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On Not Teaching Addition: A Homeschooling Parent Teaches and Researches Math

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Synopsis

Interactions with the humans in one's life can have bearings on the way one interacts with one's work—and vice versa. In particular, the ways in which a math person who is also a parent interacts with their children can correlate with the ways that person interacts with students, colleagues, and with math itself. This article describes some of that correlation in one mathmom's life. In particular, this mathmom worked toward balancing, both as a mom and as a teacher, her beliefs and feelings with societal mindsets and practices.

The [July 2018 issue of this journal](#) was special in that it almost exclusively featured “math and motherhood”. It was also special in that it was longer than usual, and welcomingly so. The wealth of ideas was impressive. In particular, Ksenija Simic-Muller's article [6] caught my attention. She talks about something which she calls “parenting anxiety”, something like math anxiety, and she gives many examples of “fear-based parenting advice”. Analogously there exists, I believe, something which might be called “fear-based *teaching* advice”, which results in what I'd call “teaching anxiety” and (Simic-Muller's phrase) “fear-based teaching”. Teachers often seem to be afraid of their students—afraid they'll talk, or eat, or text, in “their” classes, afraid students will think them uncool, afraid they ARE uncool. This affects a teacher's self-image, as a teacher and as a person, and it affects the way she teaches.

Reading Ksenija Simic-Muller's article [6] made me think about ways in which my style of mothering has affected and related to my style of teaching,

in particular of teaching math. I harbor fond (to put it mildly) memories of days and years when my own children were “actual children”, living with their father and me. I also have just-as-fond thoughts of our years now, that they’re adults, living in their own homes, two here in Philadelphia a mile or two away from me, another based in Brooklyn, still another living with his wife in Mexico. I’m glad I don’t have to decide which is my greater passion, my children or “my math”. Both have informed my life as poet and writer, and they have also informed each other. In many ways they occupy the same emotional place within me. I can’t imagine one without the other.

Being a parent, and being a teacher, is often both complicated and enhanced by societal mindsets, policies, and expectations. I have asked many questions. How can we parent in effective ways that are minimally invasive in terms of not adversely affecting the joys and meanings of the parent/child relation? How, similarly, can we *teach* in effective but minimally invasive ways? How, even, can we research in minimally invasive ways—meaning, for me, ways that don’t invade the non-math-research aspects of our lives? Sometimes the questions I asked caused me to resist authority in both its blatant and subtle forms. When should we obey and conform to the voices and opinions of the society and communities in which we live and work, when should we make compromises, and when do we need to full-blown cease to conform? In motherhood, in teaching, and in life there are many opportunities to ask questions like these.

Many of my questions had and still have to do with education. I have questioned the way education is viewed and carried out in our society, and in other societies. I have felt that a lot is wrong. Too much time, too much input, too much emphasis on peer group, too much testing, too little trusting, too much emphasis on what is called potential, too much of what I call “a big deal”, too much interference in our lives, a fair amount of dis-empowerment of children, parents, teachers, minorities, and perhaps everybody, all resulting in too much stress. To what extent is this stress necessary, perhaps inherent to life itself? This article aims to describe how I’ve dealt with these ideas and questions, and how I’ve strived to live by some of the answers I’ve come up with.

My two youngest children homeschooled for eight years—Devin up to seventh grade when he chose to enroll in our local public school, and Bret from grade 5 through grade 8, followed by two years in a magnet public school,

followed by two further years of home-schooling (all his choices, which his father and I supported). Our family homeschooled in very unstructured ways, ways very different from “regular” school and also very different from many homeschools. Structure for us was the exception rather than the rule. We used no curriculum, formal or otherwise. We didn’t “officially” teach math or reading. We had no set “homeschool” hours and no required “schoolwork”. We did not try to imitate nor replace schools in any way; in particular, we didn’t strive to participate in various “extracurricular” activities “for” children, such as summer library programs, “special” classes for home-schooling kids, Girl Scouts, organized sports, or advanced AP-ish math courses. We didn’t specifically NOT participate in these; we just didn’t feel the need to seek them out, or try to get the kids interested in them, often out of fear of being bad parents. For us these were all opportunities—offerings—rather than requirements. And we did not strive for quantity. The kids learned mainly by osmosis—by doing and observing. And what we did was what we’d do if they or we had never heard the word “education”. “Education” is a word which I believe is very loaded in our society; it’s emphasized too much, sometimes too vaguely. Or the opposite occurs and it is too rigorously defined and made so much a big deal of that it often makes people nervous.

