

January 18, 2005

John Seely Brown Lecture

INTRODUCING SPEAKER: Good morning. It is a pleasure to welcome you to this lecture this morning. We are grateful to support from Qualcomm that is helping us with this lecture but also with a much larger project that is helping the University think about different ways of helping undergraduates gain the kinds of information and technology skills they really are going to need as they graduate and move on to various careers.

It is a particular privilege this morning to welcome you to this lecture by John Seely Brown who prefers to be called JSB, so from this point on I will refer to him as JSB.

I'm also pleased to welcome the College of Education who are not in this room with us today but are over in the Aztec Center, and this entire lecture is being beamed over to them by technology. So they are part of a retreat and they want to take part in this. Take this audience and multiply it several times and that is who is watching.

Let me say a few things about JSB, and I could use up an hour talking, but I promised not to because what he has to say is too interesting and too important for us. But I do want to note that he is a graduate of Brown University and also with a Ph.D. from the University of Michigan in 1970. He has two honorary degrees, one from Brown University and another from the London School of Business. JSB was the Chief Scientist for Xerox Corporation until April 2002 and he directed the Xerox Palo Alto Research Center up until 2000. He is a member of the National Academy of Education, a fellow of The American Association for Artificial Intelligence and of the American Academy for the Advancement of Science. He is also a trustee of Brown University, the MacArthur Foundation, and In-Q-Tel. Additionally, he serves on a

number of boards including the board of directors of Corning, for Varian Medical Systems, and Polycom.

He is widely published. He speaks all over the United States and all over the world. He has published over a hundred articles in scientific journals and many books. Two of them are for sale out here. One is *Storytelling in Organizations* and the other is *The Social Life of Information* which has been published worldwide and translated into nine languages. It's already been released in a second edition in 2002. Interestingly, he was the executive producer for the film called *Art - Lunch - Internet - Dinner* which won a bronze medal in Worldfest 1994, the Charleston International Film Festival. He is a man of many, many talents. He is an avid reader. He's a traveler and a motorcyclist. He has a Harley, I understand.

J.S. BROWN: BMW.

INTRODUCING SPEAKER: Sorry. That's right, there is a significant difference. He is a designer, he is a strategist, he is a storyteller, he is an asker of difficult questions. We weren't in the car two minutes when I got asked some very challenging questions, the best kinds of questions, the ones that ask you to go right to the heart of the matter. As a trustee of Brown University he has worked with them and also with the University of Michigan and the University of Southern California to help them think about where they are moving strategically and to determine directions to go. He is also part of the National Research Council panel report called "Preparing For the Revolution: Information Technology in the Future of the Research University." He also describes himself as the chief of confusion. By that he means that his role is to ask the right questions at the right time so that we all make better decisions about the future. I can guaranty you will not find his talk confusing, however. He is engaging and what he has to

say is extraordinarily important to San Diego State University and to higher education in general. It is indeed a pleasure and an honor to ask you to join me to welcome JSB.

applause

J.S. BROWN: Thank you for that gracious introduction.

I don't have a true formal talk today. I am going to throw out a collage of ideas and images and we can weave different kinds of stories together depending on the issues that are facing you. This is meant to touch each of us in different ways. Not everything will be of interest to everybody here.

My own personal interest why I got on this hobbyhorse is I do think we have a chance to rethink education in ways we have not been able to do it before. I think the high tech world can do many things for us. Some good, some bad. Our chance is to figure out the good things. But some of the good things is there a way to get to the core of passion, the desire to build to create that is in every one of us. That is kind of where I am headed. The deep, deep message which is so easy to say and so hard to do is how do we work with, not against, change and engage in a form of judo. What are the forces coming at us and instead of pushing them back, how do we blend with them to get to the core of what learning in the 21st century can be.

One of the challenges which we all face is today's students actually have a different kind of vernacular than most of us. If we do not think what that vernacular is we will be talking across purposes. It is not to say we have to buy into that vernacular, but we have to be aware of that vernacular and see how we can leverage it. One thing I come back from studying India and China and one reason I do these talks is that education is more important than ever. When you see the kind of education and kind of skills in India and China we realize (*inaudible*). Education

is unquestionably a knowledge base more important than ever, but we the public are less willing to pay for it. So we have something that is increasingly important but increasingly poorly supported. Part of the issue is to find a new way to tap resources that have not been tapped in the past to help us.

