Chapter 6: The Long and Winding Road–Making Authentic Engagement Happen

If we teach today's students as we taught yesterday's,
we rob them of tomorrow.
–John Dewey

A teacher affects eternity;
he can never tell where his influence stops.
–Henry Adams

The Solomonic Moment

It was the end of the day, and several students from my second period class were back in my room, working on their experiments when I discovered a looming disaster.

"Beccy," I said, getting up from my desk to walk over to her. "I noticed in your group's latest draft that you still haven't fixed the serious typo in your experimental protocol."

I leaned over the table where she was conducting chemical tests on her soil samples and set the copy of the report down. She looked at where I was pointing with my pen and then glanced back and forth between me and the open container of extracting fluid.

"Goggles, Mr. Brock?" She chided teasingly.

"Oops." I replied, pulling them on from where they hung around my neck.

She and Katherine both smiled at this momentary lapse in my preoccupation with eye protection, and then they turned their attention to where I had circled the problem on their report. Beccy traced down the page with the tip of her finger, and they both frowned at the same time.

"No, Mr. Brock, this is what we actually did," said Katherine. "We took the first samples from under the mulch on the flowerbeds by the flag pole, the next from under the path back to the woods, and the last set from the playground. Then we took our negative control from the front lawn and the bare patch in the construction site like you suggested."

"Yes, but you took them all on the same day, right?" I responded, pointing at the paper. "That's what's missing from your protocol. You need a step in there telling us that; otherwise, anyone trying to replicate your experiment might take one set of samples one day, another the next, and so forth."

Beccy shook her head, and Katherine now looked worried.

"But Mr. Brock, that's what we actually did." Beccy protested. "We took the samples from the flag pole one day and performed all the tests on that soil. Then took the samples from the backwoods the next class and so on."

It was one of those "Oh my God!" moments as a teacher, and I must not have kept my initial reaction hidden because suddenly there was real fear in their eyes. Fear that only grew as I stood there in silence for several moments frantically pondering what to do.

"Don't you remember me telling all of you the very first day of the project that soil is alive?" I asked them. "And that you therefore have to take all your samples at the same time and perform any test on them at the same time?"

They both nodded and Katherine responded. "We did that. We took all three replications from the flowerbeds at the same time and did the tests on them at the same time. Then we went the next class to the backwoods and did the same thing."

"But Katherine, your group is trying to determine the impact of different types of mulch on the soil!" They both looked puzzled, and I could tell they still weren't getting it. "How," I asked urgently, "can you compare the pH of the soil from the flowerbeds with that of any of your other samples if you didn't control for changes in the environment? What if it rained between the time you took your samples? How can you know that it was the mulch affecting the pH and *not the rain*?"

Now the two of them looked crestfallen as the implication of what I was saying sank in, and I nodded and gestured vigorously with both my hands.

"Exactly!" I implored. "You have no meaningful data whatsoever to discuss your hypothesis! You're entire experiment is effectively worthless."

"But Mr. Brock!" Beccy replied in horror. "What are we going to do? This project is our final exam. It's twenty-five percent of our grade! We've worked so *hard* on this!"

Four weeks. I thought. Four weeks they've all been in here during free periods and after school and even lunch. Four weeks I've been reading drafts, and we didn't catch the mistake until now! I studied their frightened faces and felt defeated. I sighed heavily and gnawed on my lip.

"I'm sorry." I told them, shrugging dejectedly. "There's no way I can avoid penalizing you for this since I so explicitly and repeatedly said something at the start of the project. Your grade's going to take a hit."

I didn't know what else to say, and for a moment, the three of us just stood there, trapped in our own individual silences. Finally, I said, "For now, go ahead and finish these tests and clean up. I don't know what else to tell you."

They were both fighting back tears by then, and Beccy actually sniffled. But they dutifully turned their attention back to the testing equipment in front of them, and I stood up to go back to my desk. I could overhear them talking about how their parents were going to kill them, and I thought to myself: God, I *hate* having to be judge and jury in this job!

I had only taken a total of two steps when I heard "Um...Mr. Brock?"

I glanced over to where another group was working and walked over to them. "Yes?" I asked.

"We think we may have the same problem, Mr. Brock," said Caroline, cautiously.

"Yes, we also took samples on different days." Parilee added.

Worried faces looked back at me, and I shook my head.

"No, your group wanted to see how the weather changes the bacteria levels in the soil, right? You're supposed to be taking samples on different days." I replied.

