INTRODUCTION

I’ve always used stories to illustrate metaphorically or analogically concepts that I was trying to get across to a class. The stories are all true, or true-to-the-best-of-my-knowledge. Some of my friends on the faculty have told me that I should write down these stories. So, here goes. These stories are not related to one another in time or in subject. Many strive to make similar points; however, they have not been grouped in any special order here. And they are not all the stories that I’ve told over the years; they are just the ones that I can remember right now.

I, personally, wouldn’t try to read more than a couple at a time.

Oh, and please don’t think that I tell every one of these stories to every class that I teach. No. They are all in my repertoire, and I sprinkle them into the class room as needed over the semester.

TOPICS.

- Motivation
- Big Guy Hunting Squirrels
- How Old Is Tiger? (26)
- I Want To Be The Best Math Teacher You’ve Ever Had
- Do You Know How To Survey?
- CLAST PREP MATH
  - She Took Her Last Math Class Before I Was Born.
  - How Are You Going To Be In Every Classroom, Mr. Jones?
- Are You Going To Grade On The Curve, Mr. Jones?
- I Am Not Smarter Than You Are – I’ve Just Practiced This Stuff Over and Over
- I Can Make Up A Test that You Can’t Pass!
- Mrs. North, Revisited
- I Fight With My Test
- Beating A Path Through The Woods
- I Got Tired Of Trick Questions In High School
- Ya Gotta Know What Church You’re In Before You Know How To Worship
- If You Whine, Then You Owe Me Money
- That’s A Dumb Question
  - Mozart
  - Doug, The Great Chess Player
  - The Pastrami Sandwich
  - Nobody’s going to laugh at you!
- Did Any Of You Ever Swim Competitively?
- How Does A Computer Remember?
- How Many Hours do You Think I Should Prepare Before Teaching A One Hour Class?
- Did You Ever See a Mother Bird Teaching Her Babies How To Fly?
- Helen’s Ducklings Can Swim Underwater!
- A Difference Between The Community College And The University
- Commercial Fishing – Catching Grunts
- If You Can Do It Only One Way, You’re Not An Expert!
- Think Of Jim Lovell & Apollo 13
- Think Of Lt. Cmdr. Geordi La Forge (LeVar Burton)
- I Don't Give a Rat's Petunia What You Make in THIS Course!
- The Night Before I Had A Big Test, I Used To Drink Beer & Shoot Pool
- How Do YOU Learn?
  - The Helping Verbs In 7-th Grade English Class
  - Eating My Notes In College
- Can We Draw An Ellipse?
- Training My German Shepherd Dog, And What I Learned In My Undergraduate Psychology Class
  - Harvey S. Pardee
  - Daniel
- What's The Square Root Of 3 Got To Do With George Washington?
- What Is 5 Divided By Zero?
- Why Do They Want To Make It Illegal To Talk On Your Cell Phone While Driving?
- Look It Up!
- Once You're My Student, Always You're My Student.

POSTSCRIPT: In retirement I’ve discovered that in the classroom I had about as much time to teach the Fundamental Theorem Of Calculus as I now have at home to put a load of clothes into the washing machine.

TEXT

MOTIVATION: I can't teach you. You can learn. I can try to motivate you and encourage your desire to learn. But it is You who must do the learning.

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BIG GUY HUNTING:
This is about Big Guy and Understanding. Big Guy was a cat. I met him at a birthday party for one of the people, we'll call her Carolyn, who worked with my wife. I was sitting there, and Garfield, that was his name then, I guess because he was a big, big yellow tabby cat, walked over to me and jumped into my lap. Carolyn was amazed. It was her cat.

“That's the meanest, most antisocial cat in the world. He hates everybody and everything,” she said. But he had jumped into my lap. He liked me.

Well, a few weeks later Bunny, my wife, came home from work and said “Carolyn wants to know if you want Garfield. He has been terrorizing her Doberman Pincers and horses, and she has to get rid of him.”

“Sure,” said I. So I got Garfield. I immediately renamed him Big Guy. A much better name for the cat he was.
And that began a 12 year relationship – Big Guy and me. He’d come and meet the car when I came home from school – just like a dog. I was his friend. But I was his only friend. I’ve seen him chase two dogs at once out of the yard when they came snooping around. I’ve seen him rake small children with his claws (he was left-pawed) when they came up to pet the “pretty yellow kitty.” He was fearless, and he was merciless.

Now Big Guy liked to hunt squirrel in the back yard, and he would often bring me the bob of the tail as a trophy to document his catch – he ate the rest! I used to love to watch from the back porch as he tracked and caught many a squirrel. But in his declining years I think that his sight must have been failing – and here’s the moral, the metaphor –

One day I was on the back porch. He was in the back yard. Tall grass. His own little Serengeti. A squirrel was no more than 10 ft. away from him. And the squirrel did not see him. But he didn’t see the squirrel either! I was amazed. Big Guy was getting old! I wanted to help, so from the porch I pointed at the squirrel and shouted, “Big Guy, look!” And Big Guy looked, but not at the squirrel to which I was pointing; he looked straight up at the end of my finger!

Then it hit me. That’s what many students do. When I say “Look!” while pointing metaphorically at some abstract mathematical concept, they are in essence “looking at the end of my finger.”

So don’t be like the old Big Guy. Look beyond the end of my finger.

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HOW OLD IS TIGER?
This is another cat story. It’s about Tiger. Tiger was my sister-in-law’s cat. Tiger died recently.

“How old was Tiger when he died?” I asked.

“He was 26,” she said.

“26? That’s pretty old for a cat,” I stated.

“Well, Terry’s 33 now, and we got Tiger as a kitten when Terry was 7, so Tiger was 26,” she replied.

Then the significance of her reasoning hit me like a flash. She did not know Tiger’s age by going back to the year (an abstract number) he was born. No. She associated Tiger’s birth with something more memorable – her son’s age.

You are going to retain facts longer not by “straight memorization,” but by association.

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I WANT TO BE THE BEST MATH TEACHER YOU’VE EVER HAD
But in order for me to be the best math teacher that you’ve ever had, you must be the best math student that I’ve ever had. And both those things are impossible. However, it is the fact of that impossibility that makes them both worth attempting! My philosophy is to never set your goal on that which is possible. Set your goal on something unattainable. It forces you to try harder – to extend beyond yourself, so to speak.
Let's see just how far we can extend and how close to perfection we can get!

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DO YOU KNOW HOW TO SURVEY?
Years ago I was on a survey crew. We surveyed what was to become the Ochlocknee River State Park. I wasn’t the surveyor; I was the “rodman.” I had to cut our path through the saw palmettos (*Serenoa repens*) for about 100 ft. ahead of the surveyor and then hold a rod vertically and steady and place it exactly where the surveyor motioned as he looked through his instrument. (And, yes, there were ticks and rattlesnakes and wild pigs to deal with).

After he had sighted to me through his instrument, the surveyor would then pick up his tripod and bring it up to the spot I had marked. He would set up his instrument at that point, but before hacking my way *forward* through another 100 ft. of saw palmetto to set up my rod in advancement of the survey, I would *go back* to the point where he previously had his instrument. I would put the rod on that previous spot, and he would *backsight* to me. This enabled him to *check his work at each step of the survey process*. You forwardsight and then you backsight, forwardsight and backsight, *etc.*

Here’s the point: This opened my eyes to a valuable technique which is very successful in math computations and in problem solving. After every forward step that you take in the solution, spend a little time – it usually only takes a few seconds – to *backsight*, *i.e.*, to check and make sure that your last step was correct. Most of the time you can simply “do it in your head.” And you catch and correct any mistakes you have made!

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CLAST PREP MATH
In the State of Florida we have the CLAST. This is an acronym for *College-Level Academic Skills Test*. I won’t go into all the reasons for this test, and I won’t go into how the rules governing who takes the test have changed over the years. Let me say only that about 15 or so years ago just about everybody had to pass the test before they could matriculate into the junior level at the University.

