

CHAPTER FOUR: EXPERIENCE-BASED LEARNING GENERATES DYNAMIC, PERFORMANCE KNOWLEDGE.

A story is told of Barbara McClintock, the Nobel winning American biologist who was a pioneer in the study of the structure and functioning of genes. Her field of exploration was ears of corn.

'Another scientist named Evelyn Fox Keller came along when McClintock was in her early eighties and said, "I would like to write your intellectual biography, your story as a scientist. Tell me," she said. "how do you do great science?'

McClintock - who was one of the most precise empirical observers and one of the most rigorously logical thinkers in American science - thought for a moment and said, "About the only thing I can tell you about the doing of science is that you somehow have to have a feeling for the organism.'" (Palmer in Glazer, 1999, p.23.)

After misunderstanding how and why people learn, the single biggest problem bedeviling attempts to improve education is a profound misconception about what it means to actually know something (an issue philosophers have been exploring for centuries). Schooling has gone off the rails because it tends to equate knowledge *about* the world with direct knowledge *of* the world. The standard model as generally practiced promotes the former - lived experience develops the latter. As mentioned in chapter one, we call the former *static or surface knowledge*; we call the latter *dynamic or performance* knowledge. The problem with the standard model is that has been devoted to chasing shadows. Experience of is not the same as knowing about.

The misguided nature of the standard model can be illustrated with three different ways of looking at historical events, such as the story of the American presidency from 1992 to 2000.

The trivial pursuit or jeopardy way - surface knowledge

Anyone surfing the WEB, watching TV, reading magazines or even doing serious research can find an inexhaustible number of facts about the Clinton Presidency. Personal facts (name, age, religion, family, state of origin, meeting his wife at Yale); political events (Governor of Arkansas, campaign slogan - "it's the economy, stupid", advisors, policies); personal problems (finances, scandals, conflicts, impeachment). All of this information can be used to answer questions and anyone who can answer a lot of questions will seem to know a lot about the period in question. Yet none of this information by itself would equip a person to analyze the impact of the Clinton years, let alone actually conduct a political campaign. *This type of information is surface or static knowledge. It consists of facts that can be remembered, some of the information that is doubling every two years.*

The problem solving or mind games way - technical or scholastic knowledge

All of the information described above has found or can find its way into books, college courses, TV talk shows, opinion pieces, political debates and so on. People can argue about why the presidency took the form that it did, what the causes were for the personal problems that President Clinton had, why the two political parties were so at odds and how had the divisions been growing.

Theories, ideas, opinions, assessments, explanations abound. On the basis of this type of thinking people can give advice, analyze problems, propose solutions and generally seem to make sense of what transpired. Using researcher Howard Gardner's term, we call this *technical or scholastic knowledge*. There is a substantial amount of power in intellectually understanding processes and events. Indeed, a person with this degree of understanding may actually be able to contribute to a political campaign. But a person with this sort of knowledge is most unlikely to conduct a campaign successfully. Something is missing.

The felt meaning way - performance knowledge

The people who conduct presidential campaigns well have all the above and more. They have something that is very difficult to describe, and yet it is a quality that transforms all the knowledge listed above. They have a *feel* for politics. President Clinton is universally acknowledged to have been a superb campaigner. He had a feel for the process. And that means that he had more than "book learning". All the facts and ideas about politics had been reorganized in his own mind so that he could see the patterns working themselves out as they happened (except, of course, for some disastrous personal mistakes). The knowledge that has become active and real in the world is always accompanied by a "felt sense". It is sometimes called grounded knowing. And that is the knowledge that is the gateway to real power because it is the knowledge that is indispensable for effective action. *It is the type of knowledge that can only be gained from real experience. It is dynamic or performance knowledge. Peculiarly, and often unknown to the people who most highly value it, is that high level thinking and abstract ideas also become dynamic in the same way, that is, through use in life.*

Let us look, now, at how performance knowledge develops, and the place to begin is

with memory.

MEMORY

What does memory mean to you?

It's my story. When I was young and walking to school, I used to take pictures in my mind of what I saw. I even made the "click" sound. I believed I was storing photos for when I was older. . . that I would be able to peruse them. It's just being able to access my own story.

How do you feel about memorizing facts?

Memorizing facts? That feels disconnected. It feels like outside of myself. It doesn't have a lot of meaning. It isn't really part of my story . . . feels imposed.

What about learning stuff at work?

I do that out of necessity. More times than not I discover what works . . . through discovery I know what works. And even when someone helps me when I'm in a quandary, it feels like a discovery.

