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## **ENGAGING STUDENTS INTELLECTUALLY: AS PROFESSOR AND AS PARENT**

First, I want to thank our parents. Not only for supporting Columbia--and my salary--during a very difficult financial time, but most importantly for sending us some of the brightest, most motivated, and most challenging students in the world. One of the joys of teaching at Columbia is that you have to get used to teaching students many of whom are better than you were at that age. As professors, we only continue what parents have done, and we share the same hope that the apprentice will exceed the master. So, thank you for your excellent children.

Also, I want to thank the Office of Student Affairs for their invitation to speak as a representative of the faculty. This is an unusual personal opportunity for me. I have done one-third of a century of teaching at the University of Michigan, Carnegie-Mellon, and Columbia, and at AT&T and IBM, and I have been asked by chairs and deans to give talks on how to teach. Also, I've put three children through college and the fourth one is a freshman here right now. I'm grateful to be asked to gather and articulate my thoughts. Still, it takes work to reflect on: how should we teach?

*Why* we teach is easy. It is interesting to observe that any new communication technology has always thought that it was "game over" for teaching. Thomas Edison in 1877 said: "the phonograph may take the place of the teacher," and similar claims were made for radio, television, and the internet. But experience shows that teaching is best when done in person. Students are buying a ticket to the show. They are not only learning the text of the play, but studying the style of the actors, directors, even the set designers, on their way to developing their own content and their own flair. Parents know that they are under continual and intense observation by their children, who are driven to find out what the *real* story is. In a good university and in a good class, so are the teachers. That is the "why".

But the "how" is harder, particularly given the high quality of our students and children.

I'd like to explore three thoughts:

First, there is a life cycle of intellectual development; teachers and parents need to respect it.

Second, teaching like parenting can be learned and developed, particularly when it comes to engaging the students.

Third, these young adults have their own role, and they should know what we look for from Columbia students.

## **THE LIFE CYCLE OF INTELLECTUAL INVOLVEMENT**

The foundation of a university is the observation that you do not have to discover for yourself all that is true and beautiful, although this is the impulse of most young people. You can instead

listen to the best of the past. But since we don't know what is coming in the future, the university also teaches attitudes and approaches for learning in the rest of their lives.

Because this is difficult work, we start easy. We have built the curriculum backwards. In their first years we teach those things we are most sure of. The core classes, those in the freshman year, are about ideas that last essentially forever; students will be able to discuss them with their great-grandchildren. But our certainty decreases with the level of the course. Courses in the senior year, with luck, will last at least to the time of their children. Graduate school is more ephemeral still: the half life of an Engineering Master's degree has been measured to be about 7 years. That means that in 15 years it is down to about two courses' worth, and in 20 years to about just one. So, not only won't the holders of Engineering MS degrees be able to discuss it with their children, most of the degree they won't even be able to discuss with themselves.

So, the life cycle of the mind just can't be about content. Content is in books, or in the tubes of the internets; you can download entire papers for a fee. What we try to do, the value that is added by the personal dimension, is to help develop the approach of students to the material. We teach and they learn, but if we do our job properly, we teach them how to learn, and they learn how to learn. Eventually, they will make this their own, and in their own way, and that is good. They will be able to more closely adapt their education to the new needs of future they will find themselves in, just like today's teachers and parents have accommodated their own education to the present world.

Our students are blessed with high energy and high ability and high potential. But over the course of their education, we see and encourage some shifts of their minds and their hearts. They start their first years with an attitude of tolerant superiority, convinced that what has kept the world from being perfectly understood and superbly operated must simply be the laziness and ignorance of their elders. But over the years here, they begin to challenge themselves with more ambitious self-selected coursework and projects, often leading to courses with one-on-one directed study and research. One result is that in four years these talented achievers get used to achieving many--but not all!--of their goals, and begin to realize it is not from lack of trying. They eventually appreciate that any problem worth attacking is one that keeps fighting back.

