

Tau Beta Pi: Nature vs. Nurture

by Keith D. Hjelmstad, *Colorado Delta '78*

IN THE FIRST SEMESTER of my junior year in college, I got a rather official looking letter from an organization called Tau Beta Pi. "Congratulations," the letter started. "It is our pleasure to invite you to join the engineering honor society Tau Beta Pi." The letter went on to say that Tau Beta Pi had been founded in 1885 to "mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character and to foster a spirit of liberal culture in engineering colleges." I accepted the invitation. I was inducted in a ceremony much like the one you went through, and I ate at a banquet much like the one you attended (or should have), paid for from my \$36 initiation fee. (Things were cheaper a quarter of a century ago.)

I don't remember who spoke at the banquet the night of my initiation or what he said. I do remember having a rather vague understanding of the deeper meaning of the celebration. I understood that Tau Beta Pi was an honor society and that it was my academic achievements that got me into the Society. I was able to connect my high GPA with distinguished scholarship, but the part about exemplary character blew right by me. The notion of fostering a spirit of liberal culture in engineering colleges was lost on me.

Back then I did not know how to take seriously the issues of character and liberal culture. With the character thing, I figured that they were talking about someone like my dad. I think, deep down, that I had always expected that I would grow up to be an exemplary character like him. The part about fostering a spirit of liberal culture seemed like one of those gratuitous things that an engi-

neering organization might say to fend off the image of the white-shirted, slide-rule-toting, pocket-protected "techie" who could put a man on the moon but who might not know Schubert from sherbet. As engineering students who hung mostly with other engineering students, we were fairly certain already that liberal culture was soft and unnecessary.

I think it must be even harder now to put those things into perspective, because not only are you young and modestly experienced like I was then, but you also have the great distraction of a huge media enterprise misinterpreting things like character and culture for you, ramming this *information* down your throats and holding your mouths shut until you swallow it. The word *liberal* is so overused and abused today that it is almost always used in a pejorative sense. We sometimes forget that liberal culture refers to the finest achievements of humankind.

When I was your age, if you wanted to know something you had to ask. We didn't have pre-pre-game shows and pre-game shows that took away the mystery of the game. We didn't have people telling us that the next play would be a run up the middle. We didn't get to see that play four times from different angles. We didn't have color commentary. An event had to have its own color. We didn't have experts telling us what people were thinking and feeling. Humans could grieve without getting microphones shoved in their faces. Back then we elected presidents in one day. We didn't have political pundits in our living rooms telling us how things would turn out and why. Back then we didn't have Dan Rather making up the news before it happened. We had a guy named Walter who simply told us what happened.

Back then all you had to do to remain ignorant was not ask, and so I chose not to understand the meaning and value of Tau Beta Pi. I became a member, ate the dinner, and went on with my life. Perhaps you were going to make the same choice. Sorry. I plan to try to keep you from it. Don't worry. I don't plan to tell you what to think or to predict how your life will turn out. I won't even tell you who I think should be president. I'm just going to tell you some stories. I hope the stories heighten your awareness of the beauty of the ideas behind Tau Beta Pi—the ideas of honoring distinguished scholarship and exemplary character and fostering a spirit of liberal culture among engineers.

I would like to start you thinking about how you really arrived at this point in your professional development and get you wondering where you might be going in the future. The coarse screen for your election to Tau Beta Pi was the grade point average you have earned as an undergraduate, but your preparation started long before. My guess is that, like I did when I joined Tau Beta Pi, you improperly locate the center of gravity of your achievement here at the university. You probably do not fully appreciate the true roots of your engineering education. I will also hazard a guess that you do not have a clue where you are headed in your lives. (That's a good thing, by the way.) If I could have seen the next 24 years of my life when I joined Tau Beta Pi, I probably would not have believed it.

Because I don't know much about any of you, I plan to talk about myself. I could be the poster boy for Tau Beta Pi.