[Part of an interview we conducted]

Memory has been intensively researched for at least a century. It is known that there are several different memory systems, though there is a substantial amount of disagreement as to what they actually are (See e.g. Squire and Kandel, 1999). Scientists talk about declarative memory (for facts), procedural memory (for skills), semantic memory (for meanings), episodic memory (for events), explicit memory (for intentional, conscious memorization), implicit memory (for memory that just happens without intention), emotional memory (for emotions that can recur) and more.

For the purposes of education, the best way to understand memory is to divide all the systems into two different types that overlap. One is rote memory; the other is our natural memory of everyday life events. The central failing of the standard model is that it has been obsessed with the former, and has almost totally ignored the latter.

The best source of information that we have found comes from the work of O'Keefe and Nadel (1978) who distinguished between what they called taxon and locale memory. Taxon comes from "taxonomies" and refers largely to memorization of facts and skills. Locale comes from location and locale memory refers to our ongoing, spatial, autobiographical memory. It is the natural processes of registering everyday experience.

Taxon or rote memory

Everyone is equipped with the ability to memorize stuff that does not yet make sense, and all of us sometimes need to remember facts and procedures before those facts and procedures are really useful. This is how the multiplication tables used to be taught. This type of memory serves two extremely useful purposes. First, sometimes the things learned are essential for survival. A child may not understand much about traffic, but it better "learn" to look left and right before crossing a street in order to avoid being hit by an oncoming car. Second, this type of memory is a sort of way station. Memorization makes it possible for stuff to be learned that will ultimately be understood or mastered. Medical students memorize the bones of a skeleton, for example, long before most of them develop a feel for how the skeleton and the body really work. It is the sort of memory that is used to store the information that we describe above as surface knowledge. Whitehead called it inert knowledge because it is just sitting there, probably not understood, but ultimately on call.

Cognitive scientists have adopted the “information processing” or computer model to explain how static memory is mostly formed (Woolfolk, 1993). Of all the possible information available, some is admitted into short term memory where it is processed and worked on. With enough work, the information lodges in long term memory. This is roughly like the difference between ram (the short term memory on a computer that is used by any software program) and the hard drive (where information is stored even after the computer has been turned off). And, of course, this model is also partly accurate. With enough practice and rehearsal, facts and skills can be memorized for a very long time. this type of memorization can be motivated by externally imposed rewards or punishments, and is at the heart of programming people. All of this confirms that people can “store” items to be called upon at a later date. However the memories are largely unchanging. One of the most ancient and yet least understood parts of the brain, the cerebellum, seems to be uniquely engaged in this type of memorization (Schmahmann, 1997).

Locale or autobiographical memory

Something crucial is missing from the picture painted above. For instance:

Computers do not get excited or stressed;

Computers do not adapt to the world so much that they change their own operating systems;

Computers do not interpret information to suit themselves.

As was pointed out in the preceding chapter, computers are dead. Living systems are constantly adapting and adjusting and, at times, changing their internal models of how the world works. In addition, human beings are connecting all the information and making the changes in order to keep an ongoing record or story of who they are. Here

memory is also at work. It is through memory that a sense of self is sustained. So memory is actually the ongoing, changing, internal model or map that a person has of his or her life. It consists of all those patterns (described in the preceding chapter) that have been developed that act as filters and lenses for perceiving and understanding and interpreting the world. It shifts and changes as a person reorganizes his or her internal maps of life.

One of the most powerful and least understood aspects of locale memory is that the internal maps that we all have are partly organized on the basis of concepts and ideas! (O'Keefe and Nadel, 1978). A concept is essentially a way of integrating facts and information. The more powerful the ideas and concepts that we have, the greater the capacity to absorb, integrate, organize and synthesize information - and so make sense of experience. That is why the curriculum should always make categories and concepts primary and facts secondary.

Static and dynamic memory

We define rote memory as *static* because it does not change easily. It consists of facts and routes and routines that remain the same, no matter when we use them. Locale memory is *dynamic* because it is constantly changing.

In the real world the two types of memory interconnect quite naturally. In fact many of our rote memories can become dynamic memories in the course of experience. This happens with a doctor who, as a student memorizes the parts of the body and then, when in practice, begins to see many patients and how their bodies function in different ways. One thing that happens over time, and with plenty of experience, is that the doctor begins to get a *feel* for how bodies actually work.

