

Systems Change in Education

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Observations on the implications of systems thinking for learning, teaching, and the reformation of education.

I do not spend my life in schools and school systems and school districts. I do spend a great deal of my time working with businesses. I didn't actually start off in business because I had an inherent interest in it. As a child of the Sixties, I actually had no interest in business whatsoever, and at some level today that's probably still the case in a very particular way. I've grown to have a great deal of interest in the people with whom I've had a chance to work, and I have a great deal of interest in the health of their enterprises. I'm involved in a consortium, a group of organizations that have been working together now for seven or eight years. It probably has some similarities to James Comer's project at Yale in the sense that we came to a belief, maybe about 9 or 10 years ago, that collaboration was absolutely critical. No institution working by itself could ever overcome the extraordinary range of hurdles involved in bringing about significant change. I do care a great deal about those people and those human communities that represent those enterprises, but my interest in business at some level was and still is instrumental.

In our present day society, business is probably the most influential institution. If you want to bring about some sort of fundamental change as an indicator of what's possible, business is a good place to look. That's neither good nor bad; that's not a statement of preference. In some ways I wish that weren't the case. However, I've had enough opportunity in a variety of settings in public education to know that it's a lot harder to bring about the kind of changes that are needed in the institution called public education than, in fact, it is in the institution called business. And it's not easy in business. I've had this notion for a long time that we could build momentum in the world of business, that we could give a kind of credibility to some pretty nutty ideas that might really help in the other institutions of society where change is a little bit more difficult.

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In some fundamental way, I believe there is a kind of partnership that's necessary without knowing exactly what the form is, a kind of partnership between the world of business and the world of education. I've seen this develop informally and spontaneously in many settings where, after working 5 or 10 years, a group of people who have really started to develop a fundamentally different way of working together in their business enterprise look around at each other and go "Yeah."

But, in some cases, who really cares? Is the profitability of Shell or Ford 100 years from now really what we care about? Conversely, I don't actually think we have to try to convince people that we all have a responsibility for raising children. I don't think there's any convincing needed whatsoever. I think it's in us, personally, biologically (literally), and in the heritages that represent all of our cultures. I've seen it bubble out of us on countless occasions. When people start to build some real confidence, some real sense that they can shape and alter the nature of the place where they work in a way that represents what they deeply care about, they invariably start to say, "Well, but now what about the kids?" And no one has to tell them to do that. It's not on an intellectual plane like the five disciplines and all that kind of stuff. It's more a sense of, "Boy, there are big forces that are going to have to be mobilized in this world to get us out of the pickles we're in. And maybe they have something to do with this kind of partnership."

However, I'm not going to focus on five disciplines. They are a set of tools and methods, a set of practices. They're absolutely important. I didn't invent them. They're a summary and synthesis of the work of a lot of people for a lot of years. If I tried to summarize them in this short period of time, it would end up like someone trying to tell you how violins work. You need to pick up a violin and try it sometime. That's the only way to ever understand how a discipline or a tool really works. Moreover, many of the readers of this journal have a fair amount of experience, and I think their experience as practitioners, as implementers, is, in many ways, much more relevant for understanding schools than my experience as a thinker.

The focus here is on what it means when you try to go from one or two people driving their agenda through a school or a school system to actually believing that the only agenda that really matters is the agenda that emerges collectively. When each person gets up in the morning, he/she doesn't think about pursuing somebody else's vision. Hopefully, he/she thinks a little bit about pursuing his/her own vision. It's the only one that really matters for each of us. How do you create a field of harmony amongst the diverse visions that we all represent that can actually align and organize and coordinate a very diverse community? That's what the discipline of building shared vision is all about.

In this context, it might be helpful to go back to what's been the cornerstone of my own personal journey in this work for really over 30 years now and consider systems change in education. I'd just like to offer a few comments as someone who's lived with this notion of "system" for a long time, about what it means and what it might mean, and what I would consider some of its of practical implications. The word "system" is a very problematic word. Most all of us have a rich, evoked meaning as soon as we hear it.