Institutions of higher learning, San Diego State being one, may need to spend more time in how they become learning institutions themselves. How we learn to do our job better. These are some of the issues that we have facing us on the global level. It is my belief there are incredible sorts of resources we can leverage, that can enable us that are in fact more cost effective than many of the things we do today.

Today's kids 15, 5, 15, 25 -- what I mean by kid is always confusing. These are the expectations. Most of these students want to learn experientially. They want to learn interactively and visually. Almost everything that I know today I learned with and from other people. So the sense of how do you learn with other people and from other people in terms of collaborative. To me, and part of the theme of one of the book, the *Social Life of Information*, is social life on campus is seamless with academic life. Yet look at the way we build our IT systems. So that some are just used in the classrooms, academic, and some are pumped into the dormitories. But they are both the same world, in fact. I claim that a tremendous amount of learning that happens on campus happens outside the classroom. Some of the most interesting things that happen are the conversations that happen when students leave the classroom. At Starbucks or the bars. What types of bull sessions do you have? That is where you take the information and start to internalize the conversations. That happens seamlessly. You cannot stop it from happening.

We are so used to teaching people strict disciplines, but, in fact, the key today is systemic thinking. One of the things I have learned is no significant problem in the world today is linear; they are all cross-linear. So environmentalist if you can't look at the environment in terms of food and poverty and all kinds of other issues you cannot understand just how complicated the problem is. Almost every significant complex issue is sustained by cross-cutting disciplines. Think about careers. I think that is a mistaken notion. I think we should be thinking about career trajectories. Establish a platform that prepares them to discover their own trajectory for the next 30 years, 40 years, 50 years. Because very few of us will be doing the same thing in 20 years that we are doing now.

One of the most important skills I have found is the notion of how do you begin to honor multiple ways of knowing? I had experiences of working in anthropology, working in physics, working in mathematics, and working in film. I will tell you that there is almost no overlap in those communities. What constitutes an interesting idea, what constitutes an interesting solution -- even between physics and mathematics there is almost no overlap. In almost a punch line for everything I am going to say, if there is a skill today that I care most about our students learning is learning how to listen with humility, to listen to other voices and other ways of knowing. That means disciplines it also means cultures and so on and so forth.

How to make judgments. We will come back to that. And how to make a difference. One of my best colleagues dropped down from a major tenure-track position at Stanford University. He said, "I want one foot inside the academy and one foot outside the academy because I want to make a difference. I want to effect policy; I want to deal with real problems." I am finding that more and more of our kids get educated today in order to do something with the

world that makes a difference.

There is a skill besides listening that matters. It is the skill to be able to communicate complexity simply. Honor that complexity and saying it in a simple way. The notion of that kind of communication skill I will argue in today's technology there are so many rich platforms to help communicate.

I spent 30 years of my life in and around architectural studios. My wife is a practicing architect. I'm struck that if there is a beautiful educational learning paradigm it may be the notion of how studio architecture works. It is different than most of the academy. The architectural studio has 20 or 15 students working shoulder to shoulder on projects to build and design something. Consider our final build. Some do real constructions as part of their exercises, but everything they do, all work is public. You always see what everyone else is doing. If you look at a studio you will see plastered on the walls sketches that one student uses to inspire their project.

I bring this up for several reasons. At the end of a six-week project each student gets critiqued by the master. So the notion of getting critiqued publicly is a key part of architecture training. On top of that, every other student gets to overhear. But because each student has seen all the work in progress that this student has gone through to construct this final artifact, basically each of the other students in the classrooms completely understand the processes that led to the project. Even this ten minute critique suddenly has incredible new meaning to the other students in the classroom as well as to the actual student that did that piece of work. You get tremendous bang for the buck. Basically the master may only spend ten minutes per student every three days, but because of the process there is so much sharing of the struggles and

thinking that went on. What is really happening in the studio is that each of these students is starting to enculturate into a practice. They are learning to think like an architect -- the enculturation into a practice that constitutes the education here.