THE FEELING OF KNOWING

The feeling of knowing is generated when all the processes that we have described work together in some way - thought, emotion, senses and body. It is as though we come to know something with our whole body and mind. We relate to it or resonate with it. It no longer feels alien but somehow connected. We get it "in our belly."

Some psychologists who have known about this feeling of knowing were far ahead of their time. One, Eugene Gendlin, the former head of the department of psychology at the University of Chicago, coined the terms "felt meaning" and "felt sense" in the context of therapy. Gendlin developed a practice in the 1960's that he called focusing (1981). He argued that much of what we actually believe and think is present in our bodies, often as feelings and sensations that we simply do not grasp and can not put into words. The goal of focusing is to bring awareness to bear on a bodily state. Very often there bursts forth a sudden knowing, an insight into what had been troubling a person that had been present but invisible. Gendlin calls this explosion of insight a "felt meaning". The identical phrase was used by author and noted management consultant Peter Vail in his book "Learning as a Way of Being" (1996). There Vail specifically invites people who wish to understand something in depth to get a felt meaning for it. More recently, neuroscientist Damasio (1999) has attempted to shed light on what occurs in the brain as people get "a feeling for what happens."

The feeling of knowing can be found in the sports pages in every newspaper. In story after story, in sports as diverse as baseball, cricket, the many footballs, snooker, golf, tennis and basketball, we hear about the need to have a feel for the game. An example. Peerless Price (real name) was a rookie wide receiver for the Buffalo Bills football team. Speaking of his potential, Bills quarterback Doug Flutie said:

"He {Peerless} seems to have a real good feel for the game." . . . Flutie points to a play in Washington in which he was flushed out of the pocket and tried to find a receiver as he fled for the right sideline. Price broke off his pattern and Flutie found him for a 17-yard gain. "That showed a lot of savvy," Flutie says (Brady, 1999).

This refrain runs through much of science, including the molecular genetics of which McClintock was a part. This new science was defined by Sydney Brenner as "the search for explanations of the behavior of living things in terms of the molecules that compose them." (Weiner, 1999, p. 62). It was "a hybrid science, then," continues Weiner, "requiring a *feel* for the behavior of living things, a *feel* for the behavior of matter, and what Crick called "the hubris of the physicist."" (emphasis added). In a similar vein, a page on the world wide web (www.chembio . . . see bibliography) describes some of the early thinking of the great physicists Neils Bohr and Prince Louis de Broglie. It deals with the way in which de Broglie came to the conclusion that elementary particles, like photons, also operated as waves. The story teller concludes

de Broglie's leap of faith was in asserting that this same expression {for light} should apply to particles. It is instructive to get a feel for the wavelength of various particles you might encounter. (emphasis added).

The feeling of knowing extends into other aspects of our lives. Michael Schrage makes the point that great design is certainly not something that comes out of the mouth of a business school professor. Great design isn't taught; it's felt" (Schrage, 1989). While we contest the notion that it can not be taught, we agree whole heartedly with the notion that what is learned is a "sense". The quality of knowledge has shifted.

It has become dynamic. It is on its way to becoming useful in life.

THE POWER OF CONTEXT

Why is it that a feeling for something can only come from experience? The answer is that experience provides additional sources of information that are essential to help the pattern to gel. In traditional education, partly because of the shortcomings of traditional psychology, those additional layers of information have never been understood and therefore have never been missed. However, those extra layers are crucial. Collectively they could be called the power of context.

Context provides indispensable input and stimulation for the grasp of any complex idea or skill. Many children surround themselves with pictures and paraphernalia of great athletes and celebrities. Budding artists visit art galleries; budding entrepreneurs surf the WEB and often set up small businesses while at school. The context always teaches. A sterile classroom or school is one of the worst possible environments for helping children to learn.

Peripheral perception

It turns out that one of the marvelous capacities of every single human being is the capacity to relate to and perceive different aspects of the context, even when not paying direct attention to it.

Some of the evidence for the impact of what is not quite seen comes in the form of implicit memory (Schacter, 1996). Let us say that you are in a room full of items. After you leave the room, you might not be able to consciously recollect everything that was there, and you might even swear that some named items were not there. And yet research shows that if experimenters give you the option to identify different items

from a list, you are likely to choose those that were actually in the room, even if you never remember seeing them! Guy Claxton calls this learning by osmosis. (1997, p. 20).