For most of us, the kind of things that come to mind when we think of the "system" are "big," "impersonal," "inertia," "external forces." I wouldn't particularly recommend using the word for something you really care about because most people will think of a big, impersonal, set of external forces, constraints, something making one do something or not enabling one to do something.

At this point, however, I'd like to weave a little different picture. There is a revolution that's been occurring for 100 years in our scientific worldview. It started in physics; it carried into biology. My own background is actually in engineering. It's definitely present there. It's gradually working its way through a lot of different branches of science. It's a profound revolution, and it will probably have a huge impact on our societies two to three hundred years from now (if we have societies two to three hundred years from now). That's typically how long it takes for a major revolution in science to work its way into society.

Our schools, our school systems, our corporations, all our institutions are based on the principles of the 16th Century. We have a very Newtonian worldview. And we all learned it in the same place. We learned it in school because school is the carrier of what science says about the way the world works. This wasn't the case 150 years ago. In those earlier schools, people didn't necessarily learn the Newtonian worldview. They learned a lot of different things. They read Ben Franklin's *Poor Richard's Almanac* or learned about the crop rotation or whatever else was relevant. Of course, they learned a little grammar and a little arithmetic and such, but they didn't learn that the world is made up of billiard balls bouncing off of each other. They didn't learn that the nature of science is to figure out all the forces that control things. After all, scientifically, the real effectiveness in any institution is to learn how something works so that you can control it. People who lived on farms didn't think about controlling nature. They thought about working with nature because that's the only sensible mindset that you could have. They didn't think about altering the seasons; they thought about understanding them. But today, it all comes down to understanding so that we can control because that's the Newtonian worldview. Ironically, I always feel like I should apologize to anybody for a word I may use in a kind of derogatory way. I don't mean that as a criticism of Newton, who was actually an extremely religious person. Nonetheless, these things come down through the ages and they have a very particular meaning.

The revolution that's occurring in science today can be described in many different ways, and 100 years from now, somebody will be able to describe it in a way that maybe makes sense. When you're in the middle of these things you never know what they mean, but let me offer you my perspective. In some sense, science is an agent of culture, and it answers the following question: What's real? This, by the way, used to be the primary job of the priesthood but over the last couple hundred years, it's shifted to science, and the question is: "What's reality?" All culture, for as long as there's been culture, always enmeshes its members in these questions: "What's the nature of reality?" "What does it mean to be alive?" "What does it mean to be a human being?" In this modern

day and age, we look to science to answer these questions and science has come up with a rather remarkable set of developments in the last 100 years. We no longer see the world as full of billiard balls. We no longer think the most fundamental things are, in fact, things. It appears today that the emerging scientific worldview says something very different than that Newtonian worldview. It says that the fundamental nature of reality is actually "relationship" not "thing." All these things that we are surrounded by and which our culture tells us are solid and hard are, of course, almost completely empty — 99% empty space. This thing we call a body is, in fact, a process. It's replacing itself continually. Buckminster Fuller used to be fond of holding up his hand and saying, "What is this"? Everyone answers, "It's a hand." His response was, He says, "Well, that's really interesting, but last night I went to bed with one, and this morning I got a new one. Now, I didn't get a whole new one in one day, but I do get a whole new one over a few years." This is not metaphysics I'm talking. This is physical reality. You know, most of your household dust are our skin cells that die and fall off because they're continually falling off every few minutes.

The revolution in science, in a funny way, is actually about an age-old question that our modern science never dealt with much. What's life? What does it mean to say something is alive? If there's a metaphor or an image for the scientific industrial age of the last 300, 400 years, probably the most compelling metaphor is that of the machine. Our scientific progress, our technological progress has manifested itself in an extraordinary ability to build more and more complex, sophisticated, really quite remarkable machines. The only problem is that when a metaphor becomes deeply rooted in the collective consciousness, we start to see everything like that and before long we see ourselves as machines. We see our organizations as machines. We see kids, although no one would ever want to stand up in public and say it, as machines. I'll come back to this.