There was (and I believe – *still* is) a math portion to the CLAST. And many Community Colleges had a class set up to review the math skills required on the CLAST. We had such a class, and I taught it for a number of years in those days of yore.

I have two stories from those classes which may be of interest.

Both these stories deal with the phenomenon of test anxiety and math anxiety. Sure, I needed to review many important math concepts in a relatively short time span; however, one of my main tasks was to diminish the test & math anxiety – you could cut it with a knife in those classes. Many of the students were “returning students,” older folks who had been away from school and math for many years.

*<Story #1> SHE TOOK HER LAST MATH CLASS BEFORE I WAS BORN*
This class was very nervous. More so than most. Their individual math anxieties were so profound that they weren’t able to concentrate on the material I was presenting. Many were complaining
 openly that they had not had a math class for 5 years, for 10 years, and so forth. I had to do something to break this spell of anxiety.

Well, as it turned out the oldest person in the class, a 78-year old woman, was understanding the material better than any of the others. So one evening in class (it was an evening class) I asked her, “In what year was your last math class?”

And she said “I haven’t had a math class since I was 17.”

After a little quick math, we (the whole class and I) figured out that she had taken her last math class before I was born!

That put things into perspective, the class relaxed a bit, and I was able to get on with teaching math.

<Story #2> HOW ARE YOU GOING TO BE IN EVERY CLASSROOM, MR. JONES?
The first story was, more or less, “how to do it.” The second story is definitely “how not to do it.”

Different semester. Different group of people. Same problem. Anxiety. They were all anxious, but this time, one student more than the rest. She was a business woman. Ran her own business. Very successful. She wanted to come back to school and get her degree. She was an over-achiever and a great person to have in my class. You could count on her to have all her homework done and to be ready to ask good, meaningful questions in class. The type student we all like. But she was really, really nervous. Let’s call her Laura.

So one evening in class I decided that I was going to try to allay the anxiety with a bit of levity. It didn’t work. Here’s what happened.

Out of the blue I said, “You know, every single one of you is going to pass the math CLAST. I guarantee it!”

“How can you say that?” someone asked.

I answered, “Because I’m going to be right there with you in the room when you are taking the CLAST, and I’m going to walk around the room and whisper answers into your ear.”

Most of the class chuckled. I thought I’d broken the tension. Then I looked out of the corner of my eye at Laura. I was worried, because she wasn’t chuckling. Instead, she had a puzzled look on her face, and it seemed that she was mulling something over in her mind. She was taking things literally. She hadn’t seen the humor.

I turned back to the chalkboard and was beginning to continue my math lecture when up popped Laura’s hand.

“Mr. Jones,” she said, “they have the CLAST in many different rooms on test day. How can you be in all those rooms at once to whisper answers into our ears?”

“I can’t, Laura,” I answered. “I was lying to you when I said that,” I admitted.
Tears began to well-up in her eyes as she continued, “Well, Mr. Jones,” in a plaintive voice, “were you also lying when you guaranteed that we would all pass the math CLAST?”

Her logic was unavoidable. I was crushed.

Moral of the story: You really have to watch what you say.

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ARE YOU GOING TO GRADE ON THE CURVE, MR. JONES?
Alex, we'll call him Alex, was in my MAC 1105, College Algebra class. Alex had been in my College Algebra class before…. Many times before. (This was back in the days when you could retake a class over and over and over). Needless to say, Alex had struggled with Algebra. But I respected his persistence.

We had our first test and Alex made a 7 (out of a possible 100 – at the time that was the lowest score I’d ever seen on a math test…. I’ve seen lower since). I passed the graded papers back to the students. Several asked questions about the test, the grades, the usual.

Then Alex’s hand went up. “Mr. Jones, are you going to grade on the curve?” he inquired.

I know that I paused for a moment before I answered, because my first reaction, which I suppressed, was to make some sort of wisecrack about “The grade's an F no matter how you grade it.” Yada, yada, yada…. But I didn't say anything like that. I simply said “No, Alex, I never grade on the curve – a car might come around the curve and run over me.” – this is what my friend Jerry McBee always used to say to his classes, and I picked it up from him.

I was glad that I caught myself before saying something hurtful, because I knew Alex to be a sensitive person and if I had made fun of him in class, I think that he probably would have “folded up his tent,” dropped the class, and possibly dropped out of school. He was that near the edge.

Well, I just said “No, Alex,” and gave him the McBee answer. He didn’t drop the class, and he didn't drop out of school. However, he did fail my course (again).

But this story has a silver lining. Alex took my algebra class again the next semester (I don’t know why he kept coming back to me), and this time he passed!

About three or four years later he shows up at my office door dressed in a suit and tie. He’s got a University degree and a good paying job, and he just wanted to drop by to say hi.

Moral of the story: You never know. A moment of self control and kindness on my part may have made a difference. You’ve really got to watch what you say.

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I AM NOT SMARTER THAN YOU ARE – I’VE JUST PRACTICED THIS STUFF OVER AND OVER.
Students often feel incompetent and inadequate in math, and this is often magnified in their minds by the fact that there is someone in the class who is “smarter” than they are, or many times they are intimidated by the teacher, who is obviously “smarter” than the student.
Well, in this little story I try to dispel the “smarter teacher” scenario. I’ll deal with the “smarter other student” later.

When I was in High School I asked my Algebra II teacher, Mrs. North, bless her soul, a question about some math issue, I don’t remember what. But I do remember vividly her answer.

“The answer to your question is on page 348 of the book. Look on page 348.”

I was stunned. “She has been teaching Algebra II for so long that she had the book memorized,” I thought. And then in my mind I concluded “So she’s not necessarily smarter than I am. She’s just been at it so long – the same stuff over and over – that she’s got it down pat!”

After that I never automatically assumed that Teacher was smarter than I – obviously more knowledgeable – but not necessarily smarter. (Of course, many times Teacher was smarter than I, but that’s not the issue here).

And that also gave me the confidence to believe that if Teacher was able to learn this math, then there was no good reason that I couldn’t be able to learn it, if I just tried hard enough.

So, I’m not smarter than you are – I’ve just practiced this stuff over and over.

I CAN MAKE UP A TEST THAT YOU CAN’T PASS!

Yes, I can make up a test that you can’t pass. I can make up a test that I can’t pass. I can make up a test that none of the other math teachers at TCC can pass. In fact, I can make up a test that probably nobody living today can pass. But that’s not the point, now is it? No! The point is that I will make up a test based upon what is important for you to know out of this course. And the things important to know are things that I have gone over in class, and in most cases I have told you point-blank that they were important topics/skills – and why they were important!

MRS. NORTH, REVISITED

Remember Mrs. North? She was in the story about “I’m not smarter than you are.” Well, over my high school years I did have several run-ins with Mrs. North.

Here’s one. Again, this is in Algebra II. I had decided to try to stay out of trouble, so I began sitting in the back of the class room. I would read a book during class (early 20th century novels by female American authors). I asked no questions. I participated in class not at all. I appeared to be paying no attention to anything going on in class – but I was! And at least I was quiet and was bothering neither the other students nor Mrs. North herself. So she left me alone.

Everything was going along fine until one day a kid in the front asked Mrs. North a kind of “stupid” question – we all ask such questions from time to time. Hey, we’re just kids! And she didn’t answer him. No, she jumped all over him. Humiliated him. In front of the whole class. I took it all in, but I didn’t even look up.

Next day in class when Mrs. North came into the class room she found me sitting in the front row, middle.
Before she could get started I raised my hand and said, rather loudly, “Mrs. North, I have a question.” I was speaking very rapidly. I didn’t want to give her time to think. “If town A and town B are one mile apart, and I start driving from A to B at 30 mph, and if I drive at exactly 30 mph for half a mile, then how fast do I have to drive the second half mile in order to average 60 mph for the whole trip?”