- *I am a distinguished scholar.* I am a full professor at one of the most distinguished engineering schools on the planet. I have written a book and published articles in the finest technical journals in my field. My children often say "Let's ask dad; he's a professor; he knows everything." Well, I don't actually know that much, but I do love to learn.

- *I am an exemplary character.* I am honest and fair. I pay my taxes on time—without complaining that the government is robbing me blind. I never break the law. Well, there was that recent transgression of speeding in a school zone. But, like the distinguished scholar that I am, I learned my lesson and am now the slowest driver on the road. Perhaps you have been behind me lately.

- *I am deeply devoted to fostering a spirit of liberal culture among engineers.* I am a classical violinist. I have played most of the violin and symphonic music that you hear on the local classical music station. Beethoven is as much a hero to me as Newton. I am a sports enthusiast—at least I was until all of my sports heroes retired a couple of years ago and I gave up watching television. I have deep interests in history, philosophy, and education—particularly as they affect engineering. I even know about multiple intelligences. I think I might even have one of them. I am in awe of human achievement and am concerned about human suffering—particularly the human suffering that I cause. (Just ask my very human wife.)

Actually, I am content to let history decide the adjectives—distinguished, exemplary, who is to say? But, perhaps we could agree that I have lived up to the ideals of Tau Beta Pi—that I am worthy of my bent.

It was not those four semesters of good grades that made me a Tau Bate. There is a lot more to it than that. I write here to ask (and try to answer) the question, "Tau Beta Pi: Nature or Nurture?" Are Tau Bates born to be Tau Bates, or are they made into Tau Bates? Was Tau Beta Pi always in your future, courtesy of your genetic makeup, or did a bunch of other stuff have to happen first?

Distinguished Scholarship



When I think of myself emerging from high school, four short semesters before my induction into Tau Beta Pi, the last thing that comes to mind is distinguished scholarship. But I think distinguished scholarship starts (and maybe ends) with curiosity. I started to become an engineer long before I sat in my first engineering class. I started to become an engineer when I built a chemistry laboratory in my basement in that dark, triangular area under the stairs. My brother and I spent hours pouring over the SkillCraft catalogs from which we ordered test-tubes, beakers, Bunsen burners, and chemicals—lots and lots of chemicals. Once I figured out that the chemicals that kids could order through the mail were designed to be almost completely inert, I tried to make gunpowder from sulfur, which we had in our chemistry set, saltpeter, which one could get at a drug store, and crushed Kingsford charcoal briquettes, which ordinarily provided the heat on the family barbecue. Fortunately, curiosity does not guarantee success. Nothing blew up.

I started to become an engineer when I built cranes, bridges, cars, and robots with my Erector set. I started to become an engineer when I took apart and reconstructed any clock, toy, or household machine that I could get my hands on. My reconstructions were not always accurate, but no device was completely safe from my inquiry. I started to become an engineer when I built rockets with cases made from toilet paper tubes and fuel made with the heads of matches torn, one by one, from cardboard matchbooks. The specific impulse was a bit low, but the rudiments of rocket science were there. I started to become an engineer when I built hot air balloons from plastic dry-cleaner's bags, fueled by burning sterno in a handcrafted aluminum-foil cup. On one very still night we managed a flight of nearly a quarter of a mile. Distinguished scholarship starts, and maybe ends, with curiosity.

Any hope I had of distinguishing myself in science or engineering nearly died in high school under the influence of peers less curious than I was and a hierarchy of priorities that only a teenager could appreciate. I went to college not so much under the power of my own ambition, but rather through the perseverance and steady influence of parents who had not had that opportunity themselves—parents who clearly saw higher education as the ticket out of the hard lives that they had and into something that must have seemed a whole lot better. Chalk up a nice save for mom and dad. Childhood curiosity? Maybe it was nature. Going to college? Definitely nurture.