So there is the system, a functional mechanism in schools, and we all know the system means *its* rules, *its* regulations, *its* power relationships, *its* organizational charts, *its* requirements for certification, and so on. But behind that is the question of what is a

system? Let me consider it from a kid's perspective because I've had just enough experience over the last few years to think if you really want to understand the system, you must understand it from a kid's perspective. The subject of biology, for example, changes incredibly for a kid when it shifts from memorizing isolated facts about cell walls and organelles and protoplasm to understanding how a living cell functions, what it does, how it lives, how it dies, how it interacts with its environment. The cell is the building block of all living systems, and if you put a cell of that tree or my skin under a microscope, very few of us could even tell the difference. But we've been generally studying living phenomena as if they were dead, isolated facts, fragmented bits of information. Do you want to know why no kids or very few kids get excited about biology? That's why.

Seven or eight years ago, a woman I met was trying to teach English literature in a high school south side of Tucson — a very bad socioeconomic area. There were many Hispanic and Native American kids in very tough settings. She had to teach Shakespeare. She, along with her boyfriend who taught science in another school, had developed some really wonderful computer simulation models of how cells worked. They got kids totally engaged in understanding the functioning of a cell and said "Let's build a simulation model of Shakespeare. Let's do one of Hamlet." Now, here is the bizarre thing. I met a lot of those kids, and those kids absolutely loved it. I think they started to get a feeling that only an actor usually gets. All of a sudden, it came alive. They could ask questions like "What if he hadn't done that? What if he'd done something else? What might happen?" All of a sudden, rather than a static thing, something impossible in which to relate, it suddenly became a living tapestry of people interacting with one another. I'll never forget sitting around with a group of these kids about two years later. Most of them had graduated, and one in particular, Raphael, who would have never graduated, told me about what that experience meant to him. He said, "Like, my brain popped open again." He rediscovered his music. I find these paths of development are more surprising than we expect. From this little computer simulation model of Hamlet, he didn't simply decide he was going to go off to college and

major in English literature. He rediscovered his music and his desire to make a career for himself as a musician (which he had given up).

There's something different when we start to study things as if they're alive. When we apply this to schools and school systems, the most useful thing that I have discovered over the last ten years of opportunities working in depth over long periods of time with people in enterprises, is that you have got to look at the system in a very broad way. You need to keep asking, "Why is it this way? And why are the rules set up exactly like that?" Furthermore, you cannot settle for pacifying explanations. "Well, it's because the people who have power want it that way." End of story. That stops all inquiry.

There are many levels to a system and, without doubt, the most important levels are not the rules and regulations; they're not the procedures; they're not all of the manifest or obvious things. They are invariably the thinking that lies behind all those. You want to start to inquire deeply into a system, and start asking questions like, "What are the assumptions that are deep down there that we almost never even talk about?" They represent the thinking that produces the procedures and the rules and reinforces them.

Inquiring into underlying assumptions is tricky. You can ask people, "Well, what do you think about learning?" "What are your key assumptions about learning?" What you'll get is what we read in the textbook and what we learned when we got our Ph.D.s and all the proper theories. The only way to truly understand the assumptions that are operating in any human system is to watch what people do. You must watch how the system actually functions and then ask what might be the thinking that would lie beneath the surface that would lead people to act that way, to function that way. You will often come up with interpretations that almost are diametrically opposed to what people say. You know that old song (I'm just restating it in a different way here), "I cannot hear your words, your actions speak too loudly." That's how you understand the assumptions. You must look at how the system is functioning and what people are doing.

It maybe useful for me to share, from my vantage point, a few assumptions that stand out for me about

learning and about schools. I offer this with humility as a starting point for discussion by people far more knowledgeable about such things than I do. Most of what I'm going to say I say from my experience as a parent and not as an educator, but these are very real to me as a parent. I'll start off with the "deficit model."

People don't usually give speeches advocating the deficit model. It's not one of these assumptions we feel comfortable talking about, but all kids experience it. All kids. This experience, if anything, is as powerful for the high achievers as for those who don't achieve highly. Children thinking "I'm not all right" experience the deficit model. "There is something fundamentally amiss with me." "I don't have what I need to succeed in life." The way I've found it most powerfully communicated by kids is when they say, "They don't *respect* me." That's what the deficit model is experientially.