“Well, 90 mph,” she responded quickly – just as I had hoped, she fell into my trap!

“No! You’re wrong,” I practically shouted. “If you drive 30 mph for the first half mile, you’ve used up a minute. And if you want to average 60 mph for the entire one mile trip, you only have one minute to do it…. You’ve already used your minute, so it’s impossible!”

The whole class heard the entire exchange. They were stunned. Mrs. North was horrified – but said nothing. I said nothing more. I got up, walked to the back of the room, sat down, opened the novel and began to read (to myself).

I said nothing more that day and as little as possible for the rest of the semester.

But Mrs. North never humiliated another kid in that class again, and I hoped that she would not humiliate any student ever again.

The purpose of education is not humiliation.

I vowed to myself at that time that if I ever became a teacher, I would not humiliate any student.

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I FIGHT WITH MY TEST

Test-taking strategies are a “dime-a-dozen,” and what works for me may not work for you. We are all different. However, the general idea of having test-taking strategy is a universal. And when I say “test-taking strategy,” I mean something positive – not a negative idea such as “I’m going to get through this thing just as fast as possible and get out of this room just as fast as I can…. No! You have to have a positive strategy. If you have a negative strategy or no strategy at all, then you are in trouble. You really need to get a positive strategy.

One of the components of a positive strategy involves the idea of actually building your confidence, math-self-esteem, or whatever you want to call it, as you are taking the test.

Here’s one idea that I use. This works for me. Probably won’t work for you. Find your own.

I consider the test a fight, a physical conflict, a wrestling match. This is my idea. I carried it over into the realm of test-taking from my experiences in fighting: boxing & martial arts. You have your history; I have mine.

When I was young and participating in those sports, I didn’t like to lose a match. I had a will to win. And if on the one hand, I could prevail in the ring or on the mat with person-to-person combat, then certainly, on the other hand, I wasn’t going to let some geeky problems on a test “beat me up!”
This was my thought. And as I got a problem right on the test, I would say to myself, “There, I won that round!”

Or when I saw through some trick question that Teacher had put on the test, I would say to myself, “You @#!@ blankety-blank &%##@, you thought you could trick me. I see through your miserable little trick, and I’ve got you now!”

Sometimes I’d even write comments like that on the test paper (during standardized tests – where the tests were machine graded and my comments would not possibly affect my score).

Thus, I would get pumped-up more and more as the test went on. My scores went up, and I actually enjoyed test-taking.

Find something that will work for you.

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BEATING A PATH THROUGH THE WOODS
When I was in Elementary School there were lots of vacant lots in our area of Coconut Grove. And, being in South Florida where everything grows like mad, the lots were always overgrown. For some reason, my younger brother and I liked to make paths through the lots, and we would make these paths through the brush by repeatedly marching through. Over and over and over the course we would march until we had broken down the grasses, shrubs and vines. We left little trails, like cow-paths.

And it struck me at the time, young as I was, that this stomping through the brush had some correspondence to my learning process. Wasn’t this how I learned stuff, by going over its “path in my head” time after time?

Of course, if we didn’t periodically go back and re-enact our stomping, our paths would be again overgrown – everything grows like mad in South Florida!

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I GOT TIRED OF TRICK QUESTIONS IN HIGH SCHOOL
I’m going to test you on what you are supposed to have learned in my class. I’m not going to test how smart you are or how clever you are at figuring out trick questions. Again, that’s not my idea of what education is all about. And anyway, there’s plenty of other people out there who will give you the “trick-question tests.” Handling those sorts of test situations is on a different level, and you need to master the straight-forward level first.

My attitude about trick questions goes back to high school. We had quite a few teachers who liked to give us trick questions. Seems like they were all math or science teachers. One in particular, a physics teacher, stuck a bunch of us in his so-called honors physics class. I didn’t want to be in his honors physics class; there was another physics class that I had signed up for, but they moved me into his class anyway. Well, I think he was working on his Masters Degree in Science Ed, or some such, and he was collecting statistical data on us students – we were his guinea pigs! To this end we were tested – it seemed almost weekly – with every achievement test and every aptitude test you’ve ever heard of – and some that you haven’t.
And those tests are just full of trick and tricky questions. I had trick questions coming out of my ears. And I just got tired of the whole trick question scene.

(One interesting and unexpected side result, which is really irrelevant to this particular story, is that at some point something snapped in my brain, and while I had been pretty good at taking these kind of tests before, I suddenly became really, really good at test taking. And that's really why I am here today! – but that's another story.)

Well, anyway, I decided to retaliate. So I made up my own multiple choice test. A math test. Ten questions. All very, very tricky questions. And I asked each of the science and math teachers to take my test. At first they declined my offer, so I had to shame them into taking my test –

“What's the matter? Are you afraid to take my little test?” Or something like that!

Finally I got them all to take it. And I did trick them. One of the younger, newer teachers got one or two problems right (out of ten). All the other teachers missed them all!

I should have left it at that. I had made my point. But, oh, no. Not me. I had to go and post their grades in the hall by the front office where everyone could see.

You can only guess how that went over with the faculty and administration.

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YA GOTTA KNOW WHAT CHURCH YOU’RE IN BEFORE YOU KNOW HOW TO WORSHIP

This is a little complicated, but there is a good point! And you must understand from the outset that I’m not picking on any religion here. But the story, which is true, goes like this –

When I was a kid, I went to lots of different churches, Methodist, Baptist, Presbyterian, Episcopalian, Lutheran, Catholic, Jewish, Holiness, Assembly of God, Primitive Baptist, African Methodist Episcopal, Christian Scientist Reading Rooms…. To name a few.

And one thing that I’ve learned is that you’ve got to know what church you’re in before you know how to worship. For instance, in one church the pastor, reverend, rabbi, priest, etc, will say something and then the congregation all jump up, throw up their hands, and shout “hallelujah!” whereas, in other churches after the pastor, etc, says something, the congregation all drop down to their knees, bow their heads, and quietly pray.

OK, so it’s my High School Senior Prom. My date, let’s call her Martha, was a Catholic girl. (Most beautiful girl in the world, she was a Junior. Younger than I. But mean as a snake. And her dad, an ex pro football lineman, hated me…. but that’s another story.) Well, anyway, after the prom a bunch of us stayed up all night. It was Saturday night, and Martha wanted to go to early morning mass next morning at a Catholic church on Miami Beach. So we went.

Now this was so long ago, that the service was still in Latin. I didn’t understand much Latin anyway, and I was really tired, so I kind of forgot where I was and how the worship was supposed to go. Then the priest said something significant, and instead of dropping down to my knees in prayer like everybody else did, I jumped up, threw my hands into the air, and shouted “hallelujah!”
Not many things embarrass me. That did.

So what’s the metaphor? When you are trying to solve a problem, it is of primary importance to understand what type problem it is (what “church” you are in) before you decide what techniques/formulas/equations might be used to solve it (how to “worship”).

For example, if you’ve got an equation with an “x-squared” on one side and an “x” on the other, you don’t try to isolate the x. (Isolate the “x” is what you do for a linear equation). No, you try to get all the terms on one side so that the quadratic is equal to zero, and then you factor the quadratic or apply the quadratic formula.

You’ve got to know what “church” you’re in before you know how to “worship!”

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IF YOU WHINE, THEN YOU OWE ME MONEY
Teacher, you’ve got the test dates in your syllabus. You’ve got the no-late-homework-for-any-reason policy in your syllabus, and if you break your own rules for one student, then what happens next? You know. It all goes downhill. So what do you do when some kid whines in class:

“Can’t we postpone the test another week, Mr. Jones? I’ve already got two tests this week.”

You could answer brusquely, “No, Charlie. Read your syllabus!”