While I was a student, pretty much right from the get-go, a large part of me *ignored* my education. Perhaps more accurately, I was not as self-conscious about it as many children and students are. In many ways, both my parents and my teachers supported this. (My mother once told me that my elementary school teachers said, “Leave Marion alone. She’s a different kind of child.” In accordance with this, they looked the other way when I day-dreamed in class, or, in history class, investigated patterns in the various times tables, wondering whether there was a “Mr. Magic 8” analogous to “Mr. Magic 9”.) Although I was what they call “school smart” (mostly A’s) and although I liked school, I didn’t consider school or education the be-all and end-all. For example, Seventh grade math was *business* math and my grades were C’s. But I never believed I was a C math-student. And if I had a bad teacher for a particular subject, I didn’t let that affect my feelings about that subject. Nowadays many of my students talk about how they had a bad, or cruel, or abusive, math teacher in, say, third grade, and how because of that teacher they positively definitely absolutely will always hate math. But, as I tell these students, I never equated any subject or topic with who taught it. And I didn’t always believe what I was taught,

I based neither my self-image nor life-plans on what the educational system said, in particular about me, and yes, I very often “went my own way”. (And sometimes, mostly in my adulthood, that was detrimental to my life and career. See., for example, my memoir, “The Graduate Student Blues” [3] in the January 2017 issue of the *Journal of Humanistic Mathematics*, which describes how I almost didn’t get my math Ph.D.)

Again, our family lived as though we’d never heard the word “education”, nor other societal buzzwords like “excellence”, “assessment”, even “hands-on”. To me “excellence” seems to assume that worthiness is totally ordered. Moreover, consider the question, excellence in WHAT? Grades? Success? *Immediate* success? Perhaps excellence in the abstract? Among the home-schooling literature is a book titled “Home-schooling for Excellence”, about how all four of the authors’ home-schooled kids wound up going to Harvard. Well, in what ways is excellence tantamount to Harvard? The word “assessment” seems to imply judgment. And it brings on questions. *When* should such assessment be done? And how? In one school where I’ve taught, the measure of assessment was how well a student did in some subsequent course. If a student got an A in Calc II, then received a C in Calc III, that student might be “assessed” to not have truly learned Calc II. This seems unfair, and inaccurate. As Patricia Henry, Assistant Head of the Math/Computer Sciences Department at Drexel, once said, “I think students finish learning a course AFTER the course is over.” So how a student does WHILE taking Calc III might not accurately demonstrate her “true” progress in Calc III. Finally, about “hands-on”: Just because a student’s *hands* are on, doesn’t mean their *minds/heads/hearts* are on. And maybe they don’t *want* their hands to be on, resent being told what to put their hands on.

Indeed there exist buzzwords directed towards both parents and teachers, and parenting and teaching are very much related in other ways too; they have non-empty intersection. And so ideas gleaned from having been an un-schooling parent, and in some ways an un-schooling child, have seeped into my M.O.’s as a mathprof and math person. The remainder of this article consists of eleven examples.

1. *On Not Being Afraid.*

Returning to Ksenija Smic-Muller’s article [6] about “parenting anxiety”, I remember that, increasingly, once I had become experienced in parenting young children, I was not afraid of them. For example, I had few qualms

about their misbehaving. First, because I didn't go out of my way to make rules of behavior, there weren't many ways in which they *could* misbehave. I didn't mind or feel embarrassed if they chose to stand up in buses, or forgot to say thank you (but instead showed appreciation in other, more sincere, perhaps more creative ways). Second, I believe that if children are brought up to feel, not only love, but trust, then they trust whatever rules their adults do impose. They trust, e.g., that, if they run into the street on a red light, they'll be in danger.