"But we took the samples from our two sites on different days." Caroline pushed back. "Doesn't that invalidate our ability to compare them just like it does with the other group?"

I shook my head, puzzled.

"No...I don't see why it would." I answered slowly. But they still looked worried, and apparently, I was the one who wasn't getting it this time because suddenly I heard a chair slam down behind me. I glanced over my shoulder to see Beccy angrily storm out of the room and thought, *What's all the sudden up with her?*

"Mr. Brock, I don't think you're hearing what we're saying." Parilee insisted.

I turned my attention back to the three of them and motioned for Shannon to hand me their most recent draft of their report. I leafed through it and started to reread their protocol.

"I understand." I asserted, studying the steps of their experiment. "You took your soil samples from your negative control and your test site on day 1, then went out the next class two days later and...." My gut sank as I came to the word.

"No," said Caroline anxiously. "That's our point. We took three samples of our negative control over three days, took three samples of our grassy site another three days, and then repeated it all two more times."

I stared in horror for a moment and then simply hung my head. I have *failed* as a teacher, I told myself.

Head down, I said, "So you not only didn't replicate your samples at the same time like I told people to do; you took your negative control and your independent variable on different days."

"'Fraid so," replied Parilee.

I raised my head and considered her. "You, therefore, effectively *have* no negative control and therefore *have* no actual experiment either, do you?" I looked away in despair and muttered, sotto voce. "Well, at least I now know why Beccy stormed out of the room."

My brightest students! I thought. I'm looking at failing half a class of my brightest students, and God knows what I haven't caught in the drafts of my weaker kids!

I swung around to Katherine, who was watching us, and asked her to please go find Beccy and bring her back. Then, I turned back to the group I was standing next to and slowly shook my head a couple of times.

"God, I hate Solomonic moments like this one." I muttered.

"Huh?" replied Caroline.

I glanced over at her. "You know? The story of Solomon? The two women and the baby?" I answered.

They all looked confused, and I was bemused.

"Two women both claiming the same baby is theirs are brought before King Solomon to determine who the real mother is." I told them. "He decides to order the baby cut in half knowing that the true mother would rather give her baby up than see it killed. A Solomonic moment."

"You're planning on chopping one of us in half, Mr. Brock?" Parilee tried to joke.

"No," I chuckled sadly. "I *wish* it were that easy."

"Mr. Brock..." Caroline interrupted, nodding for me to turn around. I did and saw that Katherine was back with Beccy, and I motioned for the two of them to come join us.

"Beccy, I need to apologize. You, too, Katherine." I said. "I'm sorry I reacted the way I did a little earlier. I was excessively harsh, and you did not deserve that. My apologies. I should have been a better teacher and I wasn't." I then looked Beccy directly in the eyes. "And I'm particularly sorry that it looked like I was unfairly being so hard on all of you while acting like someone else who had done the exact same thing had done nothing wrong. That had to hurt, and again, I'm sorry."

She gave me a little half-smile in response but remained standing there in silence, clearly still very concerned–as were all the rest of them when I turned around to face all of them. Again, I reflected on how badly I had failed them as their teacher.

Finally, Caroline broke the silence and said, "So what are we going to do, Mr. Brock?"

"I don't know." I answered truthfully, frowning. "Obviously with so many of you making the exact same mistake, at some level I have to own my part of the responsibility for that, and I can't penalize you for something that's my fault." I studied all five of them for a moment

and then continued. "At the same time, the point of this project is to assess how well you've learned to design experiments, and so at some level, I also need to hold you all accountable for your failure to do that."

I shook my head yet again and cupped my chin with my hand, staring off, unfocused. "You're not learning anything if I simply penalize you." I said, thinking out loud. "That's just punishment. And the point of this class is not to avoid getting punished but to gain understanding. For you to learn and grow. And failing all of you does neither..."

My voice trailed off, and I felt the full weight of my power. Then I knew what I had to do for the immediate moment.

"Look," I said. "It's the end of the day, and you're tired; I'm tired. And exhausted people don't make good decisions. So I will go home tonight and think about what's the best solution to this problem, and we'll all talk about it during class tomorrow. I know that won't take away any of your worry or anxiety right now, but I want to do what's best and that's going to require some thought. Okay?"

It was clearly not what they wanted to hear, but they all murmured their assent anyway, and by unspoken agreement, we all went back to what we had all previously been doing. They began packing up to leave while I returned to my desk, and Caroline, Parilee, and Shannon chatted in subdued tones about who would still work on which part of their report; while Beccy and Katherine silently put their chemical testing materials away. I faced the pile of remaining report drafts and had to swallow my fear at what else I might now find lurking in those pages. Watching the girls go, I knew it was going to be a *very* long night.