But this creates or reinforces a “personality-conflict wall” which, I believe, can hinder the educational process.

I respond, “Don’t whine, Charlie!” . . . . (pause) . . . . “(Do) You know why?”

Normally the student looks puzzled and a bit confused. But you’ve got his attention and that of the rest of the class, too.

He may say nothing, or perhaps mumble, “No.”

“Because,” I continue, “if you whine, you owe me money” . . . . (another pause) . . . . “You know why? Because I have the patent and copyright on whining. I am in fact the world’s greatest whiner! If you don’t believe me, ask my Dean! He’ll tell you!”

After you explain it to a kid the first time, the whole class picks up on it, and the next time someone even starts to whine, all you have to do is raise your eyebrow and ask “Are you whining?”

And actually you may not need to say a word. Some other student will usually say “Hey, he owes you money!”

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THAT’S A DUMB QUESTION
The human ego is evidently a very fragile thing. We never want to look foolish. Especially in a math class. And there’s always some bright nerd in the class who is obviously “smarter than I’ll ever be.” So we don’t ask questions. Even though we have questions, we don’t ask them. We are afraid they will be “dumb questions.”

Well, I’ve heard it said before, and I’ve actually said it myself, “‘Dumb’ means ‘silent,’ so the only ‘dumb question’ is the unstated question. If you have a question, ask it. Probably half the class has the same question.”

I’ve used this line over and over, ever since I was a TA back in ’67. Until I finally got tired of it – not the idea, just the slightly pompous sound of it. So I came up with the three stories plus one promise, which are recited below, that might give the kids the confidence to go ahead and ask the “dumb question.”

The first two stories deal with the fact that the “class Einstein” is really just a small fish in a small pond. In fact we are all – Teacher included – small fish in a small pond.

<Story #1> MOZART
I did not make this story up. I don’t know whether it is true or not. It may be just apocryphal. I was just a kid. I heard it on the TV. There used to be a TV show called “Life is Worth Living” hosted by Bishop Fulton J. Sheen. He told the story to be inspirational – to give an example that none of us should be conceited about our abilities or insecure about our lack thereof.

Here’s the story as I remember it.

The great Austrian child prodigy and composer, Wolfgang Amadeus Mozart, also gave piano lessons to the nobility and their children. He was just finishing a piano lesson with a 12 year old son of a nobleman when the boy said to him, “Herr Mozart, teach me how to write a piano sonata.”

Mozart replied, “Son, you are far too young to write a piano sonata.”

“But Mozart,” insisted the child, “when you were 12 you were writing piano sonatas!”

“Ah, but I didn’t have to ask anyone how!”

So I tell that story to my class and say “Now there’s a real genius. And there’s nobody like that in this room. Not you. Not me. We are all essentially at the same level – small fish in a small pond. So don’t be afraid to ask your questions, because we’re all in the same pond.”

<Story #2> DOUG, THE GREAT CHESS PLAYER
This is another story that might come under the heading of “there’s always a faster gun.”

When I was a youngster my mom bought me a chess set and said “I don’t know how to play it, but I thought you might like it.”

So I read the instructions, and I taught myself how to play chess. Then I taught my little brother and all my little friends. And we played chess. I pretty quickly got to the point that I thought I was
pretty good at chess. I could beat all the kids in the neighborhood. When I got to high school I didn’t play much, and I wasn’t in the chess club, but I could beat just about everybody that I played. And when I got to college I didn’t play much, and I wasn’t in the chess club, but I could beat just about everybody that I played.

Then I dropped out of college after my freshman year, hitch-hiked all over the country and ended up in Las Vegas. I went to work near there, out on the desert, miles and miles away from anything. We did have a Rec. Hall with a pool table. So in my spare time, and there was a lot of spare time, I shot pool. Lots of pool. It got boring.

There was another guy that I met working out on the desert. His name was Ray. He was about my age – maybe a little older. He was OK. He really didn’t seem all that “smart” (I was so conceited – an intellectual snob). And I was really surprised when he told me that he played chess.

“Well,” I thought, “here’s a nice change of pace from shooting pool four hours a day. This should be easy.”

So we played chess. Turns out it wasn’t easy. It was hard. I lost…. and lost….and lost. We must have played three games a day for well over a week before I won my first game.

(Parenthetically, this says three things: (1) Ray was a much better chess player than I; (2) I am very persistent – I just don’t give up; and (3) Ray was a very gracious winner, because if he had rubbed my nose in it, I probably would have murdered him on the spot.)

Anyway, we played every day – at least five days a week, sometimes six or seven – for three or four hours a day, and this went on for months. I did get better. It got to the point where I might win three or four games a week, but not more than that.

It turns out that Ray was a member of the Las Vegas Chess Club. One day he told me that he was really excited. He was going into Vegas that week end to play in an exhibition at the old Sands Hotel. A famous chess grand master from L.A. was going to play against members of the Chess Club. I wished him luck, and off he went. I stayed out on the desert.

When he came back from the week end, he didn’t say anything about the exhibition. I didn’t ask about it. I waited for him to tell me how it went. Finally, after several days, I got the story.

They played in the “big room” at the Sands. The grand master played 26 members of the Chess Club simultaneously. Blindfolded! And he beat them all!

Do you hear what I’m saying? They set up 26 chess boards, say #1 through #26. A member of the Chess Club sat on one side of each board. They blindfolded the grand master and led him from board to board. At board #1 they told him the move that the club member had made. Then he made his move. Then they led him to board #2, and they told him what move that club member had made. Then he made his move at board #2. Then they led him to board #3, etc., etc., etc.

Round and round they went. And he beat them all!

Now I thought that I was a pretty good chess player. But Ray beat me like a drum. And Ray was, by his own admission, not the strongest player in the Las Vegas club. And then along comes this grand master and beats 26 of them at one time. Blindfolded! He had to keep track of 26 separate games in his head!
So if you think that that guy or gal over there on the other side of the room is really “smart,” think again. Oh, they might be a little quicker than you, but in the “big picture,” the overall scheme of things, we’re all way, way down on the “food chain.”

And if you are the one in class who thinks “I’m the smart one in this class,” just remember how smart I thought I was at chess until I learned what chess-smart was really all about.

Moral: Don’t be afraid. But do be humble!

The third story is one of deadly embarrassment.

<Story #3> THE PASTRAMI SANDWICH
I remember reading about this in the newspaper, or maybe I saw it on TV. It happened back in the late ‘60’s, as I recall. I’ve told it to my classes since I was in graduate school.

There was this fairly young guy – in his late 30’s or early 40’s in New York City. Manhattan. He owned a bunch of hotels and high-rises in the City. As I remember it, he had started out fairly poor, and he had made it big. He was really rich.

Well, he was eating lunch one day in some fancy restaurant, which he owned! I do remember this distinctly: he was eating a pastrami sandwich. Now you know how stringy pastrami can sometimes be – even in the most fancy restaurants. So he got a glob of pastrami stuck in his throat. He was choking. But he evidently didn’t want to make a scene, waving his arms about, grabbing his own throat in a choking motion, and gasping for breath. That would have been embarrassing. No, he had started out poor and had come up the hard way, and he didn’t want to seem boorish. So he sat there quietly at his table, made a few almost inaudible grunting sounds, daubed his mouth with his napkin, turned blue in the face, and dropped over dead!

All because he was too proud to signal for help.

That’s what some of you students do. You don’t understand something, but you would be embarrassed to ask for help. So you (figuratively) die!

Now comes the promise:

<Promise #1> NOBODY’S GOING TO LAUGH AT YOU!
I normally make this statement to a class at the beginning of each semester. And I probably repeat it several times during the course of the semester.

“I’m not going to ever laugh at your question, and I promise that nobody else in the class is going to laugh at you or ridicule you. If they try, they will have to answer to me!”