Commercials work in this way. Even if you see something only once or out of the corner of your eye, and argue vehemently that you did not see the name of the product, given a number of choices in a store you are likely to select or prefer the product you claim never to have seen. That is why advertisers position their advertisements in the context of programs that stimulate identifiable desires and fears in selected audiences. Diane Halpern (1989) tells of a conversation she once had with a cab driver. She and the driver had been discussing the way in which laundry products are advertised on television. The cab driver insisted that he never paid any attention to such advertising and that he always just got the blue bottle that got out the "ring around the collar." Halpern goes on to say,

"Although he believed that he was not allowing the advertising claims to influence him, in fact, they were directly determining his buying habits" (1989).

All people move through life engaged in this ongoing dance between attention and peripheral perception. And all are powerfully influenced by signals and stimuli from the environment that are perceived and that color and create a context for whatever is focused on.

Though many Americans may be hard put to tell you the name of their senator or the country's leading painters or novelists, anyone who is even moderately informed knows the names of dozens of TV actors, rock stars, athletes, fashion advisors and many others who will someday be answers to trivia questions. You acquire this information. (Neal Gabler, 3/12/2000)

The bottom line is that people always pick up impressions from their environment and

always make sense of things in context. People vary as to how context sensitive they are, but the opinions that are formed about how the world works and how to adapt are *always* context dependent to some extent.

The key, in teaching, is to make sure that the context supports the content. That is why kids learning to play ball go to ball games, why it is a good idea for an aspiring guitar player to hang out with really good guitar players, why the way to learn about political campaigns is to actively participate in many of them. The sounds, the action, the smells, the sights, the colors, the relationships all help to make sense of the basic ideas and skills. They make the content real and give the learner a feel for the subject.

The brain/mind is social

One of the most powerful aspects of context is the social setting and the social relationships that develop. Some of the indispensable elements of felt meaning come from the way in which people work together and relate.

A crucial aspect of one's context is the society of which one is a part. Throughout our lives, our brain/ minds change in response to our engagement with others, so much so that individuals must always be seen as integral parts of larger social systems.

We are an intensely social species, deeply dependent on one another for our very survival. (Gopnik, 1999, p. 23)

Part of our identity depends on establishing community and finding ways to belong. It has been called the "contact urge" (Brothers, 1997, p. 75).

Imitation is an innate mechanism for learning from adults, a culture instinct. (Gopnik, 1999, p. 168).

Even one month old babies imitate facial expressions. Researchers have shown this systematically by showing babies a person sticking out a tongue or opening his or her mouth. Babies' faces were videotaped while this was happening. The videotaped faces were then shown to someone else who had no idea what the baby had seen. The second person had to ascertain whether the baby was sticking out its tongue or opening its mouth - and did so accurately and predictably. (Gopnik, p. 29).

Lev Vygotsky (1978) suggested that even the ability for people to engage in internal dialogue - to think in their minds - is learned after experiencing external dialogue with others.

This interaction between people is very subtle and much of it is nonverbal. In their attempts to explain this connection, some scientists speak of a "mental state resonance" (Siegel, p. 70) when people are in a form of alignment. This is very important in therapy, for instance.

. . . such an alignment permits a nonverbal form of communication to the patient that she is being "understood" in the deepest sense. . . she is "feeling felt" by another person. This attunement of states forms the nonverbal basis of collaborative, contingent communication. (Siegel, 1999 p. 70).

The same state assists good parenting, for effective learning together and good teaching.

It seems as though the capacity for this alignment is also built into our bodies and brains.

Recently, the neuropsychologist Giacomo Rizzolatti has found neurons in monkeys that fire both when the monkey carries out certain specific hand motions, and when it views those specific motions being carried out by someone else. . . Based on preliminary data, it is likely that mirror neurons will also be found for

other gestures, including facial movements. (Brothers, p. 79).

The existence of “mirror neurons” indicates that we are biologically built to respond to what others in our environment do. No matter how much a person might like to think of himself or herself as a loner, everyone is designed to imitate and model others. The bottom line is that

some neurons respond preferentially and selectively to social aspects of our world.

(Brothers, p. 37)

The result is that everything that anyone learns is colored by social relationships and the groups of which they are a part. A child learns from its siblings, its parents and its peers. Mothers of young infants learn from other mothers of old and young infants. A person stepping into any world for the first time - stock brokering, hospitals, road maintenance, outdoor adventure, tagging and making graffiti, journalism, politics, border hopping - all are influenced by the habits and practices and language and values of those in the same arena.