Fear of one's own children can be related to, perhaps in part caused by, feelings of possessiveness. In our guts parents sometimes *equate* their children to themselves; they're embarrassed if the kids "act up" because in some ways it's as though *the parents* acted up (and society sometimes treats parents as though that's the case). The longer I'd been a parent, the less possessive I felt about "my" children, and the more aware I was of boundaries. "Fear-based parenting" is not what I do.

Similarly I don't feel afraid or possessive of "my" students or "my" classes or classrooms. The classes are *our* classes and the classrooms are rooms we borrow. I don't feel the need to impose a lot of rules, it doesn't bother me if they eat in class, or text during class, I don't worry that they'll misbehave (Again, how can they misbehave if there are so few rules?), and I don't feel that I have to impress them. I don't worry about making a math mistake—calculation or more serious—or "blocking" on a word or concept. If students cheat on tests, I don't take that personally. In my experience, if they trust that the tests will be "like the homework"—no surprises—if students trust in general, they're not likely to cheat. I also don't feel threatened if students do a math problem in a different way from how I've taught it. (And they have taught me new ways of doing some math problems, sometimes even coming up with new solutions.) I don't, true, feel in *complete* control of circumstances. For example, I do worry about what students might write on teacher-evaluation forms. But in general I don't worry about things that don't need to be worried about. "Fear-based teaching" is not what I do.

2. Avoiding the "Difficult" Mindset.

It's often said that parenting is difficult, in particular that homeschooling is difficult. I believe those are mostly exaggerations, even myths. Part of the reason for the societal "difficult mindset" is what I call motherguilt (or par-

entguilt, but I think it's mostly *motherguilt*). Briefly, mothers often perceive, because of societal attitudes (it's not the mothers' faults) that if parenting isn't difficult, they must be doing something wrong, neglecting something, taking the easy way out. Another part of the reason for the "difficult mindset" is society's perception and treatment of children as burdens. "I HAVE to be at that soccer game", "I HAVE to get down on the floor with the Legos" and in stores, over loudspeakers, "Parents: please keep your children by your side at all times." Society, along with its individuals, often *makes* parenting difficult.

After having been a mother for a while, I did not view my children as burdens and my default impression of motherhood was not that it was difficult. I didn't want to be a soccer mom so I wasn't (I *was* a baseball mom for one fun summer but in general my kids weren't interested in organized sports), I didn't get down on the floor with the Legos if I didn't feel like it, nor deal with messy things like Shrinky Dinks, and I resented it when, in the thrift stores my kids and I frequented, the loudspeakers blasted "Please keep your children by your side at all times." I like to think that's why my kids didn't "act out", nor "test" me, or themselves.

Just as I came to not view children as burdens, so I don't view *students* as burdens. And just as children who are not viewed as burdens tend to be sweeter, less hostile, so with students. In general, *people* who are not viewed as burdens—not *expected* to be burdens—tend to . . . well, be less of a burden.

Thus, just as I don't believe parenting has to inherently be difficult, I also don't believe teaching and learning have to inherently be difficult. That is, I don't believe that parents, teachers, schools and society should, again, *make* teaching and learning difficult. Too many rules, too many assignments, too much homework (homework in general is something I don't believe in) and too much insisting that students read and study things they're not interested in. (The more rules we make, the more rules they can break.) Assigning too many readings, in too many courses, often translates into students not being able to give meaningful attention and thought to those readings, nor choose and pursue their own readings. (I especially fume over high school "summer reading" assignments.) Making learning stressful can color students' mindsets about learning, and about what they learn. I believe that if learning turns out to be difficult ("stressful" is sometimes the buzzword here),

then children and students should, if possible, be allowed and encouraged to learn *less*. (And thus, I believe, better, also retained better.)

In my math courses I continue to do things like tell students that the term paper may, if anyone likes, be handed in early in the semester (so that at the end of the semester they can concentrate on the term papers and finals in their other courses). And I don't assign homework for the last two weeks of class (we simply read the readings *during* class and enjoy conversing about them), and I actually say, at the end of the term, "I want to make things as non-stressful for you as I possibly can".