The Ideals We Espouse

At the intersection of good teaching and real learning is the relationship between the teacher and the student. Authentic instruction may look like students "doing themselves" what they study, and genuine understanding may look like these same children "knowing another as they would be known." But neither of these actions we have discussed in Chapters 4 and 5 can every actually happen in the classroom without the right kind of collaboration between those who do them. The connection between "master" and "disciple" has always been at the very heart of education, and the quality of the community we form in the classroom determines everything about the quality of teaching and learning that take place there. Put simply, those of us in this profession "relate to others for a living,"[1] and the intrinsic character of that relating is what decides how successful any of us are at educating people.

The logical question, then, is what kinds of properties make a teacher-student relationship a good one, and the short answer is: those that produce interdependence and, therefore, true community. Only to the degree that children experience us as needing them for *our* success can we likewise help them to succeed, and the most effective educators see students as the educational colleagues they actually are and treats them accordingly. The adept teacher will always value children as thinkers in their own right, treating them as partners in the educational process, and in fact, rather than posture as a minor deity, this teacher will quite deliberately reveal and own mistakes and the consequent growth from them precisely because doing so shows students that their teacher is also struggling to construct a self and that they play an active role in this struggle. She, he, or they will let students know that they are as much a part of the teacher's own journey to become fully human as the teacher is of theirs. Thus, what makes the teacher-

student relationship a genuinely good one is the teacher's willingness to share his or her humanity with their students rather than hide behind a wall of authority and rank

That's not easy to do, though, when an essential part of the job is "to evaluate and grade the work students do."[2] Those who teach *judge* for a living, and in the face of that fundamental disparity in power, we have to wonder whether the genuine interdependence I'm claiming both teaching and learning need is even possible. After all, how can anyone ever truly experience someone else as an equal if their relationship is hierarchical in its very nature?

Yet, the danger for learning:

> *is not power and status **differences** between teachers and students but the lack of interdependence that those differences **encourage**. [Yes,] students are dependent on teachers for grades–but what are teachers dependent on students for? If we cannot answer that question with something as real to us as grades are to students, [then learning simply] will not happen.*[3]

Thus, what's at issue isn't whether there is a hierarchy of power between teachers and students but how this power gets manifested. If we invite children into dialogue with our own humanity, it *is* possible to assess and guide them in ways that promote equality instead of injustice or disdain. But to accomplish this, we must "abandon our self-protective professional autonomy and make ourselves as dependent on our students as they are on us [if we want to] move closer to the interdependence that [learning] requires."[4] Only then, "when we can say 'please' because we need our students and 'thank you' because we are genuinely grateful for them," can the obstacles to authentic teacher-student relationship fall away and learning "happen for everyone in surprising and life-giving ways."[5]

But what exactly does it mean to say "please" and "thank you" to our students? Or to enter into dialogue with their humanity? The academic answer, ironically, is actually quite simple: invite them into our work. Good teachers are always sharing the stories of their own challenges to master a particular topic, and they regularly ask students for feedback about how a lesson went. They suggest the latest books they are reading in their field, and some even work with students to publish. "I don't know, but let's find out" is a way of life in the classrooms where students are partners in the learning process, and "this is where I found the answer" is always part of the final response–except there never truly is a final response and the accomplished teachers share that about themselves as well.

Thus, by being visible as fellow learners to our students, we reveal that portion of our own self, and as we have our students "read what their teachers have written, join research teams with their teachers, and hear their teachers disclose problems they are wrestling with,"[6] we are saying "please participate with me in my own learning about this subject" and "thank you for helping me know it better myself." Hence, what it means at least scholastically to enter into interdependent relationship with our students is to constantly model and display the life a particular subject or academic discipline lives inside of you.

However, as I have oft repeated throughout this project, the K–12 world is ultimately not about the specific subject being taught but about how to build a self using the metaphors of that subject, and from that perspective, sharing in a dialogue about the struggle to become more fully human takes on an entirely different meaning. Now saying "please" and "thank you" involves not only modeling what it means to be a learner but what it means to be a mature person. In every interaction we have with children, we reveal the full complexity of adulthood and our own choices about it, and whenever we engage a student in anything at all, we demonstrate in how we treat them the values and convictions we hold worthwhile.