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DID ANY OF YOU EVER SWIM COMPETITIVELY?
I find many analogies in sports. We train our muscles and our reflexes. Similarly, we train our thinking patterns and our memory.

Did you ever swim competitively? I didn’t. But I could swim before I could walk. But that’s not the point. My son swam competitively. He was on a swim team. I was a swim team dad.

The youngest class of swimmers is “Eight and Under.” In this age class you swim every event – all at 25 yards. The Free. The Breast. The Back. And the Fly. By far the most unnatural stroke is the “Fly,” the Butterfly Stroke with the Dolphin Kick.

I went to many swim meets. I was a spectator at some. I was a timer at some. And I was even an announcer at some. But I was never a judge.

Let’s follow the judge as the kids race the 25-Fly. The judge, dressed in all white, walks along the side of the pool watching carefully as the 8-and-under kids swim. And it never fails that he (the judge) DQ’s (disqualifies) one or more of the kids along the way – usually for an improper Dolphin Kick. (It’s almost impossible to do it right for 25 yards when you are an 8 year old kid!) And inevitably the DQ’d kid gets out of the pool in tears. Well, the first time or two that I saw this I thought “What a mean judge. Why doesn’t he give the kids a break?”

Then one day it hit me. He’s actually doing the kids a favor by making them do the stroke and kick correctly right from the get-go. Because it would be far worse for the kids to let them do it wrong. Why? Because then they would learn it wrong, and someday someone somewhere would have to “un-teach” them their “wrong way” and teach them the “right way” – IF THEY WERE EVER GOING TO REACH THEIR POTENTIALLY FASTEST TIME.

And let me tell you this: It is practically impossible to “un-teach” a “wrong way.”

Almost always it is the case that we believe that the “right way” is the first way that we learned something – the way we sing a song; the way we walk; the way we talk; the way we swim; and the way we do math!

So you really need to learn it the “right way” the first time!

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HOW DOES A COMPUTER REMEMBER?
The “volatile memory” (DRAM) in your computer remembers stuff when the computer is turned on, but when the computer is turned off, this memory goes blank. This is the type computer memory that I want to talk about. There is another type computer memory, the memory on your “hard drive.” That’s different.

Let’s talk about DRAM (Dynamic Random Access Memory). I’ve got a couple of gigs of DRAM on my computer. It can remember a lot. But how does it remember? Without getting into details (that’s not the point here – this is a metaphor!), it remembers by putting a charge on a capacitor. But a capacitor “leaks,” just as memory “fades.” So computers have what they call “refresh cycles” – essentially, the computer periodically reviews everything it knows just as you should periodically review your math knowledge.
How often should you review your math? Many of us review once, just before the test. Some of us, like me, are “slow learners,” so we have to review quite a few times. But the latest figures that I read say that the computer "reviews" everything in its volatile memory (i.e., refreshes) once every 64 milliseconds.

“How many hours do you think I should prepare before teaching a one hour class?
Some folks think that they should be able to learn everything they need to know in class, with absolutely no outside studying.

I’ve told this story many times to make a point of the necessity for preparation before class. This really happened.

It was in the late 80’s or early 90's. I was teaching a College Algebra class. It was very early in the semester. One young fellow and I got into something of an argument in class – it’s usually not a good idea to get into an argument with a student, especially during class, but it happened! He was miffed with me because in going over the syllabus I had pointed out the standard rule that the student should spend 2 or 3 hours outside class working on the material either already covered or to be covered in 1 hour in the class.

He said that he didn’t think that was right; that he had paid his money to come to class, and that I should be able to teach him everything in the class that he needed to know.

After he stated his position, I paused for several moments (to give him the chance to think that he had made a good point and that I was at a loss for a reply).

“Do you think that I, as your teacher, should prepare my lesson before class?” I asked, rather tentatively.

“Well, yes, of course,” he snapped back quickly.

“Well, how long do you think that I should spend preparing to teach you? One hour? Two? Three?”

“Probably about three hours,” he responded, somewhat smugly.

“Now I don’t want to seem disrespectful, and please don’t take this the wrong way, but who do you think is ‘smarter’ at math, you or me?”

“Well, I guess you are,” he had to admit.

“But if I’m smarter than you, and I should take 3 hours to prepare for a class, doesn’t it stand to reason that you should spend at least that long, if not longer preparing for a class?” I concluded.

The whole class got the point on that one. Even the student who brought up the issue got the point.
Did you ever see a mother bird teaching her babies how to fly?
Sometimes I think of myself as the Mother Bird, and you are my Babies, my little Sparrows.

Did you ever see a mother bird teaching her babies how to fly?

Years ago I used to jog around my neighborhood early every morning. In the early Spring, just after dawn I would see and hear the birds, mockingbirds, out on the power lines with their little sparrows, teaching them how to fly.

By the way, there was usually at least one cat watching with a great deal of interest.

I don’t know how they all got on the power line, but there they were, a mother bird (or maybe it was a father bird – I really don’t know) and three or four baby birds. I would stop and watch. (Anything to get out of jogging!) The mother bird would jump off the power line and swoop down toward the ground, and then she would execute a quick u-turn and flap back up to the power line. Then she would kind of look over toward the babies and give them that bird’s-eye stare as if to ask “Who’s next?” She might have to swoop and flap back several times before a little bird would give it a try. (Now the cat’s interest level increases greatly.) And, whew! the baby bird makes it.

So now the mother demonstrates flight several more times, and baby after baby gives it a try. But there was always one who just wouldn’t swoop and flap, no matter how many times the mother demonstrated it.

Finally, and I don’t know if it was bird-frustration or not, the mother would almost literally kick the baby bird off the wire. It was “swoop and flap” or end up as a cat snack for the baby bird – he was on his own.

So, I’m the mother bird and you are the baby birds. I can and will very patiently show you over and over how to do a problem. But after a certain number of times I’m just going to have to kick you off the wire, so to speak, and you’ll either fly or the cat will get you. At that point it’s up to you.

HELEN’S DUCKLINGS CAN SWIM UNDERWATER!
This story comes under the heading: Somebody’s Got To Teach You!

Bunny (that’s my wife) and I were over at Helen’s house (that’s her sister) one day, and she was telling us about the ducklings that she found by the side of the road. Helen has a soft spot in her heart for all animals, and the ducklings had been recently orphaned – somebody had just run over the mother duck. So there they were, five or six ducklings wandering aimlessly along the roadside. Naturally, Helen picked them up and brought them home.

“Where are they now?” I asked.

“I’ve got them in the bathroom, in the bathtub where they can swim around.”

“Let’s go see them,” I said.
So into the bathroom we went.

“Look,” said Helen, “they're swimming underwater!”

And they were. But wait. Something’s wrong! This type of duck doesn’t swim underwater, does it? They were drowning! We quickly pulled them out. They all lived. But we had to show them how to swim like ducks.

So pay attention to teacher. Learn how to “swim” mathematically. It’s not going to come automatically!

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A DIFFERENCE BETWEEN THE COMMUNITY COLLEGE AND THE UNIVERSITY

At the Community College you will have smaller classes, greater out-of-class accessibility to your teacher, lower tuition fees, and, generally, greater faculty and administration concern for you as a person. So take advantage of these conditions while you can.

At the University, it’s not that the professors don’t want to interact with students outside the classroom, it’s just that their mission is research. And what you need to do is to show them that you have achieved a certain level of proficiency in your major field as you reach the junior and senior level, a level so that they will not be teaching you, rather they will be directing you in your studies.

Remember that although we have a great number of very, very smart faculty here at the Community College, we have no Nobel Prize winners! It is at the University that you will have the opportunity to come into contact with such world-class researchers. You must make yourself ready for that opportunity.