As said above, if motherhood isn't difficult, a mother is often made to feel that she's not a good mother. The same might apply to "teacher-hood", and to "student-hood". Students often seem to feel that a difficult course is a good course, along with the reverse implication, that if a course isn't difficult, it isn't a good course, and perhaps the teacher isn't a good teacher. Sometimes it seems that society *equates* worthiness with difficulty. (Masochism might be a factor here.) But difficulty per se does *not* imply worthiness.

There might be exceptions to some of this—e.g., medical school; many medical terms and procedures need to be memorized. Also, *self*-discipline is another story, as when a math researcher just-has to keep torturing herself, when she just-can't let go of a conjecture. But difficulty for pure difficulty's sake is something I'm opposed to.

3. *On Letting Children and Students Mess Around.*

My poetry chapbook, "New Heights in Non-Structure" [1], is about ways, many of them not to my liking, in which people relate to children, and in general to one another. John Holt was the home-schooling guru of the 1950s—a true guru—and one poem in that collection seeks to convey John Holt's idea of "messing around", how "messing around" (sometimes prohibited by teachers and parents) is a good and natural way to learn. That poem, "The Mathematician's Child", describes how my youngest child learned to "make" letters. "Devin at 5 learns letters the way I learned numbers/ and functions/ and differential forms./ Namely, each has to be played with awhile. / A has to be A-man, with a triangle face and no arms. . . ." Yes, the letters needed to be made *incorrectly*. "Child, interrupted" is literally what we get when we don't let a child "mess around".

Analogously, in my college math teaching I look for ways to allow my students to mess around. This means more than giving them math problems to work out for themselves. It means giving them math problems they can relax with and enjoy, perhaps math problems that are so unlike the math problems they have seen in their math courses, that they don't associate them with bad or stressful math experiences. Math-like problems often accomplish this—for example, riddles and puzzles. In my “Mathematics in Literature” classes we call our favorite riddle “the trees riddle”. It appears in our math-poetry text *Strange Attractors* [5] and it goes like this:

I am obliged to plant a grove
 to please the pretty girl I love.
 This curious grove I must compose
 of 19 trees in 9 straight rows.
 And in each row 5 trees must place
 or I may never see her face.
 Now, readers brave, I'm in no jest.
 Pray lend your aid and do your best.
 –(author unknown)

My mother was a middle school teacher, much loved by her students, and she used to say “The *cornier* the association, the better students remember it.” And so this corny-in-spots riddle-rhyme is remembered and enjoyed by students. After they've done the riddle (and often it's the students who say they “can't do math” who are the first to come up with a solution), I tell students that, yes, riddles are a lot like math, and working on a riddle or puzzle feels a lot like doing what is called “serious math research”. I add that, if we generalize the riddle—like, say, in the poem above, saying that the grove has to contain x trees in y straight rows, and “in each row z trees must place”—that makes the problem *more* math-like, perhaps math-like enough for its solution to be a theorem and to appear as a paper in a math journal.

Most students enjoy “messing around” with riddles. (True, some say that riddles make them anxious, and I myself, being more of a theory-creator than a problem-solver, am not the best riddle-solver; in fact, it took me two hours to solve “the trees riddle” whereas it took many students just half an hour). Another way in which students might, though it's probably rare, “mess around” with math is to think of their own riddles and math problems and questions.

My approach to this idea is to simply allow that to happen if and when it does, and not to give anything resembling an assignment. My hope is that, having enjoyed, and seeing other students enjoy, “messing around” with math, math-anxious students might, a la John Holt, come to enjoy math, or respect math, or enjoy and respect it more than they did before. My hope is also that they’ll be able to see that it’s *possible* for a person to enjoy/respect math.

