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From: Jack R. Stokvis[SMTP:]
Sent: Tuesday, October 26, 1999 7:10 AM
To: DEN List
Subject: WEDI Session on "Mainstreaming Deming"

Thanks for attending the Open Space session on "Why Deming's SoPK isn't mainstream?" Randy Schenkat summarized the session and I am forwarding it to you. I am also sending a copy to the DEN so that hopefully discussions can continue on that medium. All the best,
Jack R. Stokvis

W. Edwards Deming Institute Fall Meeting - Washington, DC October 16-17, 1999

*** Summary of Session: Why Deming's SoPK isn't mainstream?***

Conveners: Jack Stokvis and Randy Schenkat

Participants: Tom Dukich, Gipsie Ranney, Ian Bradbury, Jeff Rose, Mac McLeod, Linda Borsum, Bob Cable, Ben Carlson, Richard Driftmyer, Cynthia DeZouche, Mark Jowitt, Moel Partosoedarso, Larry Quick, Stein Smaaland, Rip Stauffer

Schenkat handed out and summarized a paper originally prepared for an Educators' Fifth Day with Dr. Deming in San Jose, CA in July of 1993 and based on Schenkat's Book Quality Connections: Transforming Schools Through TQM.

Gipsie Ranney captured the essence of the argument that that way of knowing is the effect of the way learning happens in American Society. When the ways of knowing model was presented there was much discussion that the "positions" were like the types in the Myers Briggs or were Piagetian. Schenkat claimed they perhaps result from the way we are educated. The paper makes the case that there are a second set of forces of destruction that are based more on epistemological considerations than on intrinsic and extrinsic reinforcement which is the mainstay of Dr. Deming's insight. Schenkat asserted that the way of constructed knowing (Belenky), commitment to Relativism (Perry), or Systems 4 (Harvey, Hunt & Schroeder) needed to grasp the richness of Deming's SoPK is probably present in only 8-10% of the population. This could be a partial explanation of why it is so hard to mainstream Deming's SoPK.

The discussion then turned to this mismatch between common ways of knowing and the cognitive demands of SoPK and how can Deming's SoPK get a wider acceptance?

Everyone agreed that simplicity was a key. Dr. Deming spent a great deal of time in selecting his examples, parables, and activities (i.e. The Red Beads). The term counterintuitive was used. We have to be open to seeing how these new ideas are so counter to well integrated belief

systems. There is a process of unlearning that has to occur. Careful questioning is needed to support cognitive shifts in people.

There was agreement with Deming's claim that we've poisoned many learners from the beginning (gold stars, smiley faces, etc.) and how do we therefore correct the "educational system." There was the observation that many elementary teachers are the "sensate" type so that a foundation to the upper levels of ways of knowing isn't built for children. This was contrasted with the possible in citing the work of Pramling in Sweden facilitating systems thinking in 4 and 5 year olds. It was noted that new basics for kids (collaboration, experimentation, abstraction, and systems thinking) are very much similar to SoPK and Constructed Knowing. Everyone agreed with Deming's claim that "there is no substitute for knowledge."

Several individuals asserted that one reason for the difficulty of "mainstreaming" Deming's theory was that many, if not most Americans are either content with the way things are or feel that the entire education issue has become politicized to the detriment of the customers- children.

The session closed with reflection: are we as a group more frustrated? Gipsie Ranney summed it up positively, "I'm not frustrated, it's encouraging to me to see people struggling with ideas; so it's not frustrating". As Charlie Brown stated: "We don't win many ball games but we have many interesting discussions."

Anyone wanting a copy of Randy Schenk's paper in word format should send an email request to him at "schenkat@luminet.net"

OPENING COMMENTS.....

PROFOUND KNOWLEDGE FOR KIDS, TOO--What's the Educator Response?

Prepared for Invited Presentation with Dr. Deming

Seminar of Educators

July 2, 1993 San Jose, CA.

by: Randolph J. Schenk 4th Draft 5/98

INTRODUCTION

We are growing accustomed to hearing of Dr. Deming's 14 points. Even his phrase-"profound Knowledge" -is being used frequently. It is easy to think of his 14 points and profound knowledge as a very sensible list of "shoulds" from the expert. That I believe is part of the problem. We are expecting to be told how to get out of the "quality" dilemma whether it be in business, government or education. Dr. Deming and others are telling us there can be no quick fixes. But we again approach TQM as if it is a quick fix even though part of its rhetoric tells us there can be no silver bullets-no quick fixes. We need constancy of purpose.

I believe admonition won't be enough to get us beyond believing in silver bullets. We have been deeply conditioned to expect quick fixes. It is part of what I would term our culture's unprofound knowledge. I'd like to suggest that we are conditioned to expect "answers" by a

SECOND set of forces of destruction that align with the forces that Dr. Deming has identified in his insightful diagram.

This second set of forces make it improbable that we can understand Deming's profound knowledge—a new paradigmatic way of thinking that calls for the interaction of knowing of: systems, variation, psychology, and a theory of knowledge. I believe by understanding this second set of "forces of destruction" we can do much to solve our penchant for quick fixes and develop profound knowledge for educators and students.

Dr. Deming's scheme of integrated knowledge in systems, variation, psychology, and theory of knowledge represents a very sophisticated theory of knowledge which I'd term his way of knowing. In fact, I would suggest that his theory of knowledge is the the linch pin for the other three areas— systems, variation, psychology. This foundational position for theory of knowledge could be conveyed in a tetrahedron - with theory of knowledge at the apex and systems, variation, and psychology in the base. I contended that theory of knowledge is foundational to significant understanding of the other three areas and in seeing that all 4 areas work in harmony.

This way of knowing or theory of knowledge is, in general, absent in our society and, in particular, it is absent in us as educators. This is a bold indictment. But I think in seeing how the system has worked, how the forces of destruction have interacted, we will come to appreciate, understand, not blame, and get on with transforming the system. We must transform the system as we are calling for these very ways of knowing with our students as the title implies "Profound Knowledge for Kids, Too".

I will be presenting the workings of this second set of forces of destruction. .Building on Dr. Deming's model of "Force of Destruction" , I would suggest we are born seeing learning as an active process. Any look at child development supports this point. However, as life ends most of us see learning only as a process of receiving information from experts. For example, one of the challenges we face in our community quality council as we work on making Winona a series of interrelated learning organizations is overcoming the ways of knowing that many adults have today. One company union steward asked me, "how can we be active learners in problem solving groups when we haven't believed in ourselves but rather in the past have depended on the boss or expert?"

A THEORY OF KNOWLEDGE

Because I am focussing on the linch pin of profound knowledge— a theory of knowledge—, I will define the term. Theory of knowledge is the area of philosophy called Epistemology. When is the last time you heard epistemology talked about in the teachers' lounge? It is defined as the study of the the origin, nature, methods, and limits of human knowledge. Kitchner's description gives more insight into this term:

Epistemology is individuals' understanding about what can and cannot be known, how they come to know something (through experience, research, intuition) and how certain they can be of knowledge. These assumptions influence how [people justify] their beliefs, as well as identifying and defining problems, seeking solutions, and revising their problem-solving behavior.