Hence, if we think honest self-reflection and respect for others are vital components of the authentic individual, we do like I did with Beccy all those years ago and admit our mistakes and apologize for them. If we believe in the value of love–in "the will to extend one's self for the purpose of nurturing...another's spiritual growth"[7]–then we let our students know that we regard them enough to spend a sleepless night trying to find a way to help them grow from a mistake rather than simply condemning them for it. If we...the list is endless, and it can be as modest an act as grading and returning assignments in a timely fashion as a sign of respect or as difficult a one as counseling a child in crisis. But the good teachers "attempt to live the ideals that they espouse to others,"[8] and in so doing, "they become living examples for students"[9] of what it means to strive to become a complete and authentic person.

The teacher-student relationship at its best, then, is about inviting children to "please join me in practicing what I preach" and sharing with them our "thank you for challenging me to be the best person I can." It is about living with them in the classroom and creating there together the kind of community we would all want our greater society to be, and it is about collaborating with them in their learning to understand what will happen if we don't. It is about working to uncover the potential all of us have to be worthy and wise individuals, and it is about helping to overcome the alienation we feel when we fail to realize this potential fully. Thus, ultimately, the teacher-student relationship is about how we choose to care for one another, and that is why its character is so vital to the process of teaching and learning. The interaction between those who teach and those who learn is a microcosm of all human interaction, and so how educators treat both their subjects and their students will determine how the children do likewise. If we manipulate and deform, students will manipulate and deform; if we love and value, they will love and value. It's as simple as that.[10]

To Learn or Not to Learn

First day of class, and the girls were practicing writing problems and hypotheses on their own while I walked around the room using my seating chart to start to learn names.

Kiki, I said in my head, studying her briefly for her identifying features before shifting my attention to the next girl. *Emma…Whitney…Maggie*…

While I practiced names, I also moved from child to child, observing what their individual answers were, noting who was tackling the assignment faster, who was tackling it slower. When I could tell that most of them had completed the initial solo work, I moved on to the next stage.

"Okay, everyone." I interrupted. "Don't worry if you didn't quite get all five problems and hypotheses written; it's just practice at this point. What I would like you to do now is go around and have each person at your table share your problem and hypothesis for each of the scenarios and then as a group decide who wrote the best one for each scenario. And it might be that one person wrote a better problem but another person wrote a better hypothesis."

I paused. "Any clarification on what I'm asking you to do?" I said. There was a general shaking of heads. "Okay, then get started. I'm going to give you about 5 minutes for this part."

The room came alive with sound then, and I continued to walk with my chart, adding voices to my learning efforts. *Other Emma…Kylie…Christina*…

Keeping my eye on the clock, I eventually started pausing at each of the table groups and telling them, "I want your group to put your best problem and hypothesis for scenario 1 up on

that white board…" until all five groups had been assigned a specific one. I followed behind, putting a series of "plus" marks and "minus" marks next to their efforts.

Same classic mistakes, I thought. But then had to reminded myself, *but the mistakes are new to them.*

"All right," I said, once everyone was done. "We're going to start with problems first. I want you to look around the room at each of the ones you've written, and where there's a plus-sign, there is something good about how that group worded their problem. And where there's a minus-sign, there is something wrong with it's worded. Take five minutes in your group and see if you can figure out why I marked them the way I did."

Again, a chorus of voices filled the room, and I eavesdropped on their conversations, while continuing to keep an eye on the clock. Eventually, I caught their collective attention once more.

I walked over to a board heavy with minus-signs where a group had written, *Why won't Portia Porsche start?* "So what are the mistakes this group made when they wrote this one?" I asked.

A young woman with dark brown hair raised her hand. *Time to start practicing,* I told myself.

"Ladies, I'm going to try seeing how well I've learned your names so far." I said to them. "If I accidentally call you the wrong name, please simply correct me." I pointed at the raised hand. "Ella?"

She nodded. "Because they used the word 'why' in their question?" She responded.

"Good. And no pun intended, but why do we avoid 'why' when writing a scientific problem?" I asked them.

Another young woman with blonde hair raised her hand.

Searching my working memory, I pointed at her and said "Whitney?"

She shook her head. "I'm Lauren." She said.

"Lauren," I responded, deliberately saying her name aloud. "I will work to do better next time. What's your answer?"

"You can't test 'why'." She declared.

"Correct." I affirmed. "It's not that we aren't going to think 'why' in our heads, but we are going to need a 'what' or 'how' or 'Is' or some other kind of wording to a problem to enable us to know what we are actually going to test when we get ready to experiment."