4. *On Courting Spare Time.*

When my son Arin was in first grade, he handed me his first spelling test. “SIG,” I read in bold caps. “RIG. THIG. SIGIG.” “My little Arin,” I thought. “my little Arin knows these words, or almost knows them . . . he’s actually writing and I can actually read what he’s written.” But then I saw, in red at the top of his paper, “VERY VERY POOR.” School, along with society, takes perfectly adequate, which is what most kids are, and divides it into petty little categories. What, for example, is so terrible about getting 50% on a test? As they say, “one out of two ain’t bad.” And Arin soon enough learned how to spell “ring”, “thing”, and “singing”.

Does *college* do that too? Does it *have* to divide perfectly adequate into petty little categories, in order to grade, in order for employers, later, to compare and make choices? Does it have to give everybody busywork? Is it afraid of what students will do with their spare time if they have it? When I was a student, K through grad school, I *made sure* I had spare time, thought of tricks, ways to do homework quickly, so I’d have even more spare time. In undergrad N.Y.U. I specifically, took an “easy” math course called “Mathematical Discovery”, intended for non-majors, because . . . well, I wanted an “easy” schedule that term (also, one never knows when and where math-research ideas will crop up).

Nowadays my two homeschooling kids thank me for giving them so much spare time—in particular, time in which they could figure out how to live their lives. And I continue to think of tricks that enable me to do quickly the things I *have* to do, and also for there not to *be* too many things I have to do. I’ve made a conscious *commitment* to goof off (e.g., I go thrift-shopping twice a week), to not be, as so many people seem to pride themselves on being, “crazy-busy”.

I also do that as a teacher. I've figured out ways to do grading quickly, and to get through the syllabus quickly. On quizzes and tests I give the "next" topic as extra credit—perhaps that can be done more with math than with other subjects. For example, on a test about the Power Rule I can put, in the extra credit section, the Product Rule – simply write it down, the formula and the theorem, and then give a Product Rule problem. Students often learn that next topic right then and there and, though I still go over it next class, I can do that quickly and with less fuss for all. Another trick, for the benefit of the *students*, is to give seatwork instead of homework. Besides having no or less homework, and besides saving time, they also get the benefit of their teacher, and other students, being available to help out and to check their work. (And thus they don't, as when they do homework, spend too much time and energy doing things incorrectly, and they don't spend nights "sleeping on" their misconceptions.)

We don't need to divide perfectly adequate into petty little categories. We don't need to assign busywork. We can devote our lives to UN-busy work, meaningful work, work that often feels as good as play.

5. On Replacing Sense of Responsibility with Sense of Control.

When I was a kid, starting in fifth grade, I often felt out of control. In my (forthcoming) poetry chapbook *Negative Aspects* [2], which is a kind of sequel to *New Heights in Non-Structure*, I wrote about how "they" tried to "instill a sense of responsibility". And "they" were the ones who decided just what we should be responsible *for*. I was already, to a large extent, responsible as a human being, responsible *to myself*. I never neglected the things I wanted to cultivate, my interests, my talents (drawing, writing, what I called "number tricks", neighborhood sports). But "they" wanted children to begin to be responsible in the practical mundane ways for which I wasn't ready. Notes home, money and lunch for school trips, reports due . . . it all put worry into my life, and there seemed to be no letup. As soon as I remembered to take home one note, there was another note for me to take home, remember to get signed, then bring back to school the next morning. With my own kids, I didn't have that "instilling responsibility" mindset. When my kids truly needed to be responsible—and when they *understood* that they needed to be responsible, along with what they needed to be responsible *for* -- they were. I didn't have to make them feel overwhelmed and out of control.

And I, as a child and then as an adult, had and have learned to be very responsible and conscientious, about the things that I need or want to be responsible for and conscientious about – without feeling out of control.

And so in college teaching I try to give students, when possible, a sense of control. E.g., I tell them, first day, that they might want to suggest some of our class readings, maybe think of homework questions that I didn't think of, or replace a question that doesn't grab them with one that does. They may choose their term paper topic (many choose to write "math memoirs") and for the end-of-term poem analysis they don't have to *like* the poem they choose, they can write about why they *don't* like the poem. And during group conversation, they may form their own groups, according to however they want, perhaps groups "too" large (six so far has been the highest number of students in a group) or perhaps "too" small, perhaps a group of one; not all students like groupwork, and I don't feel that they have to.