Some key ideas here are: what can and cannot be known with what certainty, how we come to know, and an awareness how ways of knowing influences aspects of problem solving. In fact, I'd like to suggest what Dr. Deming has so eloquently done with his system of profound knowledge is explicate for us his way of knowing. As certainly theory must guide action, each decision made is under conditions of uncertainty, any rational plan requires prediction are all beliefs that describe his way of knowing.

STUDENT OUTCOMES AND EPISTEMOLOGY

Many student outcomes are based or have their roots in epistemology. For instance, consider the wording in the National Governors' Association (Cohen, 1988) statement on student learning:

[Students need] a substantial knowledge base, as well as higher order cognitive skills. Such skills include: the ability to communicate complex ideas, to analyze and solve complex problems, to identify order and find direction in an ambiguous environment, and to think and reason abstractly. Because workers in the future will experience rapid change..students also will be required to develop the capacity to learn new skills and tasks quickly. This will require a thorough understanding of the subject matter and an ability to apply this knowledge in creative and imaginative ways, novel contexts, and in collaboration with others [p.3].

Ability to analyze and solve complex problems relates to epistemology. Identify order and find reason and direction in an ambiguous environment suggests things aren't certain. There are not right and wrong answers to every question. Apply knowledge in novel contexts is using theory. Epistemology needs to be outcomes from our schools or schools will never set the intellectual foundation needed for organizations (industry, government, or education) in the new paradigm.

Epistemology or ways of knowing, the linch pin of profound knowledge, should be our stock in trade as educators. It has everything to do with teaching students for understanding which is that illusive concept beginning to gain recognition. Educational journals are beginning to contain articles on teaching and learning for understanding. Harvard researchers have a well funded, five year project to study understanding (Perkins, Gardner, and Perrone, 1992). Ways of knowing is the foundation to changing our core technology in education. This is the process we should be studying. Dr. Deming suggests the key to leadership is knowing the business you're in. We have to know the extended process of our business. Our business is teaching and learning.

I will further elaborate on the topic of ways of knowing by considering the following three areas:

- 1) Examination of 7th and 12 th grade students' understanding to gain a sense of their epistemologies.
- 2) Exploration of the epistemologies of adults in general and teachers in particular.
- 3) Consideration of educational leaders promoting ways of knowing and profound knowledge while linking this back to force of the second set of forces of destruction which alter our active meaning making.

STUDENT UNDERSTANDING AND EPISTEMOLOGY

If you ask a student, "do you understand?" what is the most probable answer? Probably some form of yes or head nod. I will share with you some of the work of Kathy Roth from Michigan State University which shows there are many ways to interpret those head nods. Roth is a science education researcher, a professor, and teacher of elementary students as she spends half her time in 5th grade classroom. This particular work is with 7th graders and their making of meaning from reading science textbooks on photosynthesis. We'll see the students are very confident, well all but one is, in their meaning making, but they use very different ways of meaning making. I'll share five students so that you can make some judgments regarding the usefulness of the students' ways of knowing.

Myra

"She had some fish and she had some plants in there and one day she was looking at them and a bubble came out of one of the plants. And she started experimenting a little, and she notices they were giving off oxygen...They asked us what we think about what she is trying--- it is oxygen, they asked us what we thought. I put one time it did and one time it didn't...They said the first time it wasn't sunny at all the time. The first time it was out for one week and every day it was sunny."

However, when Myra was asked whether the girl doing the experiment had made a conclusion about the role of the sun, Myra said simply, "no." Although she remembered a lot of details, she missed the critical reason for including the experiment in the text.

She seems to really remember, but she can't see the forest for the trees or see the big picture. We might term Myra's way of knowing-- remembering a lot of detail stuff-- She's the vessel waiting to be filled and what needs to be done is fill up the mind's warehouse without any particular attention to where the information is going.

Tracey said she "understood" the text if she was able to decode the words and to identify details in the text that satisfactorily answered questions in the text. Tracey said she was confused only when she "didn't get some of the words," such as fermentation, chlorophyll, cotyledon. But in answering text-posed questions, Tracey simply looked for a "big" word in the question, located the word in the text, and copied the word along with the words surrounding it in the text. She was satisfied to have an answer.

Later in an interview, Tracey recalled the chapter being about "chlorophyll and photosynthesis. But she saw no relationship between the text and real world plants.

Tracey's understanding is only a detached learning. She made no connection with real world plants, but she had the ingenuity of the big word strategy. So Tracy's way of knowing is- I understand if I can answer the questions.

Kevin read to fill in details of what he already knew. He was asked, "What is food for plants?" Kevin replied, "Food can be sun, rain, light, bugs, oxygen, soil, and even other dead plants. Also warmth or coldness. All plants need at least three or four of these foods."

Despite the text's statement that water and minerals are not food for plants, Kevin recalled that the passage "told about food from the soil, like minerals and water." He also distorted the section on the vascular system to make it fit with his view that plants get their food from the soil, explaining: "the picture of xylem and phloem in a plant showed the two layers that make food go through the stem from the soil and passes it onto the leaves so it can do photosynthesis. Root hairs... go farther into the soil to get water and minerals and stuff like that, food."

This is one of the best examples of science misconceptions I could share. Kevin enters with a belief about how plants grow as he has his own theories stored away. He uses the reading to support his belief, and he even distorts information to make it fit.

Kevin is a very sophisticated meaning maker, but he has a fatal flaw. In Kevin's way of knowing, he only assimilates what supports his position. He's a vessel to be filled but he's directing the information into certain areas in the warehouse. Kevin's example is a powerful insight into child and adult learning. It proves the need for teaming learning as described by Senge in the corporate setting or Cooperative learning with students. We need others in a trusting environment to get us beyond our blind spots.

We've seen three students. They all say they understand, but they use such different ways of knowing. These three examples plus the next two students will give us a realistic insight when we consider the second set of forces of destruction or adults' ways of knowing.

The first thing Susan described in her recall of the text was an accurate summary of a critical text statement that conflicted with her own ideas. "Well the water isn't food and it gets food out of--I mean it gathers stuff out of the, it gathers water and materials out of the soil, and it's not food."

Although this statement in the text was not highlighted with bold or italics type, it made a big impression on Susan's thinking. She recognized that the statement was different from her own ideas, and she began to change her ways of thinking about plants' food. Susan found this understanding hard work and she often acknowledged feeling confused and having difficulty understanding the text.

Notice Susan is seeing conflict. This is what conceptual change science is about. She feels confused. She needs to be challenged and supported in learning new things that are expanding/remodeling her warehouse. So Susan's way of knowing relates to her awareness of conflict while she blends in new ideas.

Learning like Susan's takes time. It has to be different than the page coverage or subskill outcome mastery model. To continue this warehouse analogy, I started with, Myra indiscriminately dumped information. Kevin changed the information slightly. He starts out with a little garage adding on but in a connected way. Susan is remodeling to change part of the structure. She's knocking out some walls to replace existing ideas. This takes time. But this organized knowing, I'd suggest, is part of what ways of knowing is about. We are helping

students construct their knowing as the popular term Constructivism implies. This self awareness of our knowledge structures can be very useful. Recall how I respected Dr. Deming's explication of his structure -based on the 4 pillars of profound knowledge.

Chad read a section of text that used milk as an example of how all food can ultimately be traced back to green plants, the food producers. Chad announced that "most all of this stuff I already knew" and this was the easiest section to understand. "It was about milk." When probed, he expanded his summary of the text. "It's just about milk... how we got our milk from cows." He never picked up any notion that plants make food.