In addition to imitating and learning from others, something even more subtle happens. Collectively, people co-create their ideas and beliefs. These are often the things that “everyone knows”. When you and I have an experience, part of the way one of us responds and interprets what happens depends on how the other responds and reacts. Mob hysteria is an extreme example, where a group of people decide that someone is guilty of something and decide to lynch him, without any evidence. The term that is used to describe this phenomenon is “the social construction of reality.”

Because the brain/mind is social, one’s ideas and perceptions are always shaped in some ways by the ideas and perceptions of other people. That is why corporations

work so hard to establish their own corporate culture. It is the culture that shapes the way an employee perceives and reacts to his or her work. And that is a further reason why establishing good community is the indispensable foundation for developing better schools. The closer a school comes to being an apprentice community, the more can it capitalize on all the ways in which adults and children learn from and teach each other. Some of the great programs for teaching reading work in precisely this way. They set out to create a culture of reading, a culture similar to that found in those homes that develop in young children a readiness to read.

PERFORMANCE KNOWLEDGE

We now have enough understanding of the brain and mind to clarify the nature of learning in a way that education can use.

In the real world, dynamic memory is primary, and static memory is secondary. This includes all the stuff that we just pick up by osmosis, as we have mentioned. When a person is engaged in some meaningful task or situation, dynamic memory is activated. When there is a sufficient amount of interaction with the real world, and enough processing of experience and response to meaningful feedback, performance knowledge is the result. It consists of facts and skills internalized in such a way that they can be availed of appropriately and effectively in both planned and unplanned situations.

As a person gains a feel for something and develops performance knowledge, a great deal of new information is synthesized and memorized naturally, and even rote memorization (which is still important) becomes MUCH easier. The reason is that felt meaning is at the heart of dynamic memory. When we get a feeling for something we relate to it naturally and meaningfully. With that as a foundation, rigorous analysis and

intellectual understanding come more easily, and information and skills are remembered more effectively with less effort. Anyone who has a consuming passion or interest or hobby knows this.

Schooling has suffered enormously because the power of dynamic memory has been lost. Dynamic memory is working in every single person in every single moment (even when asleep as experience is processed). It is also working in every single student in every single moment as they deal with their total ongoing experience. It just gets ignored or suppressed or bypassed by traditional education. In fact students often fight against what is being taught when there is no connection between content and lived experience. So the standard model has fastened largely on static memory.

The development of performance knowledge is extraordinarily important because performance knowledge is the secret to so many problems that training and education have faced. For instance:

- Motivation of students: Gaining a feel for something is a part of the creative process. A feeling for an idea or skill is what the two of us have defined as “an unarticulated sense of relationship that culminates in the “aha” of insight. (Caine and Caine, 1994). An insight is a “gestalt” - a coming together of many systems and much past experience into a natural whole. Thus, meaningful learning and creativity are related processes. In each case, a person will be immersed in experience that is awash with information, questions will be formed and reformed, there will tend to be rigorous thinking and playful experiment, there will be periods when the questions are put aside. And in each case there is ultimately an “aha” that accompanies the grasping of a central pattern, an insight that the person has to have privately and intimately in order to really get that “pattern that connects”. Now

we have pointed out that “getting it” really is thrilling. This becomes an enormously powerful key for education. If students can have the opportunity to gain insight on a regular basis, the sheer joy pulls towards more examination of a topic and reduces many of the discipline problems found in schools that emphasize standardization. In effect, one of the primary defects of the standard model is that it is so joyless.

- Transfer of learning: There is a perpetual lament that learning often does not transfer to the workplace or to new environments. Why not? The answer stems from the type of knowledge participants have acquired. The distinction between static knowledge and dynamic knowledge plays out in the work place even more than in school. When people develop a feel for an idea or skill, and when they work to deepen the feel as well as mastering routines and procedures, an internal perceptual shift takes place. As we show in the previous chapter, people who “get it” have acquired a new way of looking at the world. That means that they can see the problems that they could not see before; they can grasp the needs of the situation. Those who have not made this perceptual shift literally can not read contexts in a fresh way. Their training does not transfer because they were not equipped with the perceptual lenses that are needed to operate in new environments.

- Better memory of facts: The felt sense of anything is a natural whole and, therefore, a natural organizer of information and responses. Once a person has a feel for an idea or skill or process, detailed memory of the facts and specifics becomes much easier to acquire, and further development becomes much easier. That is why education should aim to give students a feel for core ideas and processes rather than to emphasize the accumulation of facts. The facts will tend to follow if the feel is established.