Moreover, there's no space or setting or permission for that conversation to occur. There's a particular diagnosis that people who have studied complex social systems find again and again. It is that systems, human systems, "get stuck." There are certain subjects that are undiscussable and the undiscussability is undiscussable. Kids have nobody to sit down with and talk about the lack of respect they feel. Teachers, of course, will say, "Well, of course, I respect you." And then you could add "...and that's why I don't listen to you."

I think our theory of learning is based on the fact that somehow children don't have what they need, aren't formed, aren't developed, aren't whatever. We act as if we, the wonderful intervenors, through the beneficence of our grand souls and our extraordinary knowledge, will do what nature has spent millions of years learning how to do, in place of nature. We seem to believe that if there weren't schools, children wouldn't develop. How long have schools been around? At most, a couple of hundred years. Somehow, it must've been luck with Plato or the Buddha, because there weren't schools. Somehow, it must have been luck that these people developed.

Nature knows how to develop. Left to nature's own devices, development will occur. The real question is if we add anything to the process. Or do we systematically undermine the process?

Going to a very different setting, do you think there isn't an education process in a tribal culture? Is there no education going on? Is there no development occurring? There is a tribal system of education. It occurs around the world. It occurs in indigenous cultures everywhere in slightly different forms and traditions, because obviously culture creates its own unique flavor, but, ultimately, it's exactly the same everywhere. It's universal. It's been developed for at least 200,000 years, and it's been utilized for that long. We pay no attention to it whatsoever. At a certain point in time, a young person wants to learn something and hangs out with the people who seem to know something about it. That's how it works. It's a little oversimplified, but that's basically how it works. There's not a lot of evidence of dilettantism. There's not a lot of evidence that people grow up and never learn anything, or that individuals expect the tribe to take care of them. There is not much evidence of that. They all seem to find their place. They all seem to find what they really want to learn about. They all seem to find their place to contribute.

Present that notion today and, of course, people say "Well, that's ludicrous. Children wouldn't learn on their own." Those very same children who we have to tie to their chairs to learn in school are learning outside of school — learning, continually. They may not learn what we'd like them to learn, but they're learning a great deal. You can't *not* make learning occur. There's nothing you can do to keep learning from occurring. Learning is nature expressing itself in its search for its own development. It cannot *not* occur. But, we sure can make it difficult with the assumption of the deficit model. The child is in some way deficient, and we will fix him/her.

A second assumption about learning: Ask most people in our culture and in the industrial cultures where learning occurs and see where they point. They point to their heads. We think learning somehow is up there. We don't think of it in our bodies. All indigenous cultures (in fact, most Asian cultures to this day even as there are a lot of clashes because industrialization is gradually sweeping across the Asian cultures) will still say that knowledge is in their bodies not in their heads. We may have some ideas up there, but that's different than knowledge. Knowledge is about the capacity to *do* something.

You and I, most of us, know how to ride a bicycle, but very few of us actually even know the theories of gyroscopic motion whereby it works. We don't have the ideas, but we know how to ride a bicycle. We know how to walk. We know how to talk. We think that stuff is trivial? By comparison, most of what we learn in school is quite trivial. Learning language is an extraordinarily complex process.

The assumption that learning is in the head is mainly a European tradition that has its roots in the aristocracy versus the common people. You always must remember Michelangelo could not have dinner with his patrons. He could not share a meal with his patrons because his patrons were the aristocracy and they did not work with their hands. The common person was defined as a person who worked with his or her hands. So, in some ways it was natural for the aristocracy to see knowledge as in the head.

This, of course, leads us to extraordinarily limited notions of development. It's tragic because it really is the musical intelligence and the kinesthetic intelligence and the interpersonal or emotional intelligence, as well as the abstract, symbolic and reasoning that characterizes development. We all have different propensities. Some of us are brilliant in one of them and good enough in the others, but we have to be pretty good in all of them. How many of us learned in school that we couldn't sing? How many of us learned in school that we couldn't draw or paint? How many of us learned in school that we weren't too good in math or that we really weren't very good in English? That's the deficit model played out in these fragmented worldviews. It's a form of sorting, but the basic assumption about learning here is that learning is in the head. I'll never forget a story told to me by Victor Weisskauf, a beautiful man, who is a retired chairman of the physics department at MIT. When he was a young child, his grandmother played the piano. He said his most vivid memories as a child were sitting underneath the piano while his grandmother played. He said he could still remember as a three- or four-year-old sitting under that piano as she played Bach. Vicky explained that as the music washed around him, he became a physicist. Cognitive, in the head? Nonsense!