Chad used his real-world knowledge about plants rather than using text knowledge. Without thinking about plants' roles in producing food, for example, Chad came up with the right answer to the following question.

Question: All the food we eat can be traced finally back to the
(a) green plants
(b) cows

Chad correctly picked (a) and explained: "I don't know...I just circled green plants because everybody eats...not everybody eats cows but everybody eats green plants."

Yes, Chad was sure he understood. What an irony Susan felt confused. Chad asserts most of this stuff I knew already while he never picked up anything from text. We term Chad's way of knowing as disconnected uses of some past information to get by.

So we have five students that all contend they understand (well maybe not Susan). We begin to get a sense of their unique ways of knowing. Which ones fit with the National Governors' Association desired outcome of "analyze and solve complex problems, think and reason abstractly, learn quickly, thorough understanding of subject matter"? It would be hard to argue that any students other than Susan would meet that desired outcome with their ways of knowing.

Why do kids have ways of knowing similar to the ones we have seen? Briefly two explanations are found in the pervasive use of textbooks and in teacher preparation. Textbooks are the most critical determinant in our extended process of K-12 education today. Several studies have found texts guide 90% of school day. Yet Roth found less than 10% of kids would read like Susan. Students can get by with ways of knowing like Tracey's big word strategy or Chad's multiple choice and guess in the current design of most textbooks. Michigan State University has experimented in designing a more conceptually challenging textbook that engaged students in their misconceptions. They found that 84% of kids could read at Susan's level of mental engagement. Even so called at risk kids could. Yet, good rigorous products are slow to come to market.

We will see that little in teacher education has prepared us to teach for understanding and the shaping of students' ways of knowing.

More insight into student ways of knowing comes from considering high school seniors. Surely they will be more sophisticated than the 7th graders. We will now look at the work of Sam Wineburg a University of

Washington educational psychology professor who specializes in how students learn history. Wineburg was curious to know what and how our best and brightest were learning history. He wanted to see what students were like if they were fulfilling most of the recommendations for improving education today. He wanted to look at students who had parental support, who studied hard, and who enjoyed the subject. He looked at a small sample of 8 students who had A averages, studied 2.5 hours per night, and and enjoyed history as indicated by taking 4 years of high school history. These would be dream students by most any teacher's standard.

He taught this group of students think aloud techniques and interviewed them regarding 8 different types of historical information from textbook accounts, a Howard Fast novel, documents, eyewitness accounts, diary entries, and a deposition. All information bore on the incidents surrounding the events at Lexington Green April 19, 1775. He was looking at the students' ways of knowing. Wineburg also use the same interviewing techniques and information sources with 8 Ph. D. level historians. He found not surprisingly that the historians excelled in the the elaborateness of understanding they developed, in an ability to pose alternative explanations, and in using supporting evidence. It seemed obvious the historians just knew more history. But what counts as knowing? In some cases the high school students actually knew more facts about the Lexington incidents than the historians. This caused Wineburg to wonder how the high school students could know so much history and still have such little sense in reading it? Looking more at their ways of knowing was revealing.

Bland, non voiced history text was seen by students as the trustworthy source. For instance, one student characterized the textbook as "the fact" and really straightforward. Another called it "straightforward information, and an "objective account of events". Historians saw the textbook as deadlast on trustworthiness.

Students didn't look at sources or attributions. In almost every opportunity, historians first looked for attribution. Students on the other hand usually began with the first word in the upper left and never stopped reading until they reached the last word on the bottom right. For most high school students tex attribution carried no weight.

Also, for most students reading history was not a process of puzzling about the author's intentions or situating the text in a social world. They saw their task as gathering information with the text serving as bearers of that information. Given the materials they were supposed to learn , most students did what came naturally--they sat down and learned the material. These students are our best. They are doing what many reports on school reform call for. Will these outcomes serve them well in a complex world. How well will they do in Peter Senge's learning organizations which call for suspending assumptions, dialogue, systems thinking, etc? In many ways these Grade A high school seniors seem to be little different than the seventh graders: Myra or Kevin. They are doing little to construct as sense of history that is much different than just remembering.

Goodlad's(1983) generalizations about American schools seem believable with "knowers" like the students we've seen. He found:

curriculums that were dominated by English/ language arts and mathematics with consistent attention to basic facts and skills from 1st grade to 9th grade. The study found that students are not developing the ability to think rationally, the ability to use, evaluate and accumulate knowledge or a desire for further learning.

In summary of students as epistemologists, it appears kids are gaining little profound knowledge especially regarding knowledge and its construction and theories. Their ways of knowing can be basically characterized as surface level as so clearly described in some findings from the Harvard Project on Understanding. This is in marked contrast to the deep understanding which is very much like the way of knowing we saw with Susan. In the text which follows Deep vs. Surface Understanding are contrasted.

SURFACE UNDERSTANDING(the "reproduction of information presented")

- * increasing one's knowledge
- *memorizing and reproducing
- * utilizing facts and procedures
- *developing an initial understanding

Approaches:

- *intention simply to reproduce parts of the content
- *accepting ideas and information passively
- *concentrating on assessment requirements
- *not reflecting on purpose or strategies in learning
- * memorizing facts and procedures routinely
- * failing to recognize guiding principles

DEEP UNDERSTANDING(the transformation of information in the process of coming to understanding it for oneself)

- *transforming one's understanding
- *changing as a person

Approaches:

- *intention to understand materials for oneself
- * interacting vigorously and critically with content
- *relating ideas to previous knowledge/experience
- *organizing ideas within integrating frameworks
- *relating evidence to conclusions
- * examining the logic of the argument

There is much important WORK TO DO IN MAKING KIDS EPISTEMOLOGISTS. However, there is still a nagging reality. I'd suggest the Staff Development committee can't just send teachers off to Phil. 495, The Philosophy of Knowing, at the local university. As we continue our thinking about the foundations of profound knowledge, this takes us to the second area of our three- how adults know. We now consider the epistemology or ways of knowing of adults in general and teachers specifically.

ADULTS' AND TEACHERS' WAYS OF KNOWING

First, I will share some about the role of universities in shaping adult ways of knowing. University of Washington Professor Emeritus Arnold Arons spent most of his worklife trying to understand how teachers learned or didn't learn to teach science for meaning to K-12

students. He's reflecting here on the nature of the undergraduate experience.

"we professors proceed through these materials at a pace that precludes effective learning for understanding..Under such pressure, students acquire no experience of what understanding really entails.They cannot test their "knowledge" for plausible consequences or for internal consistency; they have no sense of where accepted ideas of results come from, how they are validated, or why they are to be accepted or believed. In other words, they do not have the opportunity to develop habits of critical thinking... and they acquire the misapprehension that knowledge resides in memorized assertions, esoteric technical terminology, and regurgitation of "received" facts. Although such failure is widely prevalent in sciences, it is by no means confined there. It pervades our entire system, including history, the humanities, and the social sciences."