I walked to the next board, and we continued the dialogue, with me getting about a third of the names right and correcting myself on the rest, until we had generated a set of rules for writing good scientific problems. Then I turned to the class.

"Folks, the mantra of this class is 'we learn from our mistakes'." I announced. "Let's see what you've learned. Use the rules you've generated and head back out to your whiteboards and fix those problems."

They scurried to their assigned boards, wiping away their first efforts and re-writing their problems. I followed behind again with my marker, pleased to see I was having to write fewer minus-marks. But their facial expressions told me they were disappointed that I was having to write any at all.

"Much better!" I said, walking to a board where a group had written, *What is the effect of temperature on a bird's feathers?* "But there is no such thing as perfection; there's always room to improve. What's not quite right about this one?" I asked, circling the word, "effect."

A tall girl on the far side of the room raised her hand.

"Meredith?" I said, and she nodded.

"It's kind of vague." She responded. "It doesn't really tell us anything about what we would observe about the bird."

"Excellent!" I replied. "Words like 'increase' or 'decrease'—something that indicates what we think the change is going to be are going to make our scientific problem more precise."

I moved to the next whiteboard, and again, we repeated the dialogue, adding a few more rules to our list. Then I sent them out to their whiteboards one last time to fix their work and nodded my head in satisfaction with the results.

"Okay, people. That's pretty good for now, and we need to move on to the hypotheses to figure out how to improve them." I said to them. "But this is a skill we will be practicing all year long, and you need to always remember: the learning never stops."

Limits Are What You Make Them

In her pivotal research on how individual understandings and beliefs about abilities influence how each of us learn, psychologist Carol Dweck has identified a component of human thought which she terms "mindset."[11] She argues that individuals can have either a "fixed-mindset" or a "growth-mindset" about any aspect of their life, and for those unfamiliar with Dweck's work, a fixed-mindset is the belief that a person's talents, skills, and abilities in a given area of learning are innately hard-wired into the brain, placing fundamental limits on what that individual can accomplish in that area. A person with this mindset thinks people are "born naturals" to do a task or they are not. A growth-mindset, on the other hand is the belief that someone can change and alter—"grow"—his, her, or their talents, skills, and abilities in a specific area of study through hard work and effort, removing limits on what said person can achieve in that field. A person with this mindset thinks people can always get better at a task.[12]

What is interesting and important for us as educators is that Dweck's research has "found that whatever mindset people have in a particular area will guide them in that area"[13] and that a person's mindset can actually vary from one area of endeavor to another; he, she, or they can believe they are a "natural" at one task, limiting their efforts, but be prepared to work hard to improve at another. Dweck has also found that individuals can change their mindset about any task or skill at any time in their lives; a mindset itself is never innate.

I share this brief summation of Dweck's work because I want to argue that the second critical thing it will take to achieve the kind of teaching and learning discussed in Chapters 4 and 5 in our classrooms is the creation of a growth-mindset culture in the work we do with **all** children. I believe that only by cultivating what has been termed the "yet sensibility"[14]—as in "I can't do twenty pushups…yet"—can we generate the resilience a student needs to keep "doing" a given subject until it has changed "how they live in the world," and I believe that only by empowering children with the determination to push through apparent limits can we help them create the futures they want for themselves.

But to establish a growth-mindset culture, we have to do something that has historically made the various stakeholders in education uncomfortable: we must establish genuine opportunities to fail at what we are asking students to do. There is no risk-taking where there are no actual risks, and we must challenge all students with problem-solving situations that take them out of their comfort zone. Indeed, our job is "not to prevent them from failing; it [is] to teach them how to learn from each failure, how to stare at their failures with unblinking honesty, how to confront exactly why they had messed up"[15] so that they can do it better the next time.

Only when we challenge them "to look deeply at their own mistakes, examine why they had made them, and think hard about what they might have done differently"[16] do we enable our students to change to become the individuals they want to be.