When I was initiated into Tau Beta Pi 24 years ago, I was just beginning to understand what engineering was all about. Although those four semesters happened well after the start of my engineering education, they did manage to

rekindle my curiosity. I worked hard in college and thrilled at each new concept that I learned. Could I have gotten the fire going again on my own, or was it a gift from my teachers at Colorado State University? Again, nature probably played a role, but it was a bit part. Nurture was the star of that show.

I once had a great teacher and friend who helped me to come to grips with the notion of distinguished scholarship. For one thing, he convinced me that we are all far from being distinguished. But more importantly, he taught me that scholarship is really not about being there, but rather it is about getting there. Scholarship is not an honor; it is a lifestyle. Perhaps distinguished scholarship is just living the scholarly life more fully. I get tremendous joy from the pursuit of scholarship—so much that I have committed my life to it. But whenever I begin feeling distinguished, I just think of my good friend and great teacher laughing at me for being a pompous fool. It always gets me back to living the life.

I think that the Founder of Tau Beta Pi knew from the start that one is not a distinguished scholar after a few good years in college. I think that Tau Beta Pi understands that getting good grades in college is simply evidence that one is trying hard to live a life of true scholarship.

Exemplary Character



The second criterion for election to membership in Tau Beta Pi is exemplary character. The Eligibility Code of Tau Beta Pi was adopted in 1926 to help elucidate the criteria for membership. It says, “We consider that true integrity is the *sine qua non* for membership in Tau Beta Pi, that it transcends in importance scholarship, activity, and every other qualification. Without private and public integrity, we believe that no organization is worthy of existence.”

When I joined Tau Beta Pi 24 years ago, I had a rather weak grasp of the concept of good character. I think I seriously underestimated the amount of effort my parents had invested in trying to make me a good character. As a parent now, I am beginning to understand how difficult and elusive that task can be. In my limited view then, good character meant giving your best effort and not cheating. Maybe that was about right for the issues I faced. Things are pretty simple when all of your time is spent going to class and doing homework.

I am more than twice the age I was when I joined Tau Beta Pi. I have had lots of experiences, and some of them have been far from simple. My character has been tested in many ways that I could not have imagined back then. As I look back at some of those tests, I am thankful that I was able to make reasonable choices. People like to talk about teaching ethics in the college classroom, but my experience suggests that you had better learn it long before then.

When I was six years old, my brother was four. We were very close, and we were always in search of amusement. My mother was the organist for our church—like a paper route, one of the most relentless jobs in the world. On Saturday evenings she would practice her pieces on the small Baldwin organ in our living room. It had foot pedals and two rows of stops. As it happens, Saturday evening was also the time for the boys to take their weekly bath.

One particular Saturday evening, my father was occupied with something in the basement, my elder siblings were away, and my mother needed to practice the organ. She thought nothing of putting me in the tub, with my brother queued up next, and going to practice in the next room.

After splashing around a bit, we hatched a plan. This was going to be great! What could be more fun? We giggled with childish anticipation. My brother was to go tell my mother, “I think you need to come. I think Keith has been in the water too long.” He practiced the message a couple of times to make sure he got it right. He departed, and less than a minute later the organ music stopped. I took a deep breath and laid face down in the water in the tub.

When my mother saw me she was certain that I had drowned. She screamed at my father to call the fire department. She grabbed one of my floating arms and raked me over the side of the tub to the floor. Things were not going the way I had envisioned. No one was laughing. My mother was white as a ghost and sobbing uncontrollably, and I had been handled like a sack of feed. Within a fraction of a minute everyone knew the score, but my mother was so shaken that she had to take a Valium and go to bed.

When I told this story to my children recently, my five-year-old daughter asked if I got a time-out or a spanking. I explained to her that there are some things we do that are so bad that we don't get punished for them. Some day she will understand that the punishment lasts a lifetime. I learned from that experience that the things that we do can have a dramatic effect on other people and that even the best laid plans can have terrible unintended consequences. To this day, I am unable to gain amusement from any sort of practical joke. Perhaps that is tragic. However, I am also keenly aware of the effects of my actions on other people. I always think before acting. Chalk up another victory for nurture—however accidental it may have been.