How do we take this up? This is a studio course at MIT. The toughest course at MIT that separates those who will go on to physics and those who will go to something else. It is a course on electricity and magnetism. It is a tough course in many ways. I used to think it was designed to make sure students did not get through. The catch was how could you completely go back and rethink (*inaudible*). The answer was let's build a studio. And they built a studio and set up with 13 tables with nine students per table. And what happens is almost no recitation and then problems are thrown out and issues looked at to explore, and around each table are all kinds of instruments to use to be able to explore and solve these kinds of problems. You do it basically in a community group, and if you get stuck the TA comes over. If some really interesting thing comes up, it is thrown up on the screen, everybody stops and the TA will explain how he came up with the problem. It's a very interesting interactive group. This created a tremendous amount of national attention.

The sad truth is it did not work all that well. It was not as spectacular as some of us first thought. They stopped the program for a while and stepped back and said, "what is going on here?" What was going on here it turned out to be extremely interesting. The problem was the TAs. The TAs and the faculty were still approaching this process not as an architectural professor would do but as a professor talking in big classrooms like this. So they had to take the professors off site for a while, and the TAs, and think about what are the new types of teaching styles where you are not in total control of what is going on completely. How do you become

the master in terms of the practice, but actually work with people as they evolve practices of becoming physicists.

Everything is getting rebooted again and I think the New York Times Education Life last week ran a big story on this. I forget if they talked about the re-beginning of the course but they had to rethink the role of the TA the RA and professors to make this thing work.

What have we been talking about here? It is easy to see that there is tacit knowledge and explicit knowledge. Every piece of knowledge has a tacit component to it and it has an explicit component to it. Those are interweaved. If you take the notion of that, the explicit, which is what most of our classes are about, talk about learning about something. But the tacit has to do with the practices of the profession, and learning to be. Learning to be a reader is different than learning about reading. Learning to be a musician is different from learning about music. You want to think about this distinction. The classical way to approach most education is to say the first four years of undergraduate, maybe even the first two years of graduate, is learning about, and you learn to be in terms of an apprenticeship program only after you start your doctorate after you pass your qualifying exams. My assertion is that is the fundamental thing we have to think about.

This diagram that I think to me speaks to think about a tree, what is above the ground and what is below the ground. You might say what is above the ground is the explicit, below the ground are the practices. You can build the tree easily. You can build a beautiful arched tree, but if you do not pay attention to the roots, the first time there is a windstorm, over goes the tree. The same with our professions. The first time you get hit by a new type of problem, you cannot do it if you do not have the roots or you don't understand the practices that are involved here.

I think that this is an intent to create an image to suggest that we ought to take more seriously this notion of enculturating into a practice at day zero, not at day graduate school plus two years. How do you think about this notion of enculturating into a practice and how will technology allow us to do this? The physics example I gave you was a simple example. Let these kids start to incorporate, to engage very rapidly as a community of learners in a moderately cost-effective way. Enculturate into a practice.

Let me show you one of the world's most cost-effective learning platforms that has never been recognized as a learning platform. This is the open-source movement, the most famous being Linux. Linux is a professional operating system built by thousands of people, distributed around the world. No master architect. This operating system challenged the existence of Microsoft, challenged the existence of Sony and Hewlett-Packard and IBM has now embraced it. Here is an operating system of unbelievable quality and unbelievable complexity that has been written by kids. It is an amazing operating system. But not only is Linux an open-source community, but as a community they have a set of practices. Some of the practices is you have to write code to be read. Now, I was trained in computer science, and if I could write a piece of code that nobody could figure out, I was a hero. It doesn't cut it anymore; if you want to be part of this community you have to write codes meant to be read. You start to apprentice to this program by testing yourself, by adding virtual stuff. If it cuts mustard then you start to move up and so on. But in this community social capital is what matters. The better you do things the more you are member of this community, the more your reputation builds, and your own sense of self identity starts to pick up.

What I find interesting about a lot of this, from an education point of view, is we are now

training thousands and thousands of students around the world to this virtual community in terms of enculturation, into the practices of what does it mean to be a successful member of the Linux community, or some other community. Each community is different. They all have the central issue of how do you enculturate into their practices to be a more central member. That is a dynamic that is happening below the horizon in terms of an incredible learning platform that doesn't cost anything.