This is where the stress we spoke of in Chapter 3 comes into play, and it can demand some meticulous scaffolding to the challenges with which we confront our students to cause them to "bend but not break." But there is a tendency in our schools to set the bar too low rather than too high[17] –creating conditions where real failure seldom actually happens—and the consequent reinforcement of fixed-mindset habits this produces has resulted in "a workforce full of people who need constant reassurance and can't take criticism. Not a recipe for success in [life], where taking on challenges, showing persistence, and admitting and correcting mistakes are essential."[18]

In addition, the reinforcement of fixed-mindsets in our schools creates further difficulties for certain segments of our student population that are already under-represented in the dominant white patriarchy. Known as stereotype threat, it is the internalized message that certain groups of people are innately better or worse at a particular task ("born" to be good or bad at it), and in this fixed-mindset habit, "both positive and negative labels can mess with your mind. When you're given a positive label, you're afraid of losing it, and when you're hit with a negative label, you're afraid of deserving it."[19] Stereotype threat is why "almost anything that reminds you that you're black or female before taking a test in the subject you're supposed to be bad at will lower your test score"[20] –*unless* you have the cultivated growth-mindset to counteract it! Thus, if we want good teaching and learning in *all* our classrooms for *all* our students, we must employ a culture of growth-mindset in *all* our schools. Otherwise, we frankly harm tomorrow because as Dweck herself challenges: "*Great contributions to society are born of curiosity and deep understanding. If students no longer recognize and value deep learning, where will the great contributions of the future come from*?"[21]

The Next Generation

"Mr. Brock, I'm nervous!" said Katie.

I glanced over to where she was helping me set up lab stations for the workshop and tried to reassure her.

"You're going to do fine." I told her. I counted out another set of media plates and lay them on the table. I looked over at her again. "You've been studying your notes for your part of the presentation, right?"

She nodded from across the room. "But what if someone asks me a question I don't know the answer to?" She replied.

I gazed around the conference room of the hotel to make a quick inventory of the supplies at each station and headed back toward the podium.

"Katie, it's not like I'm leaving the room while you give your portion of the presentation." I said as I collected more supplies for the lab stations. "I'll still be here to help you out if you need it."

I studied the box in my hand and then looked over at where she was still counting out plates. "Have you set out all the pipettes yet?" I asked her.

She shook her head. "Only the ones for the sterile water." She answered. "Each place still needs the ones for the dilutions and plating."

I murmured understanding and started to count out disposable pipettes. Walking around to each workstation, I tried to encourage her some more.

"Just remember that it's *your* protocol you're teaching people." I told her. "I doubt very much that anyone's going to ask something that you haven't had to think about already for yourself."

She still didn't look very convinced. But as she finished distributing the last of her plates, she didn't hesitate about going back to the supply box and getting the next item on the materials list to pass out.

We worked in silence then, and pretty soon all ten lab stations were ready to go.

"What do you want me to do now?" She asked, fidgeting a bit.

I scrutinized the room once more and then glanced back and forth between the supply box and the computer screen.

"Why don't you double check each station one last time to make sure they all have the necessary supplies." I told her. "Then go get yourself a glass of water to keep next you and try to relax. You're going to be great!"

"Yeah, right, Mr. Brock." She replied.

She began to turn and then stopped.

"Do you really think we need this many stations?" She asked, nervously.

I looked up at her and answered. "Katie, we have the mid-morning slot on the Friday of the convention. It's the prime time when the maximum number of people will be going to sessions all weekend. I hope we have *enough* stuff."

She glowered as she walked away. "Are you *trying* to frighten me, Mr. Brock?"

I had to suppress a chuckle as I watched her go. We had worked together as teacher and student for a long time, everything from classes to co-publishing to working as one of my teaching assistants in my summer research internship. If there was anyone I trusted to be up to the task of co-presenting a workshop at the national science teachers convention, it was Katie. She would be as poised as an old pro when the time came; she always was.

I turned my attention back to the computer, bringing up both the power point and the project web sites, and then clicked rapidly through the presentation's pages to refresh my own memory. I was doing the introduction and protozoa; Katie was doing bacteria and fungi. I wanted to be sure I had a sense of how I wanted to transition one from the other.

"Everything's in place." Katie told me as she returned to the front of the room. "And I went ahead and passed out the instruction sheet now that people are starting to come in."

She gestured toward the door at the rear of the room.

"Okay!" I replied and moved the mouse quickly to project the title slide. The screen filled with our "Little Things" motif, and I stretched to unkink. "Ready?" I asked her.

She swallowed and nodded.

"Then feel free to wait over with our stuff if you want." I said, pointing toward the table where we had our extra materials organized. "I know how awkward it feels to have a room full of people staring at you in silence, waiting for you to begin; so I understand if you want to sit off to the side until I introduce you."

She nodded nervously again and went to take a seat.

I noticed that a few people were starting to flip through the instruction packets at the lab stations and that others were clearly scanning the room looking for the pile of handouts. Nope folks, I thought; I do things a little differently.