I had another character-building experience early in my life. Our family was traveling across the country in our 1964 Chevrolet Impala—a monster of a car, not exactly roomy for a family of six. I am the third of four children. Seniority dictated that I sit in the middle backseat between my elder siblings when we traveled. I am not going to try to convince you that my less-than-comfortable position in the car, which had resulted from my low social position in the family, contributed to the way events unfolded. That would be revisionist. But it was a clear disadvantage.

We stopped for gas in Saguache, Colorado—one of those small towns that I grew up thinking was put there only to provide a place for travelers to stop. We all got out to stretch. Mom and the four kids went into the little grocery store, more to have a place to go than to buy anything. Of course, we four kids went straight to the candy racks to observe the endless array of sweets that we certainly understood were not available to us. One of the bins had individual jawbreakers, selling for one cent apiece. There must have been a dozen different colors of jawbreakers. Each must have had a different, and probably unbelievably good, flavor. After the other kids had gone back to the car, I lagged behind. My desire to have one of those jawbreakers was building as steadily and inevitably as the long crescendo of Ravel's “Bolero.” At some point the pressure of desire managed to push me over the high barrier of my ethical knowledge. My thoughts turned from wanting candy that I knew I could not have to hatching a scheme for getting it.

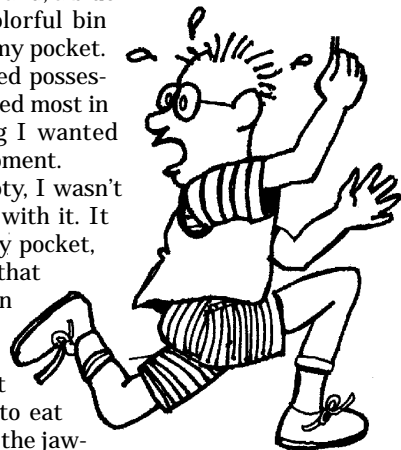
The simple solution to the problem was to take a piece to the counter, plop down a penny, and walk away with the jawbreaker as the new, legal owner. There was a complication, though. I knew that my parents did not want me to have that piece of candy. The act of buying it would require that I ask for a penny from my parents. The plan would certainly run aground at that point. I concluded that if I were to have that jawbreaker, I would just have to take it.

I burned with a sense of evil intent. There was no mistaking where I was. I was way down on the other side of the ethical mountain—a place that my parents had painstakingly tried to tell me not to go. The one thing they could never tell me, though, was what it felt like to go there. With one quick sweep of my hand, a blue jawbreaker left the colorful bin and found its way into my pocket. I had successfully gained possession of the thing I wanted most in life—at least the thing I wanted most at exactly that moment.

Once I had the booty, I wasn't really sure what to do with it. It was certainly safe in my pocket, but I quickly realized that my desire had not been based on simply possessing the jawbreaker. I had wanted to have it because I had wanted to eat it. I slowly maneuvered the jawbreaker from its hiding place in the pocket of my jeans to my mouth. It seemed like the operation took an hour, but I am sure that real time could have been measured in fractions of a minute. Again, I had been successful. My tongue was bathing in the sweet juices of the jawbreaker. Just as I was starting to learn the merits of living on the dark side, the dean of the *school of hard knocks* looked in the rearview mirror.

I thought that my furtive actions had been so smooth as to be undetectable by the most advanced scientific instruments on the planet. Now that I have children of my own, I realize that it is virtually impossible for a kid to suck on a jawbreaker without waking a bear in hibernation. I was caught. Justice was served at 70 miles per hour on a desolate highway in Colorado. The object of my desire was ejected from the side window. To my great embarrassment, I was given a lesson in ethics by the dean. The words cut like a knife through the artificial satisfaction I thought I had found on the other side. I sank into a small pool of humiliation between my brother and my sister and stayed there until the regenerative powers of childhood rescued me 100 miles later.