How does this play out in a normal classroom? This looks like a normal classroom. Small classroom. This classroom, everybody has laptops, but it is totally open. Everybody is connected and logged on to the Internet. This classroom in some sense is a nightmare to teach in. To take a classroom that looks normal like this and think what does it mean when you wire it up this way. You have two options. One is that the professor becomes more of an entertainer so people still bother to come to the class. The other thing that happens is the teacher becomes more of an orchestrator, mentor, and more of a challenger. What happens in this class is the prof says something, and a hand goes up. "I'm not sure I believe that. In that particular period in Florence I found this. I think you are wrong," is what the student says. That is the beginning of an interesting learning moment. The prof feels comfortable about not knowing everything. "Fine. You found that on the Internet, hey class how many people can find a counter fact to that?" and everybody goes off trying to find counter facts and people find all kinds of contradictory things on the Internet.

When the prof says how do we start to work with these supposed answers? How do we convince ourselves which one we want to believe in? Or which ones do we want to steal from the old one? Which piece of code do you want to build on? You have to make the decision

yourself. All of a sudden, this variety which used to be terrifying, becomes the seeds of some very interesting debate. You start to look at what does it mean to deliberate? Now, I could teach a GE course on just that; or I could actually make it into something that just emerges from the kind of classes I was just talking about. That is some of the issues we want to talk about. If you could move to the sense of the orchestra, and you could do this with TAs as well, is to get to the sense of what it means to be literate? How do you triangulate? How do you look at how many different ways you can come to something? I want to throw this out. Here again we are using a naturally occurring resource, the Web. Let's use that and let's transform that into a profound learning event. Here is an example of using a classroom as a social platform and augmenting it with the virtual. So it is a ying-yang relationship. Not trying to replace one with the other, but looking for synergy.

The issue we have facing us, -- I'm losing my voice -- is how you form multi-levels of intelligence. How do we think more about this sense of engaging in a practice in catalyzing passion and creativity. How might you do it by finding niche learning communities that each kid might want to be a part of and build on that.

I want to end with the notion of the rise of the amateur class. The amateur class. Why would I talk about amateurs? What does the word "amateur" mean? If you go back to the Latin of amateur, it means something you do for the love of it. I claim that our challenge is how to unleash creativity for the love of it. If we can figure out how to do that, we have created life-long learners and life-long creators.

Let's look at this emerging vernacular. I'm going to claim it is a composition of three different things happening. One has to do with the screen language of cinema. The second has

do with the screen language of interactivity. What are the game ecologies really about? I could spend the entire session here talking about games. I just want to caution you that almost everybody that writes a game, if you look at the game as the thing being played on the screen, you have missed most of the point. You have to look at the social life around the edge of that game. The communities that built them; how they swap ideas. It is a very rich social life. Not very far from here is probably one of the most successful game environments the world has ever seen. It's called Ever Quest (?). It is right down here. It is responsible for 30 percent of all IP traffic in Southern California. There are half a million players, sometimes as much as 50 thousand on simultaneously. In this amazing world of Ever Quest, which is a role playing game, you learn things; you trade things; you teach skills; you build claims; you figure how to get other people around the world to enroll in your claim, your tribe. You train them, and there is an economy where people actually sell their magic swords, and so you build skills and you build new artifacts through those skills and then you can actually sell those skills on eBay. Sony (?) has tried to stamp that out, so you have to know how to look on eBay, but the surprising thing is, just to give you an idea what is flying under the radar screen within a few miles distance, the gross national product per capita of real cash being traded on eBay exceeds Russia. That is what is happening right here. These are the sources and resources that are happening. But that's a different story.

Let's get on with what I am supposed to be talking about. Obviously the third skill is how do you navigate? If you do not feel comfortable finding your way and being always confused on the Web, and if you do not feel comfortable and happy to sniff around -- now most of us were trained or learned how to navigate libraries. That is a very important skill. But the

new set of skills is how I navigate, how do I move around, how do I find things on the Web. All that that really does when you put it all together has to do with a literacy which deals with how do you not just read, but how do you write in this complex world, and how do you use the writing capabilities to scaffold the presentations of much more complex notions. How do you use music; how do you use sound; how do you use images to interact with text in order to be able to persuade, to capture and get to the essence.

Getting to the essence is critical. Probably your average sentences for your philosophy journals are six lines long. My little punch line is guess what? Picasso does not traffic in (*inaudible*). He lays it out bang. His ability to get to the essence of something and say something without qualifiers means he could never be a philosopher.