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COMMERCIAL FISHING – CATCHING GRUNTS

I grew up fishing, commercial fishing, in the Florida Keys, specifically Upper Key Largo. We fished mainly for the “crawfish,” the Florida Spiny Lobster. But when the crawfish weren’t running, or when they were out of season, we fished for snapper, grouper, yellow tail, or anything we could sell. We fished the reefs, and we fished the flats. We always fished with hand-lines, and we almost always wore gloves.

Now there were days when you’d throw out your line and right away you’d hook a grunt. A grunt is a little fish that grunts when you pull him up out of the water. They are no good to eat and no good to sell. They don’t make very good bait – only for sharks and barracuda. So, anyway, when I’d hook a grunt, I’d take him off the hook and throw him back into the water. Then I’d re-bait my hook and throw out my hand-line again.
Well, before I’d get a chance to get a bite from a “real fish,” – bam – I’d get the grunt back on my line. So I’d pull him in, take him off the hook, throw him back, re-bait my line, and toss it back into the water.

Well – bam – I’d catch the same grunt again and again and again. How can I get some real fishing done if I can’t get my baited hook past the grunt? You think he would learn!

Finally I’d get tired of this constant catch-and-release cycle, and so I’d catch the grunt and drop him into the boat where he’d grunt and flop around for awhile. And then he’d die. And I could start catching some money fish.

That was then, and that was on the boat.

Now we’re schooled in the classroom.

Sometimes after I return a test or quiz, and let’s say I’m going over it with you in my office, you’ll say to me “Oh, yes, I always make that mistake.” (Haven’t we all said that at one time or another?) But if you say that, or even think that, aren’t you being like the grunt flopping around on the deck of my boat?

Don’t be a grunt! Learn from your mistakes! All I can do is “catch” you on your mistakes. It’s up to you to learn to avoid those mistakes in the first place.

Note: After having told this story in class, there have been times when a student, on getting his (or her) paper back in class would start making grunting sounds – and the whole class would know that I’d caught another grunt!

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IF YOU CAN DO IT ONLY ONE WAY, YOU’RE NOT AN EXPERT!

One of my favorite sayings to the class is “If you can do it only one way, you’re not an expert.” (By the way, this goes for teachers and teaching also – if you can teach it and explain it only one way, then you are not a teacher! If you have five kids in your class, then you’d better be prepared to explain a concept five different ways…. And how many times do you have just five kids in your class?)

THINK OF JIM LOVELL & APOLLO 13

In case you haven’t seen the movie or the TV documentary, or (perish the thought) read the book, the Apollo XIII Command Module, containing 3 astronauts, suffered an accident, leaving it without oxygen or power, on the way to the Moon. All three astronauts crawled into the Lunar Lander (built for two) with oxygen for two days and spent the next four days sling-shotting around the Moon (to get enough speed to return to Earth) and flying back to Earth. All this done using manual controls and celestial navigation. Impossible, but they did it – because when the high-tech, “electronic” way failed, their training, background and brains provided them with more than one way to do it! Yes, Jim Lovell, Fred Haise and Jack Swigert were experts!

THINK OF LT. CMDR. GEORDI LA FORGE (LEVAR BURTON)

You’ve seen him if you ever watched “Star Trek: The Next Generation.” He was the Chief Engineer. He was in charge of the “warp-drive.” When things were going well, he could control,
monitor and adjust the warp-drive from his computer terminal. But, of course, it often happened that things were not going well, and when those situations arose, say the computers were down, then LaForge could crawl up into the warp-drive and make adjustments manually. Yes, he knew more than one way to do it! He was an expert!

So, don’t get puffed-up with pride if you’ve figured out how to “work that problem.” Remember, if you can do it only one way, you’re not an expert! And what we are trying to produce in our educational system are experts!

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I DON’T GIVE A RAT’S PETUNIA WHAT YOU MAKE IN THIS COURSE!
The term “a rat’s petunia” is, of course, a polite euphemism for a similar expression. Both have the general meaning of an emphatic “I DON’T CARE AT ALL!!!”

Now, many, if not most, students take the required college math courses not because they want to, but because they have to. This is true unless they are math majors – and we see very few of these in the community college.

Additionally, most people, be they students, working professionals, retirees, ministers, judges, etc., will candidly tell you “I just hate math !!!” (Emphasis not mine. Theirs.)

So we have a problem, especially in the freshman level classes, of trying to teach kids who don’t want to be there in the first place, who resent being forced to take the class, who don’t know why they even need to know the material, who hate the subject matter because (a) they are not very good at it, (b) they have long histories of being told that they are not very good at it, (which has led in the past to their avoiding studying math and preparing for math tests in high school, which in turn has led to poor grades on tests, which in turn has re-enforced all the above), and (c) their parents, grandparents, ministers, sports heroes, and favorite movie stars all hate math – and (thus) so do they!

Moreover, even at the sophomore level, teaching math classes that students are taking because they are required prerequisites for the student’s major, many students have no idea why such courses are required and exactly how such math knowledge is going to help them become engineers, biologists, accountants, etc.

And on top of all this, it is true that math is not the easiest subject in the college curriculum. And it is not the case that every student can become a “first-string player” in the game of math. But this is no reason to make it more difficult than it needs to be.

All the above was just to prepare you for the point of this story. You can’t learn with a chip on your shoulder. If you, the student, do not want to learn, then I certainly cannot make you learn.

Thus, I must get you to “buy into the program.” I must get you to want to learn the material. (Then, of course, I must present the material in a coherent manner so that you can learn it).

The two main methods that I’ve used for years and that seem to have some degree of effectiveness in getting kids to buy-in to my program are:
(a) Repeating often

“I don’t give a rat’s petunia what you make in this course! What I really care about is what
you make in the next course and the next course. And what I really care about is how you
can use this material to rise up in the ranks of your future professional careers.

And so you need to learn this material not just for the coming test, nor for the final exam.
No, you need to learn this material so that when the time comes – maybe in a semester or
two, or maybe in a year or two, then you will be able to quickly re-learn it (for we all forget
stuff, but if you really learn it the first time, the re-learning comes very, very quickly) and
successfully apply it.”

and

(b) With each new topic that I begin in class, I try to tell the students exactly when and where (in
future classes, or in life) this material will become useful and/or necessary for them to know. I try to
give real-world examples from the courses that I’ve taught, the courses that I’ve taken, and the
jobs that I’ve had – in which the particular material helped me solve some problem or get a pat on
the back for solving some problem which others considered difficult.

NOTE: Along with the “rat’s petunia” phrase, I often throw in the Louis Pasteur quote (in
translation) which my son taught me years ago: “Chance favors the prepared mind.” although I
sometimes have to tell the kids just who Pasteur was… (?) And this does dilute the impact a bit.

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THE NIGHT BEFORE I HAD A BIG TEST, I USED TO DRINK BEER & SHOOT POOL
I don’t tell this story much anymore. I’ve had students miss the point completely. The point of the
story is that if you prepare for a test early and completely, and if you review repeatedly, then there
is really no need for last minute cramming. As a matter of fact, I used it as a psychological boost
that I had enough confidence in my preparation that I could go out the evening before a big test,
drink a pitcher of beer, shoot a couple of games of 8-ball, and still “ace the test.”

Also, the fact that other kids saw me out relaxing the night before the test led them to think
(erroneously) that I must be pretty smart when they found out that I’d made good on the test. Well,
they were wrong. I wasn’t that smart. I had just studied the material over and over and over and
over well before the test time.

After telling this story in class early one semester, it got back to me that early the next semester, a
student from the class had told a friend, “Don’t take Jones. He’s just an alcoholic!”

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HOW DO YOU LEARN?
For several years I taught a class in Conquering Math Anxiety and Learning Skills for Math. Suffice
it to say that there are many different ways that we learn. It seems like most people have several
modes of learning and that one mode is dominant. Also, the way I learn is probably not the same
way that you learn. However, the way I learn is probably the way that I teach, which – and I repeat
– is probably not the same way that you learn. So there is a distinct potential for a less-than-
maximal transferal of intellectual material from teacher to student unless both parties know their learning styles and use this information to reconcile, realign, and restructure their “connections.”