A third assumption about learning follows directly from the second. The third assumption about learning embedded in our culture and in our schools is, of course, that there are smart kids and dumb kids. It's a corollary to the second, but is relatively new, culturally speaking. It's a clear product of the industrial age. I can give you some food for thought as to why the industrial age would produce this assumption. That there are smart kids and dumb kids is in contrast to the quite universal notion that all children are born with gifts, unique gifts. The healthy functioning of any tribe is defined by its capacity to create an environment for each of those gifts to develop. They don't develop all by themselves. They develop from a lifetime of interactions of a human being with his/her environment. Smart kids and dumb kids is a by-product of the machine.

This assumption is most clear if we explore it in the context of a few assumptions about school. The assumptions I've been discussing about learning are transcendent but embodied or instantiated in the institution we call school. If you really want to inquire why school works the way it does, you must think about what are our deeper assumptions about learning, the nature of knowledge, the nature of human development, etc., because they then get embodied in this institution we call school.

The first assumption about school, in looking at how it works (not how it's espoused), is the classic industrial age management system where we break up all the jobs into different pieces. We let somebody be a superintendent, a principal, and a teacher and assume that that is the right way to manage it. We do not build partnerships amongst these people. We do not build a sense of collective responsibility amongst people. We build on the sense that if each person is doing his/her job, then the thing ought to work out fine. It's the antithesis of a real team. It would be like someone thinking, if I just rebound, the team will succeed. The team won't meet with success if we believe we are each responsible for only one thing. That's the industrial age management model. Break it up into pieces, create specialists in the pieces, let everybody do their piece, and, by golly, it should work out. The rebounder won't be on a team very long even though he/she might be great at that job because on a successful team everybody must do a

little bit of everything. Most importantly, we all have to have a real sense that if we don't function well together, real success will not happen. In schools, the one person that the kids are most aware of is the teacher because they don't think a lot about superintendents. They may think a little bit about principals if they're like me and had to talk to them on a few occasions. They think a lot about teachers. They know exactly what the teacher's job is. The teacher's job, of course, is to make sure the kid learns. In turn, the kid's job is to do everything he/she can to please the teacher — not to learn, but to gain the teacher's approval. That's the flip side of it; that's the kid's job. A kid's job is not learning in this system. The kid's job is pleasing the teacher. It doesn't matter if kids think they're really good at things. If the teacher doesn't think so, they're not. The teacher, not the kid, has the power to define.

One of the things we know is important in our society is lifelong learning. All businesses will tell you that whatever people learn in school, they're likely to keep learning throughout their lives. What do you think happens to lifelong learners whose primary skill is about pleasing a teacher? Do they then go to work and seek to please a boss? Are they very good lifelong learners? Of course not, because one of the cornerstones of a lifelong learner is to have greater and greater capacity for rigorous, objective self-assessment, to know how well he or she is doing. A system of fragmented responsibility directly limits lifelong learning.

There's another related assumption that's embedded in the educational enterprise in the industrial age — that knowledge itself is fragmented. Knowledge is thought to exist in separate little categories. Geography is over here; this is a body of knowledge called geography. Over there we have literature, and over there, we have mathematics. You might, as you go through your daily life sometime, just notice when you encounter a problem that's just mathematics as opposed to a problem that may need and require you to summarize some statistics or one that's just about history or just about geography. Life isn't that way. Life is about all this stuff as it presents itself in the process of living. But that isn't our theory of education. Our theory of education makes one narrower and narrower (until finally, they kick you out

of the system and give you a Ph.D., piled high and deep). It produces the cult of expertise. We believe that some experts have got things figured out because they've got more stuff in their pile than anybody else.

That's our theory of knowledge in the West. It's deeply fragmented. There is no notion that reality is made up of relationships and that to understand reality in a meaningful way is to understand the interrelatedness of things. Our education system does not allow the idea.