So my hero is George Lucas who got us to start thinking more seriously about this. He had asked our president, Lloyd Armstrong. He said Lloyd, if you were grading students and 20% who do not know as much about Hedgecock as Hemingway, maybe they aren't being educated. And that sent a shock wave through the community. Something I want to show you has to do with that shock wave. First of all, let me show you, he is a dramatic speaker. I will try to put him on.

Film (*much was inaudible*)

FILM SPEAKER: The ability to (*inaudible*)

...are all areas that are very powerful. As we enter the 21st century the need for literacy is becoming increasingly important.

ANOTHER FILM SPEAKER: The literacy program at the University of Southern California is about being a force in education towards giving students a particular set of skills

that will become more and more important as the 21st century progresses.

ANOTHER FILM SPEAKER: Dealing with visual and audio materials students can use the images, graphics and digital interviews (*inaudible*)

ANOTHER FILM SPEAKER: (*inaudible*) ...student interest in the literature and in topics that I teach because they work with material differently. They get more engaged with the material. The emphasis on English and the written word and spoken word, all very good and very important, has over shadowed other ways to communicate. Students need to know about editing; they need to know about composition and know about life forces and how those things work.

ANOTHER FILM SPEAKER: We have nearly 2,000 students that entered the program in three classes.

ANOTHER FILM SPEAKER: By teaching students how to use the media we are empowering them to engage with society.

J.S. BROWN: What I want to do is show you first and then talk -- I was going to show you a movie done by a 16-year-old student that I discovered. This kid, and she is Chinese and lives in the Bay Area, she had a 1450 on her SATs and her mother told her she was a failure. There are people who got 1600 and she should be ashamed for not getting 1600. This is a four-minute video that talks about how she came to terms with that.

NEW SPEAKER: Run it.

J.S. BROWN: Okay.

Any chance we can turn down the house lights? This is a wonderful story, but cinematically it was not perfect.

Film

Music playing.

GIRL IN FILM: I heard her steps coming up the stairs. I felt the anxiety.

MOTHER: Excuses. What about the (*other*) girl? She got a perfect 1600. No, she's not like you. She doesn't have to use excuses. You make me ashamed to be your mother.

GIRL IN FILM: The pain grew. My head pounded. I had been a failure, embarrassing. My mother would invade my room and instantly I knew something was wrong. Once it was all over I realized that I was never going to be my mother's rescuing gasp of air.

Her opinions consumed me. When she said those things about me about how I was nothing and a complete failure, I was killed one time and then another time and then another. Every time I heard those words it hurt like the first. I got accustomed to them. Before I could float through the pain I went to school thinking I was much less of a person than any of my other classmates. I had so many preconceived notions about myself and life that my mind was too cluttered with her notions to be concerned about what really needed my attention.

My mother always said, gasp of breath for me. The first time she had used the phrase I imagined her struggling in water trying to stay afloat. The words I kept in my head. Gasp of breath for me. She didn't get her breath. She only continued to strangle. Ultimately I gave up. I gave up on her breath, on being her last hope. I grew to hate the face and hate myself and my life. I hated loving my ideals and hearing they were stupid.

It was after one of our fights I realized that she believed her life was unsuccessful and that she was an unlucky one. I recollect a story she would tell me. When she was in elementary school she was on the basketball team and the choir (?). But when her father found out, he

forbade her, a girl, the chance to express herself. He only wanted her to be like the other girls who were all forced into the traditional female role. She was forced to do nothing, but her teachers implored her to stay saying she had natural talent. But she had no choice but to watch her talent waste away. And then I saw why she was so harsh to me and why she wanted so much more. Why I, with all the opportunities she didn't have, was her last hope, her last gasp of air.

J.S. BROWN: That is a pretty heavy piece. Interesting how she uses medium to be reflective to come to terms. I played this in concert halls in China and Singapore and you could hear a pin drop. To me, not only is it an interesting piece of reflection, but this is a brilliant narrative art. It is really skilled. These are still photographs. She could pick this up, anyone in this room, could pick this up in 30 minutes. It is pick and drop. She did the music and narration and the notice the sense of rhythm that she invented for her use. She found a way to use sound, black still images, and voice narration all to reflect and say something profoundly personal. She easily got into Wellesley. Probably they were sending this. This is an example. She was inspired by an English professor. There was a sense of using this to understand the power of storytelling. Now let's face it, the themes that you remember are stories. How do you become a great storyteller and do you start to use sound as a scaffolding. How do you use color as a scaffolding effect, and so on and so forth? There is something so powerful here that is so simple. This is a reflection medium that I think is very interesting.