From my 8 years working in higher education, I find Arons' description very accurate and generally most folks agree with his succinct description. His paragraph needs carefully pondering as much is embedded which relates to ways of knowing. He says we're gaining no sense in knowing how we know, and we don't know how knowledge is constructed.Back to our 7th graders, college should be engaging us like Susan. Rather much of it is at best like the learning of Myra or Kevin-the sponges that regurgitate. We stay as surface knowers and don't develop into deep knowers. Kniefelkamp and Cornfeld show that surface or deep epistemology influences not only how we think about knowledge but also what is our role as student, what's the role of the instructor and peers in our learning, and what learned from evaluation. Regarding the view of knowledge, surface knowers see knowledge is a collection of information, while deep knowers see that truth can exist within a specific context and is judged by "rules of adequacy". Regarding the role of students, surface knowers see their role to receive information or knowledge and demonstrate that the right answers have been learned while deep knowers see their role to learn to think for oneself and to use supportive evidence.

Regarding the role of the instructor, surface knowers see the teacher's role to give knowledge to the student. A good instructor equals absolute authority and is the knower of truth. The deep knower sees the instructor as an expert/guide/ consultant within the framework of "rules of adequacy".

Regarding the role of peers, the surface knower sees peers not as a legitimate source of knowledge or learning. The deep knower sees peers as legitimate sources of learning if they use appropriate rules of adequacy and contextual presentation of perspectives. Peers seek out diversity of opinions and experiences of others. Postion alone does not determine legitimacy; process does.

Regarding evaluation issues, surface knowers see evaluation directly related to a sense of self(bad/wrong answer=bad/wrong person). Evaluation should be clear cut, because questions asked and answers should be clear-cut. Deeper knowers see evaluation of work separate from evaluation of self. They see evaluation as an opportunity for feedback, improvement, and new learning. There are many implications

for continuous improvement and quality principles as we consider the differences between deep and surface knowers.

Relating issues of epistemology to society, if we stay as surface epistemologists, isn't it clear why we as a society believe in Silver Bullets? We put too much stock in experts; we think they know. They're the keepers of the silver bullets. But we don't know much about them and their residing uncertainties. They've never shared their thinking and doubts. If they dared to share their doubts we'd dub them as incompetent. Professions have good reason to guard their expertise with its uncertainties. Could this type of societal epistemology have anything to do with why we expect quick fixes? Once we leave college do we enter arenas that change our basic epistemology? Certainly not in a corporate world that bases most decisions on quarterly outcomes or only does the P D of Deming's well known Plan, Do, Study, Act(PDSA) Cycle. In fact, PDSA is really a very sophisticated way of knowing which involves hypothesizing and using data to study problems. I'd suggest why we often have trouble deeply embracing PDSA is partly because its instinctive use is so different that our surface epistemology. Another perpetrator of surface epistemology is the media. 10 second sound bites do little to promote anything more than a superficial way of knowing.

Enough for societal forces, what does this mean for teachers? Teachers are a subset of college graduates. I'm afraid there's little evidence to suggest they break out of the surface epistemology trap. But as we try to understand the system that has us as adults the way we are, we can't see teachers as unique. This lack of deeper understanding permeates the professions. Basseches(1984) describes the implications for this type of epistemology for managers. "Even among managers, it appears that management is often practices using a preestablished set of systemized procedures(learned either from one's company or in business school) making management mainly a matter of applying a given system rather than critically reflecting." The absence of profound knowledge just isn't with teachers; it pervades the professions. This realization is important as we try to gain allies in getting out of this ways of knowing trap which keeps most of us from profound knowledge.

Realizing that teachers are not alone as professionals in this surface epistemology, is somewhat comforting. But if we truly seek profound knowledge for kids it is incumbent that we begin to understand why teachers are generally surface epistemologists. We must get at root causes. I believe there are three interacting areas that shape educators' ways of knowing. In fact, I'd suggest some mix of these three factors contribute to an educator's way of knowing: content knowledge(learnings and understandings from civilization), cognitive positions(structures of the mind), and beliefs about teaching and learning. They set the foundation for profound knowledge. This could be imagined as a Double Tetrahedron with content knowledge, cognitive positions, and beliefs about teaching and learning the bases of an inverted tetrahedron which connects with the first tetrahedron at it's apex- theories of knowledge. We must understand how these three areas work together to keep us locked in unprofound knowledge.

CONTENT KNOWLEDGE

The descriptions which follow give a sense of how teachers know the content they are to teach. Fred Newman of National Center for Secondary Education at the University of Wisconsin-Madison says it well. "We teachers have been socialized to construe knowledge as the outlines of content of introductory textbooks. Seldom in our own undergraduate or GRADUATE training did our professors engage us in deep inquiry".

Ball and McDiarmid(1990) give insights into teachers ways' of knowing also. They suggest that this emphasis on remembering facts and lack of understanding could mean for prospective history teachers.

Student encounters with the disciplines in liberal arts courses likely shape their notions of the nature of the subject matter, as well as their disposition to think about and find out more about ideas in a given field. Imagine the difference between prospective teachers who experience history as an argument about what happened in the past and why, and those who encounter history as what is represented in a textbook? (p. 444).

Ball and McDiarmid (1990) also cite compelling research on the lack of understanding by prospective mathematics teachers. In a sample of 252 pre-service elementary and secondary mathematics teachers,

researchers found that both elementary and secondary majors had difficulty remembering particular ideas and procedures. Moreover, many were unable to make conceptual sense of the mathematics they had learned to perform. In seeking to "explain particular mathematical concepts, procedures, or even terms, the prospective teachers typically found loose fragments-rules, tricks, and definitions. Most did not find meaningful understanding" (Ball and McDiarmid 1990, p. 442, citing Ball 1990).

Finding like these have astounding implications for teachers. How is it possible for us to teach for understanding when we ourselves do not understand? Ball and McDiarmid (1990) further note:

Because teachers' work is centrally involved with knowledge and the life of the mind, their own intellectual qualities are extremely important. Teachers must care about knowing and inquiry. They must be able to grapple with fundamental questions about ideas and ways of knowing, and to know the kinds of questions and problems on which different disciplines focus (p. 443).

Most learning is probably acquired from the textbook and teacher's guide used in K-12 classes. However, Ball and McDiarmid (1990) point to the problems of misrepresented disciplinary knowledge in many school textbooks:

History texts, for example, tend to portray accounts of the past as a process of looking up information...Analysis of mathematics textbooks suggests that concepts and procedures are often inadequately developed, with just one or two examples given and an emphasis on "hints and reminders" to students about what to do.....Similar criticisms exist of the ways in which texts misrepresent both the substance and nature of

science and writing (composition). In short, learning from textbooks, although it may help to illuminate subject-matter concepts for teachers, may also contribute to the perpetuation of thin or inaccurate representations of subject matter (p. 445).

TEACHERS' CONCEPTUAL POSITIONS

Teachers' conceptual positions are the second point in this tetrahedron base for profound knowledge. We can all accept that people vary. There are several ways of looking at how people vary in their epistemologies. I first learned of this way of looking at people's differences through the work of William Perry (1970&1981). A parallel to Perry's work on college student cognitive development which is the work of Harvey, Hunt, and Schroder on Personality Development (1961). An excellent popularization of these ideas came in the wonderful book- Women's Ways of Knowing by Blenkey et al. (1985). Even the Myers Briggs distinction of Intuitive vs. Sensing Types is a consideration of Epistemology. Glickman's (1985) work on Developmental Supervision is squarely based in this area.