Waiting until precisely our appointed starting time, I exchanged a quick look of 'ready to go?' with Katie and started the workshop.

"Good morning everyone!" I announced. "I'd like to welcome you all to our workshop today on soil ecology. My name is David Brock, and this is my colleague, Katie Loya." I paused to let her wave shyly at the crowd and then continued. "I'm also proud to say that she is a former student of mine, and together, we're both going to be showing you this morning how to study soil microbes and their ecological roles in your classes."

I paused and clicked on the first slide.

"Because I'm a devout believer that not just our students learn best by doing," I told them, "you're all actually going to be practicing the protocols we show you today for yourselves. So for those of you just coming in or for those of you who didn't take a seat near one of the piles of materials, you'll want to take a moment and relocate yourself so that you're next to a lab station."

I gave people time to move and waited for the inevitable hand in the air.

"Do you have any more handouts?" asked a gentleman toward the front.

"Actually, no." I replied. "We've only put a handful of handouts at each workstation for people to share as you follow along with the instructions we'll be putting up on the screen. Everything you will be learning today is available to download free off our website–including this presentation."

I shrugged and smiled.

"We figure if we're teaching environmental science, then wiping out a forest of trees for photocopies sort of sends a mixed message." I said. "Besides, if you're like me when you go to one of these things, you want to be able to reformat everything for your own students anyway. So we simply provide everything to download so that folks can cut and paste to their heart's desire."

I paused to let that announcement actually sink in, and as usual, I saw a mixture of reactions: smiles and nods of approval and understanding from some; frowns and looks of annoyance from others. The latter, I knew from long experience, would never have used anything we were presenting anyway. They were the rabid gatherers of "handouts for the files"–the teachers who go through conventions as if somehow merely collecting the ideas of others made them a better educator. But with the nodders, there was hope because I knew good teachers will work for an idea—fight even—to make it theirs. Those were the people I was really trying to reach here today.

Thinking about all the trees I had just saved, I clicked on the first slide and began "When studying soil microbes, there are essentially four key steps you'll be performing today...."

Practicing What We Preach

Perhaps *the* key challenge to incorporating the kind of teaching and learning discussed in Chapters 4 and 5 into our schools is that we don't employ them in the actual teacher training process itself. In spite of the fact that we already know "what conditions we can devise so that all humans *will* learn,"[22] lecturing still remains the dominant pedagogy in both teacher colleges and at educational conferences, and this passive approach where an instructor talks while others listen–what Roland Barth calls the "sit 'n' git" (as in sit down and get some knowledge)[23]–is then incorporated into the trainees own teaching because "it's how *they* learned."[24]

The "sit 'n' git," though, assumes that our knowledge of the universe consists of a set of propositions for transmitting and receiving like a radio broadcast, and as we have seen throughout this book, that epistemological assumption is a false one. Genuine knowledge, you will recall, can only come from entering into community with the universe's web of relationships, and because "there can be no community when one person is talking all the time and the rest are presumed to be listening,"[25] the "sit 'n' git" can't teach anyone anything. As Barth summarizes well when recounting finding a box full of:

> *all my notes from four years of college, along with syllabi and final examinations…I opened up the box and took out some folders. Despite three-hour lectures for sixteen weeks each, I couldn't even remember* ***taking*** *many of these courses. I then administered myself a couple of final exams. I'd have been very happy to settle for 0.5 percent retention. I found none*.[26]

Hence, because most teachers are themselves trained using a fundamentally flawed method of instruction, their own instructing regularly reflects this fact, and since the majority of professional development that follows during the rest of their careers usually involves one "sit 'n' git" after another, little ever changes. Indeed, research has shown that only 1% of the continuing professional development in this country is of high quality,[27] and because bad epistemology begets bad teaching—*telling* people how to get the kids in their classrooms *doing* is a self-contradiction—the way we instruct educators in their craft just reinforces the teacher-centered classroom.

What we now know is that if we want teachers producing genuine learning, they must actively engage in the process of student-centered teaching, and since teachers are no different than students—they learn best by doing—the only way to learn how to teach in a student-centered fashion is to do exactly that.[28] Therefore, what we need in our schools are systemic mentoring programs where experienced already authentically engaged educators work with those entering the profession to demonstrate how to craft student-centered instruction and provide the opportunity for new teachers to practice such lessons under their mentor's watchful eye. New teachers "need to have an idea of what quality work looks like, have time to practice and work toward it, and take ownership of their next learning steps"[29] if we want to empower them to become authentically engaged educators themselves.