This even continues in graduate school, where students are required to not just know, but to create. Experienced advisors appreciate that the principal sign that a student is engaged with the work is that student alternates between elation and despair. The end result is a genuine contribution, but also a genuine intellectual humility: they produce a result that is good enough to publish, but limited enough to have been actually been doable. Brand new students may resist the idea that what we call knowledge is just a steadily improving approximation, but by the time they leave they begin to appreciate that grades and recognition have to give way to an appreciation for excellence in its own right and a satisfaction derived from the work itself.

This is not easy. Every professor and every parent knows a colleague or friend who has never made that transition. But this means the best education respects this development. The best research comes from an innate urge to know, and the best teaching from an innate urge to explain and share. The university is built on two words. For research, that word is, "Wow!" And for teaching, it is: "Watch!"

## THE THREE JOBS OF GOOD TEACHING

So, how do we encourage this growth? There are things we as teachers and as parents can do, many of them learnable, many of them supported by research, and none of which a book alone can give you.

The first job of teaching is Mastery: delivering it, and the authority that it provides for evaluation.

Buying a ticket to the show means sitting up front for a point of view, for a personal experience with a master. A teacher or parent is more like an editor than a journalist, although all good editors have had a beat on the street. All good editors know what is good, and how and when to correct—but also how to do so without draining the work of the composer's personal voice.

Here are some tips, taken from my "How to Teach" talks:

*Mastery Tip 1:* A master selects and encourages problems and approaches that appeal to the joy of discovery. And in this, a teacher's own past experience is the best judge. Human memory is a great filter; if you remember something, often it is because of the strong feelings that accompanied it. This makes it worth sharing. This is one reason why parents find themselves talking like their own fathers or mothers, or why teachers hear the echoes of their own mentors. The really great ideas are eye openers, and carry a tingle in the gut.

*Mastery Tip 2:* Never expect to teach and grade the same class twice. The students are different each time, just as each new child in a family is different. It is a bit like playing jazz: you have to know the melody, but you have to be willing to improvise to the audience—and only the masters can improvise well. Still, a good audience makes a better master, and this is one way to evaluate students: did they make the teacher better?

*Mastery Tip 3:* Each lecture has to leave something unformed, something that has at least a bit of mutual exploration. A teacher needs reminders of what the young'uns are going through, not the least of which is the joy. You can't teach well if you don't find something of a surprise yourself. Keep your teaching notes loose. A willingness to explore shows the comfort that comes with technical mastery, and the trust one can place in a well-formed but spontaneous judgment.

*Mastery Tip 4:* Periodically ask the killer question: how do I know that *I* am doing a masterful job? Answer: read your teaching reviews. Research has shown since the 1920s that students in general don't lie. Have the courage to listen.

The second part of teaching is providing structure and pacing. This is the easiest part! There are certain mechanical aspects of teaching, which I call the "Hints from Heloise". There are many in my "How to Teach" class. Two of my personal favorites are: Imagine the class consists of students who are nearly deaf and nearly blind; you will talk more distinctly and write more clearly. And, you should always leave the classroom feeling a little sweaty, whether it is from accomplishment or from terror.

But here's some things specifically about intellectual engagement:

Structure Tip 1: There is no one single way to teach, just as there is no one single way to raise a family. It is far more important to find a way to organize your teaching that you are comfortable with, and that bears your own mark. A good family creates its own organization and its own traditions. So does a good teacher. And over time it will follow you around campus.

Structure Tip 2: Learn to ask leading questions: "Why would this be helpful to know?" "Is this sufficient information for someone else to reproduce this work?" Or, if student gets stuck: "What would be a reasonable *approach* to finding the answer? Why?" Then, simply, wait. As in jazz, as in parenting, silence is a powerful way of focusing attention.

Structure Tip 3: Remember from cognitive psychology: don't be afraid to repeat; repetition is the mother of learning. Remember from cognitive psychology: don't be afraid to repeat; repetition is the mother of learning. (That was a joke.)

Structure Tip 4: Realize that the best jokes are situational and hard to script; most professors don't do stand-up well. But, they don't have to. Badda bump!

Structure Tip 5: Do not be afraid to break the fourth wall: tell them what you are doing and why. Don't be afraid to struggle, as long as it is out loud. A good teacher or parent doesn't have to always be right to be effective. As in many performing arts, a part of the value of the ticket to the show is to be able to watch how skillfully a player gets out of a difficult situation.