There are some free on-line tests that you can take to help you discover your dominant learning mode. So go for it!

However, here I share with you a couple of tales of my learning “skills.”

<Story #1> THE HELPING VERBS IN 7-TH GRADE ENGLISH CLASS
One way that I learn is by repeating the material over and over and over and over. In 7-th grade English class Teacher said we needed to learn the “helping verbs,”

**am is are was were**  
**be being been**  
**has have had**  
**do does did**  
**shall will should would may might must can could**

This is the order in which I learned them in the 7-th grade, when I must have been about 13 years old. I’m 67 years old now, and I can still rattle them off in the same order. How did I learn them so well? I repeated them over and over for the rest of that long-ago day in 7-th grade. All day long I repeated the sequence – out loud! I drove everybody crazy. I had no friends for a while after that, and as I recall, the teachers sent me down to the Principal’s office for “talking in class.”

<Story #2> EATING MY NOTES IN COLLEGE
I think that we are supposed to have five senses: sight, hearing, touch, taste, and smell. One may talk about a “sixth sense,” but let’s not go into that here. Now since we experience the outside world through these five senses, it’s reasonable to conclude that we learn through these five senses. My final conclusion to this line of thinking is that the more of the five senses that we use to learn something, the faster and better we learn it.

I’ve had such ideas since I was an undergraduate in college, and I actively put them into practice.

Now, I don’t claim to be any kind of a role model, so when I admit that I used to smoke – pipes and cigars, not many cigarettes – you won’t hold that against me. (I did give it up “cold turkey” when my son was 3, and that was more than 30 years ago.) However, back to the point: I had several different blends of pipe tobacco that I smoked – nothing illegal, mind you! And these blends had very distinctive tastes and aromas. I would smoke a distinctively different blend when I was studying specific topics in my German, French, Chemistry, Philosophy, Physics, Math, *etc.* classes. This gave me a taste and a smell association for the particular material I was studying.

Also, I really love what is commonly called “classical” music, and so I would accompany my studys with different symphonies, operas, *etc.* so that I would have an aural tag on my subject matter.

Additionally, I would write out things over and over and over: the statements of mathematical theorems, vocabulary lists, chemical formulas. Anything that you would write down once, I would write down 50 times at one sitting. And I would repeat the sittings several days apart. Normally, as
I was writing, I was speaking or singing the material aloud. This way I was getting sight, hearing, and “muscle memory” (touch) into the picture.

Note: To this day I associate the German sentence “Ich habe keinen Stuhl.” (I have no chair.) with the main theme to the second movement of Beethoven’s 5th Symphony – and I made that linkage in 1963.

Well, I’ve gone a long way in this story, and I’m not to the end of it yet.

I really wanted to get a better “taste” component into my learning process. Now, in those days (the early 60’s) the professional wrestlers on TV were often getting into contract disputes with their promoters, and they would show their anger by ripping up a contract on camera and eating it! So that’s what I decided to do. I’d write up a complicated math theorem and its proof, rip up the paper and eat it!

That’s one method that didn’t work. I’d have to spit it out. The only thing that I learned from that experience was that paper didn’t taste good.

But the other ways worked fine. For instance, I remember once taking a German test and I couldn’t remember a certain word, but then I “smelled” it and got it right.

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CAN WE DRAW AN ELLIPSE?

Notice the “WE” in the title to this story. When I’m teaching ellipses in precalc, “I” don’t draw an ellipse; “WE” draw an ellipse. And we draw it on the blackboard…. with chalk…. the old-fashioned way!

It takes three of us: me and two student volunteers. They get, of course, a bonus point for the day. It also takes a “string” to draw the ellipse. I usually use the cord off the pull-down projector screen. Each student holds one end of the cord at a focus, and I use the chalk to pull the cord taut, thus completing the equation d1 + d2 = c. Then I score the blackboard with the chalk, keeping the cord taut, and, bingo, there’s our ellipse.
Of course, after drawing the ellipse I add the normal information.

But the point of this in-class exercise is to make it really clear to the students exactly what the generating equation is all about.

(NOTE: A kid with a cell phone took the picture and emailed it to me. You can always count on someone in the class to have one of these gadgets!)

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TRAINING MY GERMAN SHEPHERD DOG, AND WHAT I LEARNED IN MY UNDERGRADUATE PSYCHOLOGY CLASS
(When comparing the teaching of people with the training of animals, I try to point out the comparisons and yet stress the differences – it is rather demeaning to think of “training” humans in a manner similar to training a dog. However, with the proper respect to each type subject, I must say that it does work!)

Years ago I did breed, raise and train German Shepherd Dogs. In the “show ring” one needs to keep the dog’s attention. Back in the day, we used the following method – I don’t know if they do it this way any more. The trainer had to wear a sport jacket in the show ring, so we’d go to Goodwill and buy a cheap, used one, preferably of non-descript color and pattern. We would get some beef
liver, chop it up into small squares and put these treats into the pocket of the sport jacket. (This is obviously the reason that we’d buy a cheap, used jacket). Then, as we are showing the dogs in the ring, we would, from time to time, slip the dog a piece of liver. This keeps his attention.

The bits of liver are also used as rewards in the at-home training sessions.

So I relate this story to the class, and then I tell them that the “bonus points” which I give out to them are like the bits of liver that I gave out to my dogs – they are not going to “fill them up” (i.e. change their grades), but they will keep their attention.

What I often don’t tell them is the principle that I learned in Psychology class as an undergraduate at FSU – that you don’t give the little reward every time. And you make sure that they don’t know which time the reward will be given.

NOTE: You can train yourself this same way.

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HARVEY S. PARDEE – You don’t have to invent the light bulb to be a creative engineer. Once upon a time, many years ago, when I was a young man in my early 20’s, I knew this old retired man, Harvey S. Pardee. He was in his 80’s at that time. He lived in a retirement community in Bakersfield, CA, and I lived in Las Vegas, NV. We were about 450 miles apart, yet I often drove to see him even for just a weekend – 900 miles round trip, just to visit.

Mr. Pardee was a Mechanical Engineer, retired. Actually, he was an inventor. I’ve seen photos of him with Henry Ford, Thomas Edison, and Harvey Firestone at their winter homes in Ft. Myers, FL. The photos were a result of his association with Ford.

As he told the story, when he was a young MIT graduate engineer, he somehow got an audience with Henry Ford to show him a gadget that he, Mr. Pardee, had invented. It was a radiator cap. It had a round, vertically mounted, silver dollar sized disk atop the cap. On the forward facing side was the Ford logo, and facing back toward the driver was a water temperature gauge. Ford liked the device and had it put onto millions of Model T’s. Harvey S. Pardee made lots of money on that one simple device.

All through his life he invented things. His mind remained active even into his 80’s. He was still inventing things when I knew him!

You see the world around you. You see something that needs to be done, or improved upon. And you figure out how to do it or improve it. Just keep looking and thinking.

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DANIEL

Daniel (pronounced “Dan-ee-el”) was my student years and years ago. He was also a friend, and I know that he would not mind my using his real name in this story. Daniel was an older student – still young, but younger than most of the other students. He already had a profession. He was a hairdresser. He was French-American. I don’t remember, but he may have been born in France. I
don’t know why he wanted an A.A. degree, but there he was in my college algebra class. I know that he was in my class for two semesters. It may have been three. He always sat in the front row.

Now, math wasn’t his “strong subject.” He’d be the first to tell you this. Thing about it was, unlike lots of other students, Daniel never got hostile toward math. He asked lots of questions both in class and after class, and from time-to-time he got frustrated. But he never got angry. He had a very pleasant disposition. But he just couldn’t retain math. It was like “in one ear and out the other.”