In the course I developed, "Mathematics in Literature", the homework/class conversation questions are designed to encourage students to bounce off the readings by writing how they relate to the students' own experiences, lives, and feelings. I tell students that, when I go over the homework (which I do have to grade, but most of my students get A). I do *correct* things like grammar and sentence structure, but I don't *grade* on these things. What I grade on is how engaged they become with the questions. I also tell students that I understand and expect that some questions, and some of the readings, will engage more than others, and that it depends on the individual student. Feeling free to be individual is part of the sense of being in control.

6. *On Just Hanging Out.*

Sense of control, for both children and students, goes along with a sense of dignity, plus a sense of freedom from fear and from feeling overwhelmed. In my parenting I gave my children and my self permission to "just hang out", and in my teaching I give my students permission to "just hang out" during groupwork or seatwork. This also provides more opportunity for me to interact with those students who are not very vocal, nor apparently very "smart" or creative. And during actual class time I give the students and myself permission to "just talk", meaning converse, maybe make small talk. Once as I was lecturing to my Statistics class several students—friends who had probably talked about this beforehand—suddenly said "We know all about THAT!

[As I remember, it was a particular instance of hypothesis testing]. We want to know more about YOU.” I’d already talked somewhat about me, and they wanted to know more. “We want to know about your husband, your children...” they said. So I told them (about, e.g., my first husband’s chronic illness and my happiness with my second husband. And, probably, more about thrift-shopping). I know I’m not the only teacher who does that; I’ve read how some teachers give themselves and their students permission to go “off topic”. And we were way ahead of the syllabus so we had *a lot of time* to be “off topic” (as well as to talk freely and leisurely “on topic”)—and to keep our dignity and to not feel overwhelmed.

7. On Junky Movies, Sexist Lit, and Trivial Theorems.

At home with young children we gave ourselves permission to watch “junky” movies. We could simply enjoy them, or use them as opportunities to talk about *why* these movies were “junky”, or how maybe there was something about a particular movie that was *not* junky. And, for the end-of-term assignment in my “Math/Lit course”—to choose a “math-poem” and analyze it, why they chose it, what they like about it, or what they don’t like about it, how they relate to it, or not—it’s fine with me if a student chooses a “junky” poem, from a kind of “junky” site. The poem might be “junky” but the poem analyses aren’t; students usually have something to say.

Students sometimes, often privately after class, tell me “junky” math ideas. “Why do we define x -to-the-0 as 1, for x not equal to 0?” I had asked, and one student invoked calculus; as I remember, he invoked the Power Rule—short-sighted in some ways but long-sighted in others. “Ah yes,” I smiled, “but the Power Rule INCLUDES x -to-the-0 equals 1...” I don’t consider a student’s enthusiasm, or engagement, junky. Instead I’d classify it under John Holt’s “messing around”.

This reminds me of the rather sexist math-literature that is in the only math-fiction anthology that’s available to use as our text [4]. We don’t have to, and we don’t, *avoid* such literature; instead we can *use* it to talk about which parts are sexist, and why, or even *whether* it’s sexist (or, as I put it, “reflects the sexism of the times”). Students don’t always agree. At any rate, “sexist lit”, like junky movies, is permitted in my students’ lives, as it was in my children’s.

8. *On Testing in Meaningful Ways.*

I'd like to say something about testing (testing relates to disciplining, as well as to many other parenting and educational issues). Of course there are "negative aspects" of testing. There are also other kinds of testing besides actual tests, written or oral. There's subtle testing, in ordinary conversation (in and out of the classroom). There's the need to prove, to reassure. Testing tests *everybody*, not only students. It tests parents, teachers, administrators, principals, curriculum developers. Everybody worries about tests. Being tested can feel like *having already failed*.