Structure Tip 6: Have the courage to video record yourself. It is the rare parent who hasn't been blindsided by a covertly recorded dinner table conversation. Most faculty need to have the same experience.

The last part of our job is Support.

Support Tip 1: Get to know your students. This is hard, since in a semester there are only 40 contact hours, and then they are gone. Our Courseworks website has student pictures; review them. This is important, because research shows that about three students establish the mood of a class, and they do so in the first three weeks. So, find them, and establish a working relationship with them. Establishing a safe and open environment is necessary for the flip side, too: part of the job is to be able to alert the Office of Student Affairs about the occasional incident of academic dishonesty, or the need for a psychological intervention.

Support Tip 2: Learn to recognize and maintain the optimal level of anxiety in a class. Your class should become an event they don't need a calendar reminder for. But also learn to seize on the spontaneous encounter. There are unexpected moments in the classroom that a good teacher recognizes that are like those moments in the family car that any parent instinctively senses. Be willing to use them to make a deeper connection.

Support Tip 3: Learn to read the signs of connection, and respect them, and let them develop. Often this is a full smile or a look of complete puzzlement, followed by the quiet that comes

from realizing that one is face first with the truth. Those in the humanities have it easier: the great truths that they are exploring often have the virtue that their opposite is also a great truth. But for scientists and engineers, there are similar feelings, like: "yes, of course, the natural world would have to work in that way" or, "yes, that design seems almost inevitable given the constraints".

## **WHAT WE LOOK FOR**

So, as teachers and parents we strive for mastery, for structure, for support. But we are working with developing adults. What about their role? Now I'm talking to you, the first-years.

We know Columbia students are good, often better than us, in ability and willingness to do the work. So we're looking for something more than just the certification of quality given by the admissions committee.

One fundamental aspect we look for is simple physical involvement: attend classes, do the work, including *all* the reading. This also means no cell phone or laptops: would you bring one to a Broadway play? Most importantly, a good student is *there*, with a mixture of openness and skepticism. It is your job to develop both openness and skepticism, in equal measure.

We look for a willingness to pose your own exploratory questions. We don't like questions that are really a statement of "Look at me!", or questions that are recordings of what worked last year. These questions don't have to be perfect; a good teacher knows that a near-miss is perhaps an even more valuable teaching moment.

We look for a sense of personal integration. In those disciplines like the humanities that seek out human truth, we hope you realize that the most personal is often the most universal, and that a certain fearlessness in presenting yourself honestly is critical. Write poetry--but, there needs to be truth behind the poetry. For those in disciplines like science and engineering that seek out physical truth, we hope you realize that a respect for the natural world does not mean you have to check your personality at the door. There needs to be imagination behind that patent application. Don't be afraid to color outside the lines of your discipline.

Lastly, we need consumer advocates. If our job is to provide mastery, structure and support, ask yourself: do you feel you are getting your fair share of excellence, justice, and fun? We need your feedback. Be a little noisy.

## **CONCLUSION**

For teachers and for parents, to engage your students or children, you have to already be engaged yourself. Some of the best advice to teachers was given over 60 years ago to parents, by Dr. Spock: "Trust yourself. You know more than you think you do." But it also helps to listen to that other Spock, to be able to occasionally lift one eyebrow and say, "Fascinating!" Teaching always has been a human (or at least half-human) endeavor.

Like parents, teachers have to live with the knowledge that they may never see the end result of their work and care. But over time they should be blessed with an increasing number of

remembrances of moments of connection that simply speak for themselves. These highlights will be recalled on both sides; the awe and creative unrest that they stir up will be equally shared.

Some people will say that teaching and parenting are fundamentally a gift of the self. Rather, I think it is instead a gift of selflessness. It isn't just about you. You must respond to the urge to give testimony to truth and beauty as they themselves are, rather than your own personal biases or preferences. And you must willingly acknowledge their incomplete but developing form. One of the joys of Columbia is that our students are experts in demanding this from us. And for this it would be impossible to ask for much more from any other student body.

But, finally, it comes back again to the parents. We thank you for the fine teaching job you have already done. We hope that you find that we are up to the task of continuing your good work.