But that takes time and resources, and to do it well takes a *lot* of time and resources. I know. I was once blessed to mentor a former student of mine into the profession who was totally new to teaching, and it was an amazing experience to uncover and unpack all the skills and habits I now did almost instinctively and hold them up for reflection. But the process also took nearly an hour of meeting time every single day of the work week and a few weekend afternoons that year, and while I did it without pay out of love for my former student, that is not a realistic model for the kind of truly systemic change in teacher training our schools so desperately need if we are going to have effective teaching and learning for every child. I will return to the issue of investment in education in Part III of this project, but for now I will put it bluntly: if we want good teaching, it is going to cost.

However, there is an alternative cost as well, and we are already paying it. Our society has clung now for decades to a dysfunctional approach to education that has "lost sight of the basic purposes of schooling, and of the high expectations and disciplined effort needed to attain them. [More than a generation of children have passed through schools] eroded by a rising tide of mediocrity,"[30] and yet here we are billions of dollars in so-called reform later and "most of America's high school students are [still] not ready for either college or work."[31] "Every school

claims to teach its students to think, but few do,"[32] and so we find ourselves in the very crisis this project is seeking to address. Put simply, we have collectively failed as a nation to provide the kind of schooling our children need to engage in the effective learning they will need for their lives. Consequentially, we are actively risking denying them a future, and therefore, I ask us as a society: which cost do we really want to pay?

Notes

1. Jeffrey A. Kottler, Stanley J. Zehm, & Ellen Kottler, *On Being a Teacher: the Human Dimension, 3rd ed.* (Thousand Oaks, Ca: Corwin Press, 2005), p. 22.
2. Palmer, *The Courage to Teach*, p. 137.
3. Palmer, *The Courage to Teach*, p. 139; my emphasis.
4. Palmer, *The Courage to Teach*, p. 140.
5. Palmer, *The Courage to Teach*, p. 140.
6. Roland Barth, *Learning by Heart* (San Francisco: Jossey-Bass, 2004), p. 27.
7. M. Scott Peck, *The Road Less Traveled: A New Psychology of Love, Traditional Values and Spiritual Growth* (New York: Simon and Schuster, 1978), p. 81.
8. Kottler, Zehm, & Kottler, *On Being a Teacher*, p. 22.
9. Kottler, Zehm, & Kottler, *On Being a Teacher*, p. 23.
10. As a follow-up to what happened that day with Beccy and her classmates, the reader might be interested to know that out of such momentary ashes, she and I would develop one of the strongest mentor-mentee relationship I have had with one of my students, and I was there for her college graduation, her dissertation defense, and, most recently, her wedding. And for those who would like to know how I ultimately handled the educational situation in this story, each research team was given the chance to explain in their conclusion to their report why the mistakes they had made were, in fact, mistakes, and if they could successfully display the necessary metacognition without any aid from myself, there would be no penalty.
11. Dweck, *Mindset*, p. ix.
12. Dweck, *Mindset*, Chapter 1.
13. Dweck, *Mindset*, p. 47.
14. Whitman and Kelleher, *Neuroteach*, p. 43.
15. Tough, *How Children Succeed*, p. 183.
16. Tough, *How Children Succeed*, p. 121.
17. Dintersmith, *What School Could Be*, p. xix; Tough, *How Children Succeed*, p. 161.
18. Dweck, *Mindset*, p. 137.
19. Dweck, *Mindset*, pp. 75-76.
20. Dweck, *Mindset*, p. 75.
21. Dweck, *Mindset*, p. 220.
22. Barth, *Learning by Heart*, p. 29.
23. Barth, *Learning by Heart*, pp. 31-32.
24. Barth, *Learning by Heart*, p. 33.
25. Barth, *Learning by Heart*, p. 36.
26. Barth, *Learning by Heart*, p. 34.
27. Whitman and Kelleher, *Neuroteach*, p. 149.

28. Lest I be accused of hypocrisy, the irony of my own "telling" about the "doing" has not been lost on me: it's why I have used so many scenes from my own teaching to illustrate what student-centered education looks like.
29. Dintersmith, *What School Could Be*, p. 210.
30. National Commission on Excellence in Education, *A Nation at Risk: the Imperative for Educational Reform* (United States Department of Education: archived at http://www.ed.gov/pubs/NatAtRisk/risk.html, 1983).
31. *Crisis at the Core*, p. 11.
32. Dintersmith, *What School Could Be*, p. 70.