We have a system of education, a school system that's based on what philosophers call naïve realism. In this system, we believe teachers do not teach their views. They do not teach their opinions. They do not teach their interpretation of what happened. They teach what's actually fact. The kids learn that "this" is what happened in history, that history is just as the author said. They don't think that this is what this teacher (or author) has interpreted to have happened, but that things happened just as they were told.

There's a famous Chilean scientist, Umberto Maturana, working in the field of biology (one of the areas of scientific development that is really putting the nail in the coffin of naïve realism, because it's been falling apart for a couple hundred of years), who has developed a pioneering theory about how biological entities actually produce something we call cognition. It has revolutionized the cognitive sciences. He says very bluntly, "All things said are said by somebody." That's all you need to know. "All things said are said by somebody." No human being ever produces a definitive statement about reality. It's not actually biologically possible. Think about what that would mean in schools.

We all can think of teachers who we knew didn't know the answers, who were, at the same time, so excited about the time they were going to get to spend with us and what we might learn together. We loved them as teachers. We knew they thought a great deal, and we were interested in their experiences and their thoughts even though they didn't give us THE answer. When they told us what happened in history, they said they were giving one view. Our history books still don't point out that Ben Franklin for 30 years was the Ambassador of the

Iroquois nation and that most of our ideas about the design of the Constitution came from the Iroquois. That just didn't get into the story. But the good teacher transcends that myth of "I have the answer you need" (as would fit into the deficit theory). I have what you need, it's called *an* answer. This is how the institution embodies that view of learning; the teacher must have answers, not questions, not curiosity or passion.

The last assumption I'd like to share with you is that school is a machine. It is not a living system. Think about a few definitional cornerstones between machines and living systems, and you can see very quickly what I mean.

Does a machine evolve itself or does it just sit there and do what it's designed to do? Does your car grow? Does it evolve? Now someone could say that some of the machines that are being created today might have the ability to actually evolve through the way they're programmed. Be that as it may, machines function in certain ways towards determined ends. A living system is, almost by definition, in change. It never stops changing. Look in the mirror; we never stop changing. It's the nature of a living system. A machine operates according to its design specifications. It can't really operate much differently than the way it was designed to operate.

One of the most obvious machine-like characteristics of all schools is they are designed to run at a certain speed. Every teacher knows what they've got to cover in a semester or a year, and the machine has got to go at that rate. It can't go slower and it can't go much faster. Kids who might want to go faster get lost, but kids who really might want to go slower have no place to go. If you want to look at all the different features of school and just hold up one that everybody can look at and say is crazy, it is this underlying assumption of a set speed. What's so magical about 18 years of age for graduation from school? There's no difference if a kid left school at 15 or 16 or 25. What difference does it make?

I spent the weekend with one of the foremost people in the world in cost accounting who invented something called activity-based costing. If there's ever a Nobel Prize given in the field of accounting, he and his colleague undoubtedly will get it. He's revolutionized business. His son, he and his wife live in

Sweden. Their son has cerebral palsy, and we spent most of the weekend talking about their struggles in school and all the things they were told their child would never be able to do. But he's done almost every one; it just took a little longer. He finally completed high school at about 22. He's now in college. But the only reason he succeeded is because his mother has devoted her life to battling. A machine runs at a certain speed, and if you don't run at that speed, you don't fit into the machine.

There are a few other characteristics of machines versus living systems but maybe that's enough to make the point. I'll end with one thought. A machine has no purpose of its own. It has its designer's purpose. An important question to ponder, (and, again, assumptions have to be inferred, deep assumptions, by looking at how things work, not by what people say) is what is the purpose of this machine, school? I would recommend engaging kids in this conversation because, unfortunately, we adults have been part of the machine for a long time. Ask a six or seven or eight year old. He or she will probably have very fresh perspectives from their experiences because he or she is coming in from a different world.

A living system creates its own purpose. If I had one kind of wish for all of our institutions, and schools in particular, it is that we wake up and dedicate ourselves simply to allowing them to be what they would naturally become, which is human communities and not machines — living communities where beings continually ask the question why we are here and continually keep rediscovering and re-articulating that purpose.