The purpose of this program at USC has nothing to do with technology. Technology is not taught in any of these courses. Rather, the issue has to do with how do you make a visual. How does visual art play out in philosophy, history, women's studies? These are all the different disciplines that have been reflected in this.

How do we enable this to get off the ground? The key is any professor who wants to sign up for putting a course through this. It has nothing to do with taking course material and making it multimedia. It has to do with getting students to write their term papers in multimedia. The prof, him or herself, has to experience what this is like. So there is a two-week workshop for the professors. They come together and to get this off the ground they provide them an extra TA. The profs have to dedicate two weeks in the summer and they come together as a community and they experience creating their own stories and then thinking through what should their curriculum be. I want to show this.

Film (*much of the film was not audible*)

FILM SPEAKER: My course has been entirely reshaped because of the experience of the summer.

I really am trying to figure out new ways of telling stories.

ANOTHER SPEAKER: Seeing what other people can manage provoked us to do other things in different ways and we were able to inspire one another.

ANOTHER SPEAKER: Some of this discussion was about literature.

ANOTHER SPEAKER: I thought a lot more about this course than I have about any other course.

ANOTHER SPEAKER: The lectures and the multimedia centers. I'm ready to rock.

ANOTHER SPEAKER: This will help my own writing.

ANOTHER SPEAKER: I was learning things I had never thought of learning before. Learning new ways to look at things.

ANOTHER SPEAKER: It's allowed me to go further.

J.S. BROWN: Those are all professors chosen -- you have to write a proposal for the two-week course. They formed their own learning community. They started learning from each other. At the end one thing they found most powerful, each one had to do a story board for what their curriculum was going to be. If you do story boards you have to do images. What are the fundamental ideas you want to get across. That is just kind of a quick example.

I will show you one -- I will jump a moment to kids.

First of all, there is an interesting point of view that today's kids are multiprocessing. They do e-mailing and instant messaging, chat rooms, cell phones, ripping music, watching TV, and they do it all at once. In the digital world everything happens seamlessly. The usual claim, therefore, is that these kids are not paying attention to anything. I just want to say "careful." To some extent that's true, but it may be much less true. What we fail to realize is that these kids -- philosophically there is a huge difference between what you attend to and what you tune to. These kids have tremendous peripheral vision. They process a huge amount on the periphery. That building up the peripheral awareness these multi-channels that they have happening. The curious thing is if you go to most top CEOs they find out their attention span is shockingly small, and you find out their ability to context switch happens instantly. They are always multiprocessing. If you go to the other extreme and you go to driving high-performance motorcycles, the only reason I am alive today is you become attuned to millions of things happening on your periphery and you are a fast content switcher.

We never think how we design for the subconscious mind, yet the subconscious mind does an astronomical amount of work for us. These kids are basically tapping that.

What that all means is less clear but a fair amount of that is going on.

I want to show you a kind of response. (*Reading screen*) "I'm not listening I'm simply bored." I don't have attention deficit, I'm just not listening.

Basically this kid says I don't want to study I build (?). That is at some level an absurd comment, but on the other hand there is something true about it. I first thought, oh God, I got myself an arrogant jerk, and then I hang around and I have dinner with his parents, and the father gets to discussing something that came up in the Senate. The question became "what does it mean to be powerful in this country?" He said, "you know, Dad, in Rome it has to do with how close you live to the Senate. Which is to some extent true. Because the closer you live to the Senate, the more influence you have on the power. " Now I think maybe now in the U.S. it depends on what close relationships you have with Senators, and that's what determines power." So here is this 16-year-old kid who has invented a theory about something that has do with today's democracy just from playing a game. I was sobered by that. This kid was giving out a little bit more than I first thought.

I want to end quickly going through what these real shifts are to these students. We talked a lot about the shift from text to an expanding sense of literacy. Text-image, text-sound and so on. Second shift had to do with leadership. But the interesting thing about these shifts is they are interconnections. The next had to do with the shift from an authority, base being told, to more of a discovery-based experiential type learning.

