners are immersed under the care, guidance and coaching of educators, and where the key driver is what students themselves care about and want to discover or master. Each of these is important, and each of these *includes* but goes beyond the ones that occur before them on the continuum.

This is my take on the legacy of Dewey, who expressed the vital nature of experience in education (Dewey, 1997). It seems to me that Bloom's taxonomy was heading in precisely the right direction, but that Dewey had a much better grasp of the complexity of learning environments that are needed for complex learning outcomes.

2. Complex instruction (CI) is largely sabotaged by the system constraints in place in education today, and that includes most current reforms.

- CI is destroyed by the fragmentation of time and subject areas. In part this is because the flow and structure of complex projects become impossible.
- The focus of CI is narrowed by an emphasis on only one type of outcome (standardized tests results). The key to deeper understanding, real world competence and so on is the demonstration of these skills and capacities in the real world in real time. When the demonstrations are curtailed or ignored, student attention is devoted to compliance.
- The dynamism of CI is leached out when authentic students' interests and questions are ignored. Passion, perseverance, motivation, skill development, deeper understanding and increased competence depend upon actual questions being answered and actual responses to actual performance. This is the governing dynamic of online gaming and of the social networking in which students of all ages indulge all the time.
- The efficacy of CI is destroyed when the developmental nature of natural learning is totally subjugated to bureaucratic timelines designed to control the flow of students through the system. The reason is that competence and insight can be guided, but results cannot be manufactured, and insights only happen when they happen.

3. Although the power of new technologies offers huge possibilities, much of it will be nullified in the formal education system by traditional modes of thinking.

More specifically, educators will never get where they want to go if they don't know and understand where they need to go. One of the really sad scenes that permeates education today is to see so much money spent on so much technology that represents new and faster ways of doing what has always been done.

Contrast this with the fact that, as I write, I have taken a few minutes to link to a Google+ Hangout in which the actors from the most recent *Star Trek* Movie are talking with NASA astronauts, one of whom is on the space station, about the ways in which science fiction is becoming our everyday reality. This hour long event, live or replayed, could be used to enhance any subject or subjects, ranging from literature and history to biology and math.

Technology by itself can simply be an administrative convenience. And, at the same time, it is changing the dynamic of the culture itself. As an absolute minimum, we need to see in it the possibility of teaching and facilitating learning to pursue the higher levels of outcome described above.

Revisiting Standards and Test Scores

We are now in a position to revisit the dilemma posed by the two contrasting ways of generating high test scores represented by South Korea and Finland.

One way is direct. The desired objective is largely to generate high test scores. This goal is of very little intrinsic interest to most students, where even most of those who want to score highly have very little interest in most of the content. That is why a command and control environment operates, where test scores are the be all and end all of every aspect of schooling, and the students will be made to pursue them.

The second way is more complex. It is messier. It goes deeper and wider and wanders off in a variety of directions. While there may be a command and control fallback position (there are some behaviors, for instance, that simply are not acceptable), in general the entire environment is more self-directed and more self-organizing. Test scores are NOT the focus. Solid understanding, real world competence, development of the executive functions, and generativity and creativity, are the goals. But testing in the course of the process can be a very useful tool. And in general, it just so happens that students from these environments do well on standardized tests anyway.

Getting There from Here

Getting there is immensely difficult. It calls for ways of thinking and system qualities that are conspicuous by their absence in our culture, although there are enough examples in the US and around the world to show that it is possible. Examples (see Caine and Caine, 2001, 2011) include High Tech High, Bridgewater Elementary and a middle school in South Australia, Reggio Emilia in Northern Italy (perhaps the best early childhood education system in the world), and superb home schooling, often called unschooling, such as that modeled by the Colfaxes of California.

In the short term, I suggest a transitional approach. Make sure that all professional development is grounded in a coherent philosophy, aiming at least at solid understanding. And implement programs that aim higher but can still operate within the current system. One is the work on brain based teaching and natural learning being carried out by Professor Tim Jones and his colleagues at the Sam Houston State University (Jones, 2013). Another is the work being carried out through the Natural Learning Research Institute and with what we call the Guided Experience to Instruction, the Executive Director of which is my wife, Dr. Renate Caine (Caine and Caine, 2011, www.nlri.org). Both of these intentionally work with and seek to capitalize on the ways in which the human brain/mind learns naturally. And both make high standards a

priority, although high test scores tend to follow. A third is to look at some of the great material on project based learning (The Buck Institute, 2013; Edutopia, 2013) or service learning.

The Art of Learning Together

I would also make an examination of the fundamentals the central thrust of your professional learning community for, say a year (For our approach to PLC's, based on what we call process learning circles, see Caine and Caine, 2010). Generating data simply does not matter very much until the fundamentals have been mastered and enough common understandings about learning objectives and the essence of great teaching have emerged.

A Final Word

Whatever system changes and programs of professional development are selected, it is my deepest hope that the decisions are grounded in well thought out understanding of how people – students and adults – learn, and in a clear grasp of useful learning objectives. Getting there from here is difficult at the best of times. It is important, then, to know where "there" is.

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