As a homeschooling parent I did not test. As a math prof I'm usually *required* to test. So I use tests to *further teach*. I mentioned putting extra credit problems on tests, in particular as a means of introducing the next topic. My students looked forward to them. Once I couldn't think of any interesting extra credit problems (and the "next topic" wasn't something that lent itself to an extra credit problem), and several students were disappointed! "Where's the extra credit?" they asked.

Another way in which tests can further teach, in particular on the Final: the questions can *summarize* the course, can emphasize the progression of topics. (I don't "mix 'em up", as some teachers like to do. If there are advantages to that practice, a teacher could have Part I of the test/exam be a summarizing type of test, described above, and Part II can be a mix 'em up type of test, or vice versa (but Part I being the summarizing part works better for me because it helps students relax and because through doing Part I, students might learn things that help them in Part II).

Thus a final exam can cement the knowledge that a student has gleaned from the course. Every once in a while, so I've heard, a student who's been failing all term will suddenly, on the final, see the light. Perhaps a summarizing final exam can help make that happen. Decades ago a student doing independent study with me, Complex Analysis, told me the way she would like to learn. At the very onset of the course, I'd give her a copy of the final and, as the term and her learning progressed, she'd answer, one by one, all the questions on that final. So the final, in a sense, served as a supplementary textbook.

We can sometimes test in meaningful ways, and we can try to *not* test in *non-meaningful* ways.

9. On Not Asking Much.

I didn't and don't ask much, personally, from my sons and daughter. I don't need them to read my poetry books or remember my birthday (they usually do), and I don't need them to keep up appearances. I don't ask much from my students, either. E.g., it looks good if a course sports 100% "class participation", if students are spot on time with their homework, and so on. But I don't grade on "class participation", and I often simply *assume* that students haven't done the homework; I work with things like that. I trust that each student "class-participates" in their own way. And, although I do ask that students eventually hand in overdue homework, in *teaching*, in striving to impart and exchange knowledge I, again, teach as though they have not had the experience of doing the homework, meaning working out the problems. In my present course, Math in Lit, every once in a while a student or two will have not done the assigned reading. So we just run the class in a different way from if everyone *had* done the assigned reading. One way is to ask if anyone (besides me) would like to summarize the story. There are things to be gained by that. We see the story from a different point of view, we can converse in the middle of such a summary, things might get cleared up, I can get a further sense of how students perceive the story, and we sometimes get a few laughs. We don't need to be punitive or judgmental when students don't do what they're asked to do. If things don't appear to go according to some form of etiquette, it doesn't have to be a big deal.

10. On Appreciating Axioms and Babies.

In mothering, in writing, in being a citizen of this world, I like to appreciate things, to not take things for granted. I like paying attention to obvious things, and not always expecting children or students to come up with things that are not obvious. And in my math research I'm not afraid of discoveries that are "obvious" or "trivial" (both words which mathematicians sometimes use in disparaging ways). Often coming up with a lemma that's "too" simple and "too" obvious has led me to a desired theorem. And if not, I still sometimes like the lemma and I save it, just in case. Also, I view myself as being good at "elementary", "easy" math. Someone once said to me, "Some mathematicians understand advanced math but not elementary math." I sometimes seem to have the opposite problem!

One lifelong (since age about 15) math research theme of mine has been what I call “alternate arithmetics”. I don’t take addition for granted. What if humankind didn’t “start” with addition but with some other binary process? And then proceeded to define a “new” multiplication as iteration of the “new” addition? I wanted to see what a human being new to math would define as a “first process”. Would a child, not taught addition, come up with something else? So for awhile I didn’t teach addition to Devin, my younger home-schooling child. Later Devin learned all the arithmetic operations via a fun card game that I made up; we called it “Extended Casino”—a game that’s so interesting and so not-obviously-educational that we still play it. And eventually addition crept into Devin’s life, as it crept into the life of humankind. I was and am satisfied with this, but I still study alternate arithmetics. (Currently I have a lot of theorems about what I call “associative arithmetics”, meaning associative binary operations other than addition whose iterations are also associative.)