The very real, practical implication is that education should be aiming to do more than develop replicable routines and procedures. It should seek to develop in learners a felt knowing for the material at hand. When that is done a bridge is built between education and the real world, a natural bridge that is located within the hearts and minds of learners.

Oh that it were that simple

Unfortunately, as we venture into the murky domain of the feeling of knowing, a host of issues lie in our path because “feeling” is such an imprecise word.

** What is the difference between the feeling of knowing and an opinion? After all, if feeling is what counts, isn't every opinion equally “right”, particularly opinions about which people feel strongly? No. But the problem is complex. Every belief that shapes how we perceive the world is grounded in feeling. And so we do have to deal with the issues of bigotry, prejudice, ignorance and the relevance of intellectual rigor. The challenge is to find coherence between thought, feeling, experience and evidence. Thus cognitive psychologist Bruner talks of the “test by affective congruence” (1967). A beautiful illustration is provided on a Web page called the Programmers' Stone. Here, really proficient computer programmers discuss the dance between rigorous analysis and creative insight (www.fttech.net . . . see bibliography).*

** Aren't we really talking about intuition? We are and we aren't. The word “feeling” covers a lot of ill-defined territory. In fact it calls us to reconsider the relationship between knowing and intuiting because great advances in science as well as major developments in business and other domains often stem from an apparently unjustified*

sense or conviction with people successfully “following their own noses” where others feared to tread.

* *A child does not know as much as an adult. How can they both have a felt meaning for anything? Surely there are differences?* Yes there are, and there is a developmental path for learning such that a novice can have a felt meaning for something (say chess or football) at some level and an expert at another level. The quality and depth of their knowing is profoundly different, and yet each can have a degree of felt meaning.

* *Do “feeling” and “emotion” mean the same thing?* No, but the issue is complex and scientists disagree. We have touched on this above. The word “feeling” conveys something larger in the context of this book, because the entire body is also engaged. This takes us back to the nature of humans as living systems and what cognitive psychologist Mark Johnson calls embodied learning. Those teachers who claim to teach the whole child are exactly right, and those who advocate having children sit still for 12 years while they absorb what others tell them are severely limiting the brain by disengaging the body. This will turn out to be one of the chief problems of fully on-line schooling.

* *What happens when a feeling turns out to be wrong?* Science, business and the arts are rampant with stories of competent, proficient experts who have followed their feelings into disasters and dead ends. Having a feeling is not always a guarantee of being on target. This is why systematic and rigorous thought combined with practical experience is critical, as illustrated by the story of Barbara McClintok with whom we began this chapter.

IMPLICATION: THE ENTIRE CONTEXT COUNTS

A decision has to be made about what type or quality of knowledge education should provide. There is a difference between knowing about something and being able to do it. The former is often important; the latter is essential. The standardization model is geared towards static knowledge though sometimes such knowledge includes partial intellectual understanding, with a surface grasp of essential concepts. However, the goal should always be to aim for dynamic knowledge or performance which is grounded in a deep, visceral feel for what is being studied, as the ground for rigorous understanding, and which depends upon the immersion of the learner in appropriate experience.

In chapter three we identified three interactive elements that together are the indispensable core of the guided experience approach that leads to the acquisition of performance knowledge. They are relaxed alertness, a combination of low threat and high challenge; Orchestrated immersion of the learner in complex experience in which curriculum is embedded; and the active processing of experience by the learner, guided by the teacher.

In this chapter we flesh out some crucial aspects of the context within which these elements need to occur.

- First, students need to be in a safe, honest and challenging community. Ideally, this quality of community occurs in the classroom, school and larger world. A good learning community occurs when a healthy set of relationships is developed. The result is that ideas can be safely probed, confusion revealed and skills methodically tested because useful feedback is uncontaminated by threat, power plays and the fear of punishment.

- Second, because the context communicates, learning is enhanced when the physical environment is designed to support whatever is being studied or taught. Every adult who designs a home to suit him or her self knows this. Every business that pays attention to location, color, atmosphere, sound and other factors in the environment as a way of communicating better with customers knows this. Every politician who makes an address on TV, flanked by the flag or other artifacts knows this. It is time that public education learned the same lesson.

The challenge is to align the several elements that we have identified so that they support each other. A critical aspect, as we will see, is that high level success generally requires really great teaching because teachers tend to be the orchestrators of it all. We begin by providing some real world examples of where experience-based learning leading to dynamic knowledge already takes place, facilitated by teachers, guides and mentors. This will be a foundation for seeing what the education system needs to do, an issue expanded on in depth in chapter six.