Four Cognitive Positions seem to emerge from these works. I have synthesized this below in a brief summary of 4 positions and their characteristics. I continue to use the Systems 1-4 labels that Harvey, Hunt and Schroder used in their model. Perry would label the System 1 thinker a dualist and the System 4 Thinker as an individual who has made a commitment acknowledging relativist (Deming's making decisions in uncertainty). Blenkey would term the Systems 1 thinker a received knower and call the Systems 4 thinker a constructed knower.

System 1 Different Surveys between 35-55% of college educated
-Black and White thinking -right/wrong answers (knowledge is absolute) - difficulty generating alternatives - prefers structured chain of command -the teacher is expert

System 2 Different Surveys between 5-15% of college educated
-negative against rules - resist control - still hard to see another point of view

System 3 Different Surveys between 15 -25% of college educated
-see how points of view relate -a people person, so task usually slip
-all opinions are equally valid

System 4 Different Surveys between 4-7% of college educated
-can accomodate change - highly integrate information processing systems -good balance of task and personal orientation - sees the big picture in learning(teacher has expertise)

If the first point in the base of the tetrahedron related to content knowledge, the second point is conceptual levels which relates to mental structures and how information and beliefs are organized. Relating this to profound knowledge, thinking about systems and big pictures is going to be much easier for a Systems 4 than Systems 1 individuals. In fact, I'd assert that conceptual level explains why it is a challenge as Scherkenbach (1991) has noted for people currently

to think in terms of process. Being guided to action by an integrated theory of psychology will probably be unlikely if one sees knowledge as existing in absolutes as a Systems 1 thinker does.

I have been involved in some research looking at how pre-service teachers in an undergraduate program distort or clarify meaning in complex passages. Shouldn't we expect teachers to display this capacity if they're to teach and model it for kids? Similar to Schommer's(1990) research, we are finding System's 1 thinkers distort theories that don't fit their preexisting beliefs. This is very much like Kevin's reading strategy.

Variation, which I 'd suggest is using knowledge of statistics in decision making, is a sophisticated way of knowing. There is much evidence which shows that most knowing that happens in schools is based on a subjective way of knowing very similar to Systems 3" all opinions are equally valid". Perhaps this explains why using data is a foreign concept. In summary, I'd assert that many of Dr. Deming's pronouncements about Profound Knowledge are out of the the range of individuals unless they are Systems 4 thinkers. The highest probability of making meaning and understanding Dr. Deming's very sophisticated message about the interaction of 4 facets of knowing- systems, variation, psychology, and knowledge- comes with Systems 4 thinkers.

Concretely, we can see the difference between a Systems 1 and Systems 4 teacher through the work of Murphy and Brown(1970) . System 1 Teachers " consider themselves, textbooks, and persons in high positions to be sources of authority. Questions have only one right answer. It is inappropriate and unnecessary for students to search for other answers and thereby defy authority. Teachers who function at this level deliver information and ask questions in such a way that only one answer is right. Students are rewarded for recalling the definitions and facts provided by the authoritative sources, and for conforming to the rules and procedures set forth by the teachers.

Systems 4 Teachers "see knowledge as tentative, not absolute, and they have respect for doubt, an openness to new experience, and can consider situations from the pupil's point of view. They do not regard themselves as authority sources. Rules and standards are neither arbitrary nor imposed; rather they are presented as information. They encourage students to test, relate, and reflect upon their own ideas and to hypothesize, synthesize, and even conjecture about content and ask questions to aid in the search for understanding and for relationships rather than precise, correct answers. What conclusions would you draw? What types of ways of knowing are being foster in these two classrooms?

Site based management is calling for a high degree of collaboration. Two of the five standards in the National Board of Professional Teaching Standards are calling for collaboration- Standard 4-Reflective Practitioners and Standard 5-Community of Learners. Do you suppose Systems level bears on how individuals works in groups? Glickman(1986) makes contrasts. System 1 teachers depend on authorities or experts to make change while System 4 teachers visual and verbalize consequences of various actions, chose of oneself the action(s) most likely to improve situations, and make own changes. Although almost 30 year old

data, the research of Harvey(1971) gives some sense of the distribution of teachers in these positions. 45% were found at Systems 1, 25% at Systems 3, and 8% at Systems 4. Such distributions might explain why it is hard for educators to truly understand Dr. Deming's profound message. Recall this would be true our most adults given our current processes of education.

BELIEFS ABOUT TEACHING AND LEARNING

The third point in the base of this tetrahedron that gives us a view of educators' ways of knowing is beliefs about teaching and learning. How are teachers as learners? Recall that Dr. Deming says theory leads to questions without questions experience teaches nothing. Is there a quest for more knowing?

The research suggests many teachers seem to have little awareness of a need to learn more than teaching methods. Yet ideally teachers must care about knowing and inquiry in the new paradigm. Most teacher education candidates think they know their content from high school courses; all they want are some "methods" to teach it. Goodlad(1990) describes that "baglady" phenomenon, in which teacher education candidates just want more "methods" to put in their bag of tricks. This belief limits school staff development because it perpetuates a mentality that seeks no theory or rationale--just new methods to use Monday morning. Deming sees this kind of learning without theory as pointless.

Goodlad(1990) observed three characteristics of teacher preparation that bear on teachers' roles in working together as reflective practitioners in a learning community.

1. There was little evidence that teachers were learning the methods of inquiry.--[Theories of variation and knowledge from the Profound Knowledge Paradigm]
2. There was a common teacher belief that everyone is entitled to his own opinion no matter its basis. [Strictly, Systems 3 behavior].
3. There was no sense of training for reflectivity and an understanding of why things worked, with exploration of alternative possibilities. [Theory doesn't guide action].

In summary, Goodlad and his fellow researchers have expressed a shared dismay at the paucity of intelligent, informed discussion of teacher decision making and a lack of preparation in dialogue, compromise, and problem solving.

The three points in the inverted base of the tetrahedron--content knowledge, conceptual level, and beliefs about teaching and learning--offer much explanation concerning educators ways of knowing. It seems likely that current understanding and use of profound knowledge which is central to education's contribution to the transformation in government and business is very far from a reality. For example, the foremost quality value is seeing that the problems are in systems and not with individuals. The ability to understand this quality value is based primarily on one's cognitive level--being able, as in Systems 4 thinking, to see the big picture, work on abstract problems, and consider situations from many viewpoints. Seeing the problems in the system often goes beyond simple cause-and-effect thinking. It calls

for systems thinking (Senge, 1990) or dialectical thinking (Basseches, 1984). One's cognitive, or conceptual paradigm also has a significant bearing on work within a group as in using process skills. An epistemological position that depends on experts (Systems 1) or views all opinions as equally valid without discerning their basis (System 3) leads to poorer problem solving skills. Senge (1990) lists the abilities of identifying, suspending, and challenging assumptions as essential for productive group work and learning. These are definitely System 4 skills.

Two other important quality values (a sense of continuous improvement and an appreciation of profound knowledge) are foreign to many people's belief about learning. If we view learning as a search for the precise and correct answers from experts, we will not see learning as recursive, continually being refined, and being more deeply understood. For educators, a solid foundation in the three facets of ways of knowing (as illustrated in the Tetrahedron's base) is the prerequisite for an awareness of the quality movement, the use of problem-solving skills, and the acquisition of group process skills.