Think about the interaction of the first two. If you do not know how to navigate the experience you discover is seriously impeded. Your ability to do comparable discovery depends on how fluent you are navigating.

The third had to do with reasoning. And that is the shift from the deification of deductive

to more of a lateral sense of pulling stuff together, engaging in bricolage, meaning how do you tinker with things? How do you take things and put them together and build new things? By the way, that is the way we build almost all technology today, even though my lawyers don't want to hear about it. We borrow things; we tinker with them; we modify them; we join them; we build stuff. What do you think (*inaudible*) is? What do you think (*inaudible*) is? Bricolage.

Notice with bricolage you appropriate something. That means you bring it into your space, you tinker with it, and you repurpose it and reposition it. When you repurpose something, it is yours. Suddenly I take something outside and take it into myself. There is a catch. If you want to bring things in and tinker with them and put them together, you have to make judgments. Who wants to build (?) on junk music? Coming from the software world you have to make judgments on what subroutines you want to build on. You are constantly making judgments. Just because you know how to navigate, if you can't judge things (*inaudible*)

We have now maybe found a way to turn the weaknesses of the internet into the pluses. No longer do you have the institutional awards that everyone in this room uses, "it comes from Stanford University Press, therefore, it has been vetted," because most of the stuff on the Web has no institutional awards behind them on the Web, so now you have to actually decide for yourself even more if you want to build on this kind of thing or borrow this kind of thing, so on and so forth. I'm going to claim that putting those three things together is a very powerful foundation for a new type of society.

You folks with kids know that the fastest way to be classified as a dinosaur is when you get a new device and you ask the kid if they have seen the manual for it. "No, I have not been to a museum. What's a manual?" About 30 seconds later they start to explain to you how you use

this kind of thing. They know how to jump in, link, lurk, play, and try. And that is not random trying. They find the patterns, what they learn in game playing is being sensitive to peripherals. You are a pattern recognizer.

I want to suggest that bricolage will have a profound impact on our economy in terms of various open sources (*inaudible*). It lies at the root of the remix culture. Let me pause a moment and say these hip hoppers, which say outrageous things, are incredibly sensitive to certain turns of phrase. You see hip hoppers constantly try to find an interesting turn of phrase. They process stuff and pick stuff up and use it through repurposing, through bricolage. They are active learners in terms of things that horrify most of us.

To me the final part of literacy for the 21st century has to do with how do you start trusting through triangulation? How do you know whether something that you come at from two angles (*inaudible*) -- it really helps if you are a sailor to make sure that the points you think are co-linear, are co-linear. The trouble is on the Web sometimes two different things appear to be (*inaudible*). The very notion of how do you figure out how to root something out in order for yourself to come to some belief in it, so I can do something with it that I care about, I think is the game. With that, thank you.

applause

NEW SPEAKER: JSB is happy to answer some questions if any of you wish. Raise your hand.

NEW SPEAKER: (*inaudible*)

J.S. BROWN: (*inaudible*)

NEW SPEAKER: (*inaudible*) So many students in high school can't read. So many

children are left behind. There seems to be a melt down in education except for certain specific groups that live in certain zip code areas. What does your program do to raise the level of education in America from the bottom up? I'm glad to hear today that we need more bars on campus at San Diego State to go along with the increasing number of Starbucks.

J.S. BROWN: A lot happens at Starbucks. You are asking not only a loaded but a complex question, as you know. I am less convinced than you are about the theme. For example two brief stories. I'm often shown kids that can't read and yet you find out they have their own blogs. So kids can write to each other. You might not call that literate writing, but you have to be careful that in fact these kids are much better at reading than we know. We do not know how to test them in real situations to see how they function.

The second story I told last night. We picked up a small group in East Palo Alto which is the ghetto of Palo Alto. This was ten years ago. A set of high school kids that had dropped out of school and classified as functionally illiterate by the school system. We took the kids and gave them capability and some equipment and said "you construct an argument about something you want changed in some part of East Palo Alto and we will get it played in front of city council for you. We promise you that." These kids constructed this incredible beautiful short video argument." It was an argument about why they had to get these particular drug dealers off this particular corner in East Palo Alto. We played it in front of city council and caused a change. *(inaudible)* They made a persuasive argument. So when we say these kids are illiterate, we have to be careful not to put them in contexts which have no meaning and they don't care about. Just like the student I told you about earlier. "I learn from doing things," he said. He is now in microbiology. So things are happening here behind the scenes. If you put kids in different