Elementary, “easy”, “trivial” math is, in the math community, often looked down on. But in parenting and teaching, understanding and respecting elementary math, and elementary things in general, don’t have to be a problem. I like to give credit, to children and to students, for “easy” things. (Consider how the rules of courtesy are rather “easy” to memorize, but not all that easy to live by.) In yesterday’s Math in Lit class a student talked about how she gets all-excited about simple things, including simple projects for her school assignments such as delving into animation and children’s literature. It leads her places. Her peers aren’t interested, she sometimes finds it hard to find “lab partners”, but she’s insistent. Also in yesterday’s class I gave a “mini-lecture” on axioms, what they are. Euclid’s “postulates” of plane geometry and Peano’s axioms of the natural numbers are important in math. Axioms are simple, “obvious”, “trivial”, and that’s precisely the point. We have to start somewhere, and where we start has to be “beyond a reasonable doubt”. Where we start, before we get to the important theorems, has to be trustworthy. I love axioms! I also love the kind of theorems and ideas that are easy to understand but hard to prove (such as Fermat’s Last Theorem, which took 350 years to prove, and Goldbach’s Conjecture, still neither proven nor disproven).

So yes, I like axioms, simple-sounding theorems, and babies! And I like to give *permission* to people, permission to be babies, to go back, every once in a while or more often than that, to go back to “easy” things, to *get enough*

of easy things. That's how I was as a homeschooling parent and that's how I hope I am as a person, writer, and math teacher.

11. On Putting Feelings First.

One “height of non-structure” is about “putting feelings first”. And I can be very feeling, very sensitive and, some might say, vulnerable. Another buzzword among math educators is “gentle” (e.g., “A Gentle Introduction to Calculus”). Well, I can be rather gentle, perhaps cringing-ly so to some. And sweet, “too” sweet. Some might say “twee”. (I once wrote a poem titled “Sweet Liberation”—“the right to be sweet”, one reader commented.) I liked, for example, to sometimes think of my kids as, again, babies. Raw and new to existence. I liked, not to discourage them from developing and growing up, but to be as gentle with them as I would with babies, to feel about them as ethereally as I did about my babies.

And as a teacher I like to view my college students as “kids”. Well, college teachers other than me often refer to them as “kids”. And I like to think that students appreciate that. In my Math in Lit course one of our readings led to a class conversation about ways in which students have grown up since entering college, as well as ways in which they have not grown up. One student said that there were ways in which she hoped to never grow up. Another said that he liked knowing that he could, on occasion, temporarily regress, go back to not being grown up.

I try to run my classes like support groups, or at least to draw from the ideas used in running support groups. Why not? In *New Heights in Non-Structure*—my poem “Learning as Grieving and Vice Versa”—I say “I wanted my babies allowed to grieve as slowly and as incorrectly as they pleased. I wanted them permitted anger, depression, and denial-isolation as they saw fit. I wanted the world to join me in this. I wanted the world to be a support group for babies—babies who are survivors of more than one face, more than one room, hugging without seeing, trusting that what they're hugging is what they saw last”.

College students also learn things that are disturbing, not only intriguing, and that might need to be survived. Math students in particular learn about infinities, n dimensions where $n > 3$, Russell's paradox, Goedel's metatheorems, certain shapes, in particular fractals. “Society is coming to be gentle

and wise with its grievors,” that poem concludes. “So why hasn’t it been the same about all learning? Maybe someday it will. . .” Well, why not?

Even those teachers who are not parents interact with other human beings (including, probably, children) and with their culture. Plus, we were all once ourselves children, and students. How we negotiate our encounters and dealings with other people can inform how we interact with our students, and how we handle, for example, “math anxiety” or hostility. I like to think that I have the same personality as a teacher that I do as a “regular” human being, and that the way I act in front of a class is pretty much the way I act in my everyday non-teaching life. I don’t believe that this is necessary (and it might, sometimes, not even be sufficient), but I do like the idea.

We are all “survivors of more than one face” and if we’re math teachers or math majors we’re survivors of infinities, continuous non-differentiable functions, and Goedel’s meta-theorems. We and our students are survivors of many of the same things.

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