EDUCATIONAL LEADERS' RESPONSES TO THE 2nd Set of "Forces of Destruction"---HOW TO PROMOTE PROFOUND KNOWLEDGE?

The case has been made for "Ways of Knowing", a theory of Knowledge, or epistemology as the foundation for Dr. Deming's system of profound knowledge. Dr. Deming's message is important for the quality of our lives well beyond the material in the next century. Profound Knowledge is important for kids, too. Much is implied in Dr. Deming's way of knowing that is very akin to a good liberal education. This paper has begun to examine some of the root causes which keep us from attaining profound knowledge. I label these causes the 2nd set of Forces of Destruction. In both K-12 and Higher education some of these forces are: -systems 1 teaching, -the textbook package, - low level assessment, -scant modelling of uncertainty, -little evidence of multiple perspectives, -fact paced coverage, -the seduction of easy performance, the "social contract" where kids behavior if not challenged-see Doyle (1983), -survival by non-meaning making. This second set of forces begins to explain why paradoxically learning switches from a Systems 4 to a Systems 1 perspective the more that we try to educate in today's paradigm. This paradoxical switch is also supported by a set of societal influences. Among these forces in the broader culture are: professions maintaining boundaries, - the media, few work environments that promote reflection, news reporting, and a trivial pursuit mentality.

The educational leader who is to get his or her faculty out of the crisis has a large task ahead. Providing a foundation in ways of knowing is a tremendous leadership challenge. "Ways of knowing", as a topic itself, is very ego threatening; it attacks the very core of our professional existence. But we can no longer ignore this foundational area.

We have tremendous amounts of work to do in Human Resource Development. This will take some long time frames. We have to begin to get the issues raised in this paper acknowledged. I'm afraid this is often a case of not knowing that we don't know. This effort doesn't seek to blame. It's a systems issue that needs focussed attention.

Initially, in starting this large undertaking, I see great value in thinking through how schools and districts could begin to embrace the support conditions that will enable teachers to attain National Board certification. Intentionally creating school environments that support reflective practitioners and communities of learners is a necessary first step. Further we have to begin digging into what it means "to know" in content areas. This type of knowing has to be dignified and regarded as core to our profession. I've given some pretty bleak accounts in the way we as educators are knowers. I will now give a sense of world class standards for a well educated college graduate generally and specifically for teachers. These standards hold much promise in professionalizing teaching. They are based on the work of Shulman and his colleagues at Stanford. This work set the foundations for the National Board of Professional Teaching Standards (NBPTS). They hold a much better image for teachers than that which is conveyed in the commonly accepted adage--"If you can do, if you can't you teach". They suggest, "Those that can do, those that understand teach".

These standards are in three parts. First, I'll describe content knowledge, and then for teachers, specifically, I will spell out pedagogical content and curricular knowledge. I believe working for these standards can begin dealing with the absence of profound knowledge.

CONTENT KNOWLEDGE

It is predictable. When content is heard, people tend to think the overemphasis on content is what has caused problems in education. High School biology books are measured by the pound. They are laden with facts and terms to be memorized. Our surface epistemologies keep us focused here. I'm not talking about more facts and terms. Content in the NBPTS scheme is something different and very akin to ways of knowing or theories of knowledge. The Boards say teachers need to appreciate how knowledge in their subjects is created, organized, and linked to other disciplines. I speculate that this is hard for us to relate to; it is for me. I never learned these types of frameworks in college education. I was the Arons' regurgitator and had little in my head that represents knowing this way.

We gain a concrete look at content knowledge by considering the example of Joe from a Stanford case study of a new teacher.

*Exemplary Content Knowledge in Mathematics

Joe's discussions of mathematics as a field of inquiry revealed an impressive breadth and depth of knowledge of the discipline. He gave long explanations of what math is all about, interweaving historical and structural descriptions. Historically, according to Joe, mathematics began with two basic operations, counting and measuring-- that is, numbers and geometry. Each of these led to increasingly differentiated and sophisticated systems. Structurally, he described mathematics as consisting of three branches--analysis, geometry, and algebra--undergirded by logic and foundations. These branches intersect to enrich each other and to form subfields, such as algebraic geometry. For Joe, all these ideas relate to each other....The different parts of mathematics aren't really so isolated.

Joe's way of representing math is very eye opening; math never hung together for me that way. Wouldn't Joe make a great chair in a Math

Curriculum committee? Why is content knowledge so important? This is the foundation of teaching. Dr. Deming says there's no substitute for knowledge.

Think about knowledge in relation to curriculum work. A current topic today is Integrated Curriculum. Integrated Curriculum expert Heidi Jacobs (1991) says the starting point for all discussions about the nature of knowledge in our schools should be a thorough understanding of the disciplines. I'd predict the absence of deep knowledge of content will cause very limited work in interdisciplinary integrated curriculum. A good liberal education should give us all this perspective in our content areas. We need to see the big pictures, know the uncertainties, appreciate the competing theories. I think we can safely say that it is not happening today. If we want to correct teacher education, we have to go further upstream than teachers' methods course work. Learning in the disciplines is essential. Yet, currently Higher Education is one of the most impervious organizations to fostering an optimized, extended process based on staff collaboration. But that's another issue.

PEDAGOGICAL CONTENT KNOWLEDGE

Content knowledge alone will not make good teachers. The level of content knowledge—very much related to ways of knowing—described should be within the capacity of any higher education graduate. In my estimation, the essence of teacher professionalism is in the second area—pedagogical content knowledge. Returning to our epistemology framework, content knowledge aids the educator in knowing his or her own ways of knowing and the many ways of knowing across disciplines and cultures while pedagogical content knowledge aids the educator in knowing students' ways of knowing particularly as the students are evolving meaning in their physical, social and mathematical worlds (recall Kevin's views of photosynthesis) and in knowing how to link into these student worlds. Pedagogical content knowledge is defined as:

knowing for the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations—in a word, the ways of representing and formulating the subject that makes it comprehensible to others. It also includes an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconditions that students of different ages and backgrounds bring with them to learning of those most frequently taught topics and lessons. If those preconceptions are misconceptions, which they so often are, teachers need knowledge of strategies most likely to be fruitful in reorganizing the understanding of learners, because those learners are unlikely to appear before them as blank slates. (Shulman, 1986).

Shulman gives the example of how a teacher might use knowledge of Star Trek and its characters (part of the students' world) to link with the teaching of Julius Caesar. As we consider Kevin, what do we have to know about his misconceptions of photosynthesis to move him to new conceptions? At the Harvard project on understanding, I learned of presentism—students' tendency to only look at history for today's frame and not step back into the context of time. How do we help students overcome students' presentism?

Pedagogical content knowledge is at the heart of knowing what gets a teacher linked to students in helping shape more elaborate ways of knowing. This is part of the special uniqueness of teachers that separates them from the lay public. It does not really make a difference whether one teaches as the sage on the stage or the guide on the side, pedagogical content knowledge is at the core of our profession. Sam Wineburg and his colleague Suzanne Wilson have a very illustrative article in the 1988 Kappan entitled "Models of Wisdom in the Teaching of History". Mr. Price and Ms. Jensen are very different teachers, but they are alike in their deep understanding of content and pedagogical content knowledge.

It is obvious to see the impact and interaction of content and pedagogical content knowledge by comparing Joe and Sharon.