Sometimes he would slow the class way down. Example: I’d explain some new topic in explicit, wonderful detail, and as I was about to move on to the next topic in the lecture, up goes Daniel’s hand.

“Mr. Jones, I didn’t quite catch on to that example you just put on the board. Could you go over it again?”

“Sure, Daniel.” I would reply, and I’d try to find a slightly different way to explain the topic and the example.

Then, when I finished, Daniel would be nodding his head up and down, affirmatively. So I’d prepare to go on to the next item. But just as I started….

“Mr. Jones,” all of a sudden his look of understanding had changed to one of confusion, “what did you do on the third line of your solution?”

The whole class would softly moan behind Daniel. They would quietly shake their heads in disbelief. But I’d stop and go over the problem once again.

I made it a point to never seem exasperated or out of sorts with Daniel’s questions, because he wasn’t “putting me on.” He wasn’t trying to waste class time. He really wanted to know. And I wanted to show him.

But the most important result of my patience with Daniel was that the entire class knew that I would patiently answer any question that they asked, and that quenched the usual fear that students have of asking the “dumb question,” because (and I say this in all love) there could not be a “more dumb question” than some of those that Daniel asked.

But you know what? Those classes turned out to be really good classes in terms of student learning and student involvement. They were a pleasure to teach. And ultimately Daniel graduated. I went to his graduation party.

And wherever he is now – I wish him the best.

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WHAT’S THE SQUARE ROOT OF 3 GOT TO DO WITH GEORGE WASHINGTON?
We are teachers, but if we stay alert we can be learners, too. Case in point. When I was a grad student back in the late 60’s, I was teaching a college algebra class. (As I recall it was called MATH 102). Anyway, one day I’m working some problem at the board, and I needed to approximate the square root of three. We didn’t have hand-held calculators then. We had tables in the back of the book.

So I said to the class, “I’m going to have to look up the square root of 3. I know the square root of 2. It’s 1.414 (approx.), but I don’t know the square root of 3 off the top of my head.”

A young lady in the middle of the class raised her hand. I acknowledged her. And she said, “Here’s how you can remember it. The square root of 3 is the same as George Washington’s birth year…. The square root of 3 is 1.732, and George Washington’s birth year is 1732.”


It’s funny how, if you can relate two things like that, you never forget either.

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WHAT IS 5 DIVIDED BY ZERO?
Here’s another story from the 60’s. This one didn’t go quite the same way, but it did teach me a valuable lesson in education.

The way that they taught fractions back then had one bizarre bit of notation. They said that any number divided by zero was infinity! So I when I put an example on the board. I wrote

\[
\frac{8}{0} = \infty
\]

This turned out to be a bad example. My mistake. Why? Well, because on the test I didn’t want to put the same problem. So on the test I put

\[
\frac{5}{0} = \infty
\]

And, of course, one student answered
I bet you saw that one coming, didn’t you? Well, I didn’t. But when I was grading the tests I thought about it long and hard. Did the student get it wrong or did she get it right? I decided that, based upon what I had taught her, she got it right! I just didn’t teach her right. So I didn’t take off any points – that little problem wasn’t worth much anyway – and I wrote out an explanation of what she should have done on the problem.

Moral of the story. You’re always teaching them something. Try to make sure that you are teaching them true stuff.

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WHY DO THEY WANT TO MAKE IT ILLEGAL TO TALK ON YOUR CELL PHONE WHILE DRIVING?
Because multi-tasking dilutes one’s concentration, that’s why! So don’t try to do two things at once. You must be able to concentrate on what you are doing. Just as this applies to driving a car, it also applies to working math problems. And even more especially it applies to working problems on a math test.

Here’s what I’m talking about. It requires a little self-training. But it works for me, so it was worth the effort. When taking a test, if I come upon a problem that I just know I’m going to have a hard time doing – that’s easy to deal with; I just move on to the next problem and come back to that one later if I have time.

No. The problems that really hurt me are the problems that I start doing and then midway through my work, I get stuck. Bogged-down. Frustrated. I try and try and try, and finally realize (a) I probably can’t do the problem and (b) I am wasting too much time on the problem. The “skill” which I have taught myself to handle this situation, and which I recommend to you, is the skill of “just letting it go.” I, at least temporarily, completely forget the problem. I wipe it out of my mind and move on to the next problem. The trick is to completely wipe the event (of the “bad” problem) out of my mind. Like it never happened!

I have found that if I don’t wipe it out of my mind, when I go on to the next problem I’m still worrying about that last problem. This dilutes my brainpower (which is not really all that great on a good day!) so that it’s harder for me to work on this next problem. Then when I go to the next problem after that, I’m worried about the two previous problems, and that further dilutes my brainpower, etc, etc, etc. So I end up missing a whole bunch of problems.

They say that a major difference between the kids today, Gen Y, and the kids of my day, Baby Boomers, is that the kids of today can multitask. Let me say this: I don’t believe it! The human brain is still the human brain.

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LOOK IT UP!
This one’s all about Josef. This was the first class in which Josef was my student. It was an Intro.
to Logic class. Josef – I didn’t know his name then – sat in the back of the class. Big guy. Turns
out he was a Marine from the Gulf War days. Bench pressed 500 lbs (so he says – probably true!)
I didn’t know any of this at the time. No big deal. We have lots of big, strong young men in our
classes – even in logic.

Well, one day in class I’m lecturing along about some logic topic and I used some “big” word. I
don’t remember what it was. I use lots of big words as necessary. If the word fits, I use it – big or
small. Well, then, up comes Josef’s hand.

“Mr. Jones, what does ________ mean?” (Remember, I’ve forgotten what the word was).

So, I’m in kind of a smart-aleck mood that day. “Look it up!” I respond.

And I turn back to the blackboard to continue my writing. But I hear a noise. I look back over my
shoulder and see that Josef has left his desk. He walks out of the classroom.

I thought, “Well, maybe I was too snippy with him, and he’s gotten mad at me and quit the class.”
I’m a little remorseful at this, because I never like to lose a student.

However, I continued my lecture. And a few minutes later Josef came back into the classroom and
sat back down in his seat at the back of the room. I was in mid-sentence on some point of logic.

But I picked-up on what was going on, so after I finished the logic idea I was stating, I said to
Josef, “Well, what does it mean?” And he told me and the whole class.

He had gone to the library and looked up the word, just as I had invited him to do. The point is that
when I told him to “look it up,” he hadn’t whined about it, tried to guess it, made any kind of “smart”
reply, or just sulked. No. He just did what I told him to do, and he did it right away. He got the job
done! And learning had taken place. I thought: “This is my kind of student.”

Subsequent to that first encounter, I have had the pleasure of having had Josef in several higher-
level math classes at the Community College. After that I worked with him through his
undergraduate days and Masters level days at the University. We had many sessions, all of which
I enjoyed, because he did the work, and I was there to help explain some concept or notation. If I
tried to “solve the problem at hand,” Josef would jump all over me and tell me to back off. He
wanted to understand, and I was there to aid in his understanding, not to do his work for him.

I must say that ultimately this relationship ended, because when he got into his PhD program, he
was far past any “understanding light” that I could have shed.

Now Josef has his doctorate – has had it for several years, and we still talk over the phone several
times a week. We are colleagues. We are friends.

This is called mentoring. I’m not unique. Many of us do it, and I want to encourage you to do it.
Because the point is that if you can successfully mentor one or two people – it doesn’t have to be
hundreds – think of the intellectual chain reaction in which you are participating. You are not just
another brick in the wall, you are a valuable link in the chain!
ONCE YOU’RE MY STUDENT, ALWAYS YOU’RE MY STUDENT – for as long as I can help you. But my greatest joy comes when I have to say to you, “Whoa, you’re way past me on that one. I can’t help you anymore. Perhaps you can teach me, now.”