I have never forgotten that experience. I can still remember, decades later, what it felt like to be on the other side of ethical, responsible behavior. It taught me that one does not truly appreciate ethical stakes until one is embroiled in an ethical dilemma. You get acquainted with your true ethical nature when you are face-to-face with temptation. I also learned that situations involving unethical behavior have a way of cascading to the point of exquisite complication. When we participate in unethical behavior, we pull in many good but unwitting people. I got a clear and early lesson and had the good fortune of learning in a small-stakes game.



Exemplary character certainly means living your life on firm ethical ground. But I think it means more than simply doing the right thing. It means more than being able to distinguish right from wrong. It means more than just staying on the right track. To me, exemplary character also implies generosity to your fellow man—not with your money, but with your actions. I guess that it never hurts to share your money too. Exemplary character is not squeaky cleanliness, and it often cannot be found in one who simply follows the rules. Exemplary character is warm, kind, benevolent, and helpful. Exemplary character is not just right action, but well-considered action. Exemplary character combines goodness with wisdom.

When I run for president, I suppose that someone will find out about the jawbreaker. The *character issue* will rear its ugly head. When they uncover *bathtubgate*, then I'm finished for sure. Political spin control will spin out of control. The news media will crucify me. Great effort and tremendous resources will be spent to put the nails in my political coffin, but I think that they will have really missed the point. The observable events in our lives often make such a big splash that we miss the smooth ripples that emanate from them. You will not find exemplary character in the splash; it is in the ripples. Your experiences will not make your character exemplary, but what you make of your experiences might.

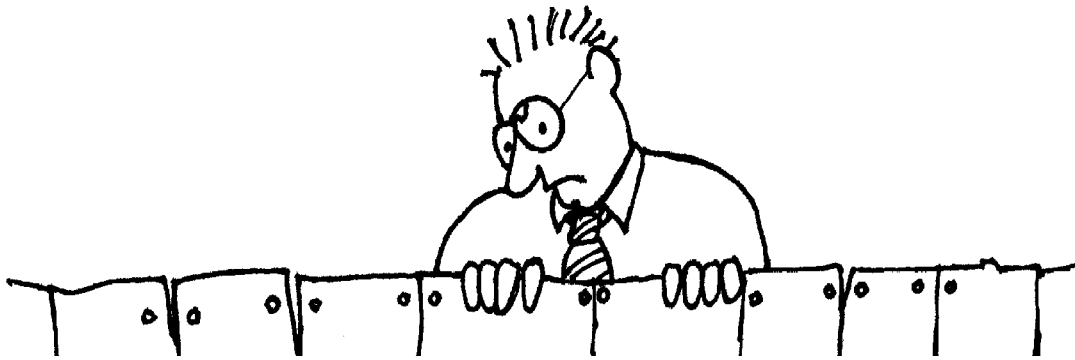
We would all be well served to widen our perspective on character from the superficial popular usage to the enduring notion of *true integrity* implicit in the Eligibility Code of Tau Beta Pi. Exemplary character is a lofty goal that we should try to live up to every day of our lives. It is possible to improve one's character late in life through good influence and conscientious effort; but it is pretty clear that those early lessons we learn as children are crucial to our prospects of exhibiting anything close to exemplary character in our adult interactions. The Eligibility Code puts character above scholarship in terms of the relative importance of membership criteria for Tau Beta Pi. That makes sense. Exemplary character is harder to attain than is distinguished scholarship. (It is also more difficult to measure.) Nurturing of character is even more important to attaining exemplary character than nurturing of scholarship is to attaining distinguished scholarship.