JOE consistently explained mathematical procedures very deliberately, step by step, taking little for granted. His language is unflinching accurate; he used counter examples to delimit definitions, and also sometimes employed figurative language to explain by analogy... In the instructional segment... on factoring quadratic trinomials, for instance, he presented one procedure, gave three examples, then showed a variation of that procedure, followed by three more examples. In two other instances, when some students leaped ahead to the answer to a problem, Joe acknowledged their insight but then went back and supplied the intermediate steps for the rest of the class. Several times Joe responded to students' confusion by reteaching an idea or lesson, acknowledging aloud that the material was not easy. He also diagnosed individual difficulties. By listening carefully, Joe quickly discovered and corrected misconceptions. His extensive knowledge of mathematics was apparent in his teaching in many ways.

SHARON, in planning, tried to think about where the students would have problems and tried to come up with at least one extremely clear example that ties main concepts together. She also tried to use examples that represented the types of problems that students would encounter in the homework assignment. But planning for student difficulties and developing clear examples proved more difficult than expected... Although Sharon recognized the value of being able to provide clear examples, she expressed uncertainty about how to develop that skill; she viewed it as an inherent ability of particular teachers. When students needed help with a problem, she chose to work out the problem for them rather than making the student reason it out. Reflecting on the problems of the group test in her 4th period class, Sharon pointed to the diverse ability level of the students, the language barriers, and the social problems of some students.

I'd suggest we rationalize much of kids' learning failure because we do not know our content. Much of special education for the mildly handicapped is in the area of reading. Our problems come in not designing in quality instruction. I was a learning disabilities teacher early in my career. I was also unpopular because I was suggesting back in the early 70's that most of our reading problems could be explained by poorly designed materials (back to the challenge of textbooks) and poor teacher preparation in the teaching of reading. I also think that much of our dabbling in learning styles is a shallow substitute for not knowing our processes as set out in content and pedagogical content knowledge.

CURRICULAR KNOWLEDGE

The third area in these world class standards that set the foundation for the National Teachers Boards is Curricular Knowledge. This, too, is an area that differentiates a teacher from the lay knowledge of the public. Curricular Knowledge is represented by:

the full range of programs described for the teaching of particular subjects and topics at a given level, the variety of instructional materials available in relation to those programs (alternative texts, software, programs, visual materials, single concept films, laboratory demonstrations, or "invitations" to enquiry") and the set of characteristics that serve as both the indicators and contraindicators for the use of particular curriculum or program material in particular circumstances. I would expect a professional teacher to be familiar with the curriculum materials under study by his or her students in other subjects they are studying at the same time (lateral knowledge). The vertical equivalent of that curriculum knowledge is familiarity with topics and issues that have been and will be taught in the same subject area during the preceding and later years in school, and the materials that embody them. -Shulman-1986.

Curricular knowledge is very much like knowing the extended process. The following questions illustrate how it might be represented in the National Board of Professional Teaching Standards. What are the major topics you might cover throughout the year? Which topics are most important (what makes them so)? Which take the most time to cover and why? What is the sequence of topics that you teach? What are the advantages and disadvantages of that coverage? What text and resources do you use, and do you sequence your year similar to the materials?

This massive transformation of schools needs the support and understanding of allies who are also embracing the quality transformation in their businesses or government agencies. I'm hopeful of building on the notion of learning communities throughout Winona. So, yes, we can have Profound Knowledge for Kids, Too. But it starts with a new paradigm for educators and we have much work to do.

SUPPLEMENTAL PAGES AND APPENDIX- PARTIAL BIBLIOGRAPHY

WAYS OF KNOWING

We're used to think of learning styles in terms of whether we're right brained or left brained or whether we are visual learners, auditory or kinesthetic learners. I'd like to share another way of thinking about learning and our styles of learning. These ideas come from an insightful book called "Women's Ways of Knowing". Belying the book's title, I assure you that the ideas have much relevance for men, also. More importantly, the ideas give insights into the work we are doing with outcomes. There are also many other community implications that comes from understanding this "ways of knowing" approach. Among these are a community acceptance of our outcomes work and a rethinking of the purpose of schools and community learning. Below are five descriptions of how various types of people look at learning and knowing differently: Silenced, Received, Subjective, Procedural, Constructed.

0. Silenced Feels stupid, mindless, and voiceless; feels can't teach

others because of being unable to figure things out for self and unable to learn from others. Have an especially difficult time learning from words as they are not thought of as tools for conveying meaning between people, but as weapons. This perspective is rooted in violence and social disintegration and is an unlikely part of a typical sequence of development.

1. Received Knowledge Goal is to receive, store, and transmit without modifying information from authorities; learns through memorization and recitation the words of others-- relatively rote and passive activities. The emergence of this perspective signals the entrance into the shared culture of one's community. Here truth is absolute. Any problem has one right answer as a thing is either right or wrong, good or bad. While received knowers imagine knowledge being transmitted through the use of language, they are unable to imagine knowledge being constructed by themselves or by anyone else.

3. Subjective Knowledge In discovering a multitude of perspectives, the person no longer believes there is only one right answer. Turning a deaf ear to authorities, Subjective knowers listen to their own inner voice, intuiting knowledge that is thought of as personal, private, and essentially incommunicable. Intuition and personal experience are now seen as the important sources of knowing; information that has been passed down from authorities is irrelevant. Believing in multiple realities, Subjective knowers listen to others in a non-judgmental way, but their ability to really hear and profit from others seems limited. This may be because Subjective knowers question the value of words to communicate personal truths, a value that Received knowers take for granted. It may be hard also for Subjective knowers to attend to others as this is the first framework where the source of knowledge is clearly seen as being lodged with the self and they are preoccupied with listening to their own inner voice.

3.5 Procedural Knowledge The person has become invested in acquiring systematic procedures for developing and communicating knowledge. Two distinct types of procedures have been identified: the separate and the connected approaches.

Separate knowing- The person tries to remove the self from the knowing process, taking as impersonal a stance as possible by relying on impartial standards, rules, hypotheses, so that his/her perspective will not bias the ability to perceive reality objectively. The separate approach is often an adversarial one, focusing on critical analyses for proving and disproving arguments.

Connected knowing- The goal is to understand and be understood rather than proving and disproving truths. Connected knowers are collaborative rather than competitive. Objectivity in the connected mode is sought by first drawing out others through interviewing and story telling so that they might be seen more fully. Then by drawing on this knowledge and their own empathetic capacities, the Connected knower achieves objectivity by projecting the self into the other's perspective without superimposing her/his own perspective into the process. Connected knowers' propensity for asking questions, drawing out and building up the ideas of others give them the "mid-wife of ideas" label. Meanwhile, their personal view may get lost or set apart from the knowing process; this new understanding may be "uncovered" but not fully "constructed" through a collective synthesis.

4. Constructed Knowledge It is understood that all knowledge is continually constructed and evolving--that even the smallest child is a constructor of knowledge. Both separated and connected procedures are seen as invaluable tools to be used freely for deepening one's

knowledge and understanding even when the goal of outdoing others through winning arguments has been firmly rejected. Since context is seen by Constructed knowers as a vital force shaping what can be known, they feel responsible for examining, evaluating and developing the frameworks they and others bring to the meaning making process.