contexts and give them access to the right set of tools. The most amazing thing to me, does this mean there is a huge divide between those who have access to tools and those that don't? Let me tell you that the most powerful computers today, in terms of what we are talking about, cost 195 dollars. It's called Play Station 2 and (*inaudible*). Those are more powerful than the PCs that any of you have in this room. You put a PS2 on the kid and you are off and running. The digital divide as we know it, I feel -- the headlines at Cambridge when I gave a talk at Harvard I said the digital divide was between today's students who are digital and the faculty sitting in front of me at Harvard who are basically analog. The headline was "Harvard professors are classified as dinosaurs." (*inaudible*)

NEW SPEAKER: I was struck when you were talking about the difference about learning about and learning to be. That strikes me as not just experiential but existential or spiritual learning as well. I'm curious about your observations about how the digital shifts affect the spiritual lives of young people.

J.S. BROWN: It is hard to assess spiritual minds. The bias I am coming from -- I'm a person who believes that spirituality comes from craft, that you get better at doing something no matter what the craft is whether surgery or hip hop music, what you really learn doing a craft is you learn how to pay attention to the 'talk back'. Songwriter, painter, mechanic, motorcyclist, computer hacker, you start to go to a relationship with the material you are working with. I claim that is one lesson in spirituality. This learning about as you enter that world and learning how to listen to the way you interact with the outside world with the material you are craftsmithing around. We tend to segregate certain types of craftsmen as being doers. It is more of a continuum. No matter what you work on from supercomputing or how to tune a motorcycle,

the unexpected is always happening. That's why I came to the notion of the roots of the tree. Something unexpected is always happening and you have to learn work with that, play with that, to honor that, and listen to that. That to me is a very interesting way of staying connected to the world which is one way of looking at spirituality.

NEW SPEAKER: One more question.

NEW SPEAKER: I'm curious about you (*inaudible*) how can you make the move to making the social difference since -- (*inaudible*)

J.S. BROWN: Two answers. I traffic in stories. One is a very interesting open-source system on-line encyclopedia, probably now considered better than Britannica. It's an amazing thing read by thousands of people around the world. What I discovered a couple weeks ago, there was a meeting in Berlin, if you want to take a particular super speciality (*inaudible*) it turns out that the people that write the initial articles are amateurs. Amateur historians et cetera. They do the initial framework, and then the authority, the professors, come in and actually start to tinker with it and comment on what is right and what is wrong, start to improve it, rewrite something. Without anybody ever noticing, what has happened is a new type of apprenticeship program. Amateurs who are passionate about this period of history start to interact with the professionals and they start to interact. So something very interesting is happening in terms of how do you drive a relationship between the authority and the amateur.

The second comment and you may have misunderstood what I was trying to say. Play Station 2 connected with the Web is a piece of technology. What I'm talking about in these games like Ever Quest is the social life around the edge of these games. While parents think their kids are wasting their time playing stupid role playing games, it turns out that once you go

in there and see what is going on, these kids are learning leadership skills the likes of what you cannot believe. They are learning how to orchestrate and recruit. One guy was organizing 100s of players all over the world, motivating them. Nobody is getting paid. The leadership skills you learn in terms of how to run a not for profit is what is going on. I can't think of a more important skill to learn than that. I can tell you some dramatic stories about the career trajectories of these kids. That came from the leadership skills in terms of how to make a difference in terms of motivating people from different cultures.

That is what I mean about the social life around the edge. This is going on upstairs in the closed doors of these kids. They are blogging or (?) around some of these games. That is what I'm drawing attention to. If you look at the periphery, on the edge rather than the center, you begin to see opportunities that may relate to the kinds of specific intelligence and responsibility I'm talking about. It is not a panacea. There is a lot of crap that goes on, but I'm trying to figure out how we see differently ourselves, where there is some very good stuff. But even some of the bad stuff is less bad than you might first think.

INTRODUCING SPEAKER: I would like to thank all of you for coming and I would like once again to thank JSB. If you go to his website you will find many pieces he has written. You will find these kinds of diagrams and papers and publications. Out there are two books of his that I encourage you to stop and look at. I would like to thank you very much for a very (*inaudible*) presentation.