Fostering a Spirit of Liberal Culture

I gather that Founder Williams thought that engineers, as a class of people, were challenged with regard to liberal culture—the arts, literature, and all of those other things (besides engineering) that distinguish us from the lower animals. I have known enough engineers in my life to recognize that this unfortunate stereotype is sometimes well deserved; yet there are a lot of cultural dim bulbs out there in the world. They are not all engineers, but perhaps there is some natural selection involved in the creation of engineers.

It is hard to characterize the exact relationship between liberal culture and good engineering. As a result, there are many engineers who simply cannot see the point of requiring engineering students to learn something of the humanities and social sciences. When I think of the engineer, I like to think of the whole engineer. An engineer is





not someone who needs only to know how to apply math and science to solve technological problems. An engineer is a professional who lives and functions in our world and who should have as much appreciation and understanding of that world as anyone else. I think that an engineer who lacks the spirit of liberal culture is as limited as an artist who does not understand how things work.

Engineering is about enhancing the quality of life. For whom? For us perhaps, so that we can spend more of our effort celebrating life (or at least pondering its meaning). How can you enhance the quality of life if you don't have a clue what the celebration is all about? If there is an area where engineers truly need nurturing, this is it. Tau Bates are called to this task.

I took up the violin in the fourth grade because someone told me that it was a surefire way to get a college scholarship. To me, it sounded like learning to play the violin was money in the bank. After making the decision to play the violin, one needed only to sit back and wait for that first scholarship check to arrive. I soon discovered that there were a few other things to do first.

There was the pathetic first assembly of five "wannabee" violinists. The orchestra met in the basement of Washington elementary school in the room right next to the cafeteria where Mrs. Krumholtz was preparing the noon meal. Mr. Woodworth, principal bassist in the community orchestra, was the teacher. The sounds that emerged from that room were awful—more like tortured cats than music. The scratching and clawing continued for about 15 minutes. Everyone seemed to play from a different page. Mr. Woodworth tried hard to keep a smile pasted on his face.

I soon started taking private lessons from Mr. Gary. I think all of us have had a Mr. Gary in our lives. The part of the dictionary that includes the words crotchety, cantankerous, and crabby—the C-section—was invented to describe Mr. Gary. Come to think of it, there is a word in the A-section that describes him too. He was a cranky old man who had little tolerance for children. I can still remember one lesson when I was trying to perform a song that I could not play well. For some reason, I had drifted off on my bowing. To try to correct me, Mr. Gary started screaming at me "Up bow. Up bow. Up. Up. Up!" The more he screamed, the worse I played.

I changed schools in the fifth grade. Charles Hay Elementary School had retained the services of Mr. Shea—the concertmaster of the orchestra in which Mr. Woodworth played. As the first violinist in a professional orchestra, Mr. Shea was a talented musician. Unfortunately, he also had little tolerance for children. At that time, I was embarrassed to bring my violin to school because the other kids either teased me mercilessly about being a sissy or would say

something stupid like "are you carrying a machine gun in that case?" The school orchestra under Mr. Shea was not exactly a scintillating experience, and in sixth grade I decided to quit. One day when it was time for orchestra, I simply did not show up.

Mr. Shea was furious. He stormed into my classroom and asked Mr. Riggs if he could talk to me in the hallway. With his voice raised in anger, he told me how I had let him down, had not kept my commitment, and was a lazy inconsiderate bum. He grabbed me by my shoulders and shoved me against the wall with enough force to surprise me. Mr. Shea was the Bobby Knight of the grade-school orchestra. But that was 1967, when I think it was still okay to push kids. Somehow we wound up in the principal's office discussing the matter. I was the first one dismissed and went to my classroom determined never to play the violin again.

My mother explained to me for the umpteenth time the value of an education in music. She convinced me that better things were in store for me if I would just stick with it, and she found a new teacher. Mrs. Freed was a wonderful person and a great violin teacher. She provided an environment in which I could thrive. I took lessons from her until I went to college.