As I pulled quotes from Women's Ways of Knowing in the Constructed knower section (1st set of digits refers to page # in WWK) , I wondered if we should be more intentional in the examples, modelling of thinking, - and that much K-12 and a good share of higher education is very scant in this area?

1. A More Process View of Reality

* OUR CO-CREATING We can assume that something exists out there--- but something is thinking that something exists. Our consciousness is part of the world. We are creating the world at the same time we think about it. c 132-57

* THE NATURE OF CHANGE Circumstances change. Our way of looking at things change. Time may have given us what we think are right answers, but it also gives us a different set of problems. c 138-60.

*THE JOURNEY It isn't the finding of truth that's so wonderful. It is the looking for it, the exploring, the searching. If you were ever to think that you've finally arrive at it, you've blown it. Truth is more elusive the older I get. c140-64

2. Knowledge Construction

*EXAMPLES OF THINKERS CREATING KNOWLEDGE- I have come to see things in my own way. I feel that everyone has something unique to say, but some people know how to develop it. Some people can go even further--they can go outside they given frames of reference. Most people have something to say inside given frames of reference. But then you take someone like Freud or Darwin--they are able to jump outside of the given to create a whole new frame of refrence. That doesn't happen too often, They stay with it. They create their whole life around it. They change everything for everyone. C 133-58

* ROLE OF MODELS In science you don't really want to say that something's true . You realize taht you're dealing with a model. Our models are always simpler than the real world. The real world is more complex than anything we can create. We're simplifying everything so that we can work with it, but the thing is really more complex. When you try to describe things ,you're leaving the truth because you're oversimplifying . c -138-61

*EXAMPLES OF KNOWLEDGE CONSTRUCTION It was important that he has listened to mothers something that not many theorists about infancy do. This man had spend hours talking to mothers about what they did with their babies and how they did it and what felt good to them and what they noticed. He was charting new terrain by taking into consideration

thousands of pieces of information and weaving this new theoretical base. c 140-63

LINKS IN DISCIPLINES--

I am starting to care about academics. I'm beginning to feel that my courses have been connected. It's much more interesting once one discipline starts to interconnect with others. You can go through your own courses, pull together your own connections, figure out connections yourself.. c 140 - 65.

3. Meta-awareness of Thinking

*SELF KNOWLEDGE- I think it's important to see why I think the way I do. Some people seem to think that their ideas belong to them, but a lot of things people believe have a long tradition of belief. It helps you to understand your beliefs if you understand where they come from. And it helps you to examine them and say, 'Well, do I really agree with this?' C 137-59

*OTHERS' THINKING- I tend to trust people who share the process of their thinking. c 145-66

We now view events that happen in our lives very differently. He read them very straightforward, on a superficial kind of level. And I don't. I probe them. I read into them. He says he sees things in black and white and I see all kinds of shades of grays-- all these gradations he doesn't see. That's been exacerbated by my education. I think it's a good thing. He thinks it's not so good. c 147-67

A good expert is someone whose answers reflect the complexity the situation holds. c-139 62X-

Wisdom- Meacham(1983) argues that wisdom is an attitude rather than a skill or body of knowledge:

to be wise is not to know particular facts but to know without excessive confidence or excessive cautiousness. Wisdom is thus not a belief, a value, a set of fact, a corpus of knowledge in some specialized area, or a set of special abilities or skills, Wisdom is an attitude taken by persons toward the beliefs, values, knowledge, information, abilities, and skills that are held, a tendency to doubt that these are necessarily true or valid and to doubt that they are an exhaustive set of those things that could be know".

RELOOKING AT FINDINGS THROUGH ADULT DEVELOPMENT LENS

These theories would suggest that it might be difficult for Level 1 co-workers to recognize there are legitimate differences of opinion about some issues and to accept that even experts do not have the right answers for some issues. This could make consensus difficult.

Some difficulties that Level 2&3 co-workers may experience in the consensus process are using evidence to justify a point of view, appreciating multiple-based perspectives on a single issue, understanding the nature of knowledge itself leads to uncertainty of knowledge, and understanding that different perspectives may lead to different legitimate interpretations of evidence but that this is not the same as bias.

It would seem that consensus is calling for Level 4 Knowing. As I listened to co-workers, I heard folks talking from positions of Level 1 and Level 2&3 knowing.

Level 1 knowing examples: There's a right answer for everything somewhere, you've just got to find it. There's always someone out there a little bit smarter that knows the right answer. Sooner or later everyone comes to some agreement because they find their way wrong and others' right.

Level 3 Knowing examples: 20 people on the line, and 20 different answers. I guess anyone can have an opinion. I agree everybody's ideas are good but don't think that people think that because of who some people are.

POSSIBLE IMPLICATIONS:

The definition of consensus implies many skills that people need to truly bring their capacities to bear for an optimal action in the company decisions. I've come to see consensus as an involved process in the social construction of knowledge and meaning. The research on how people know has given us many insights as to why consensus is often difficult for people.

If these are the positions that individuals hold what's the likelihood the spirit of consensus can be reached? There seems to be little capacity for developing new ideas or testing the validity of ideas. For example one co-worker stated, "everybody has different ideas in what they'd like to see and its really hard to get so many people to agree. Even if stayed in room and tried to get consensus, I don't think we would have; I think we would still disagree. OJ trial faster than trying to have people agree".

If co-workers are at Level 1, 2 or 3 of knowing, is consensus in their repertoire? What skills might facilitators have to apply and what conditions might need to be present to assist in developing ways of knowing more aligned with consensus? Would any direct intervention talking about ways of knowing be useful? Are there many individuals in corporate training that attend to models on knowing? What does this have to do with human development in general?

A whole set of other questions gets generated when one examines Deming's PDSA cycle or other problem solving cycles as ways of knowing. PDSA is almost universally associated with Learning Organizations now. However, it seems to be forcing Level 1, 2 & 3 knowers into a procedure that likely quite alien. Perhaps that explains its rather limited and rote use.

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DIMENSIONS OF RELEARNING LEARNING Consciousness and the interaction between growing organizational consciousness and personal consciousness give much more capacity and range of choices both to individuals organizations as futures and day to day actions are negotiated. To get to this type of consciousness it seems that we need to be aware of many different facets:

1. systems thinking-- multiple causes, delayed effects, -- beyond simple cause and effect reasoning-- see in some type of constructed knower's context-- also issue of feedback loops and quick responding
See #3
2. we have to know more of our distortions and what allows us to be to easily meaning making people-- our current levels of meaning making are not foolproof enough to guide us in the type of decisions we need to make --but we're the last to know.. In addition to a healthy skepticism, we need to know the workings of meaning making. This somewhat relates to our penchant for portfolio of solutions
3. we need to know the power of understanding variation- and without this knowledge the types of errors we are prone to make in organizations
4. an ethos must pervade the org and individual about co-creating a universe-- futures are made not just trends-- we have a profound influence on outcomes
5. we need to know how to learn via methods such as sci method - knowing the skills needed such as operationalizing, evaluating but also we need to know how to make meaning via more qualitative procedures
6. we need to see the hidden assumptions and practice in our culture that unexamined propel us along and set our directions-- ie compensation, ranking, costing
7. we need to realize the process nature of things and not be caught in rigidity of formal plans--
8. we need to know how simple actions like mindless cost cutting, dept,