I actually did get a music scholarship—although it was a rather modest sum. Long before the scholarship came, I had learned that money was not the point. I have continued to play the violin all my life and love playing. It adds a dimension to my life that solving another differential equation or writing another line of computer code simply cannot do. Playing the violin also provides me an easy avenue of escape from the relentless stressors that are present in daily life.

Although I cannot directly prove that playing music has improved my abilities to engineer, I am fairly certain that my appreciation of music has connected me more firmly to the people I work with and the students that I teach and advise. It has also been a vehicle of introduction to many interesting people I would never have met for any reason other than playing a little Mozart. At the time I joined Tau Beta Pi, I expected to crunch numbers all my life. I completely underestimated the extent to which my career would revolve around interactions with people. I think music helps me more in this arena than does the calculus.

I also did not realize that my experiences with learning the violin were a metaphor for learning engineering. In particular, it taught me clearly the appropriate roles of teacher and student. The violin teacher is essential as a guide who lays out the path you should follow—giving you assignments of the right difficulty at the time you are ready to face that level of difficulty. The teacher is as essential as an impartial judge, who listens to the sounds you make and

how you interpret the written notes. The teacher is essential as a source of encouragement and inspiration. No student can succeed without these things. However, the teacher cannot play your violin for you. Mrs. Freed could play the music *for me* on *her* violin—and it always sounded great—but she could not play *my* violin for *me*. I had to learn to play the violin by doing it myself. Sound familiar?

Perhaps I did not fully comprehend the charge to “foster a spirit of liberal culture in engineering colleges” when I joined Tau Beta Pi, because music was so much a part of my life already. I understand it better now. I think this charge is a tall order, but a most important one. For some of you this charge will prove to be the hardest part of being true to the ideals of Tau Beta Pi. For others, it will be natural and welcomed. Founder Williams made a big leap of faith in assuming that, if you cast your net at the top of the engineering class, you will catch those engineers who can best understand and appreciate the relationship between liberal culture and engineering, and hence those engineers who are best able to foster the spirit of liberal culture.

A deep appreciation of liberal culture (or any aspect of it) does not happen overnight. Those best able to foster liberal culture have probably been nurtured since childhood to appreciate those sorts of things. I certainly was. On the other hand, we continue to grow new interests as we experience new things. Our old interests do not always sustain us, but once we have appreciated one aspect of liberal culture, we are better able to appreciate new ones.

I have not read all of the great books. I cannot recite a single sonnet from memory. I don't remember why the War of 1812 was fought. In the end, each one of us is a specialist in the realm of liberal culture. While I play Beethoven, someone else reads Shakespeare, another dances, and someone else writes poetry. Find your niche. Think of ways to keep your cultural interests near the center of your life. Try to think of ways to share your gift with other engineers. Whatever you do, for the love of the bent, don't kill the spirit.

Conclusion



In my opinion, Tau Bates are made, they are not born into Tau Beta Pi. Those things that distinguish a member of Tau Beta Pi are largely the product of hard work and determination. In this group, I think it would be hard to deny that nature has played a role. I would guess that most of you are swimming in the deep end of the genetic pool. But, I have known many very bright and naturally talented students who will never come close to an invitation to Tau Beta Pi because they were not nurtured toward the ideals of scholarship and exemplary character. You have much of which to be proud. You have proven that you have wings to fly. Remember that you owe a great debt of gratitude to those who nurtured you to the point of flight.



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Note: This article was adapted from remarks to attendees at an initiation banquet of the Illinois Alpha Chapter of Tau Beta Pi.

You were invited to join Tau Beta Pi, and you accepted the invitation. I welcome you to this group that values distinguished scholarship, not as a title to be held, but as a dream to be pursued, a life to be lived. I welcome you to this group that values the ideal of exemplary character. I welcome you to this group that sees the value of liberal culture in the pursuit of engineering. Please enjoy forever the distinct honor of this recognition of your achievements.