Mother and Community College Professor

Elizabeth Dorland

When do you decide you want to be a chemist or to teach chemistry or to be a professor? I wasn't sure what I wanted to do even after arriving in graduate school. Then suddenly I did. But that's the middle of the story, so let's go back to the beginning.

As a kid I imagined being married and having a family in the 1950s Midwest norm of around two boys and two girls. Very few women in our small town worked outside the home. Most married soon after high school and had families immediately. By the time I got out of college and into grad school in the early 1970s, I had settled on 2 kids as a good number. In that later era of women's liberation, I also thought that it would be a good idea to be at least 25 when I married. This was in stark contrast to the conditions in my small town.

Both of my grandfathers were Nebraska farmers. In the 1950s I lived on a farm until I was 8 years old. The closest I came to doing chemistry back then was making mud cookies to bake on warm rocks in the sun. Or maybe the time my sister and I tried to walk (then run) through a cloud of anhydrous ammonia leaking from a fertilizer tank to get to our house from where the school bus stopped at the bottom of our lane. That didn't go well, so we took a long-cut around through the cornfields.

I lived in the same town as both sets of grandparents. Neither my mom nor my grandmothers worked outside the home when I was young. However, both of my grandmothers had been teachers before they were married (in their day, married

E. Dorland (✉)
Washington University, Campus Box #1138, St. Louis, MO 63130, USA
e-mail: dorland@wustl.edu

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ladies had to quit), and both put a high value on education. My parents both attended college, but were married at age 20 and didn't finish at that time. Still, I always knew I would go to college. It was just assumed. My mother went back to college in her 30s and became a teacher too. It seems to be in the blood.

There were no chemistry kits in my childhood, and I set off no explosions. In my small town of 1,500, there was just one room of students for each class from the first to the eighth grades. All of my teachers were female until I reached freshman General Science. I don't recall much about my science education in the early grades, but I definitely remember seventh grade. Miss Bowers filled a large beaker with table sugar. Then she poured concentrated sulfuric acid into the beaker. Readers who are chemists know what happened next. A tall, fat black column of porous carbon grew out of the beaker and towered over her head. We were amazed. That may be the only thing I remember from the whole year.

I had an excellent (male) science teacher when I was a freshman in high school. He had been a farmer for many years, but had gone back to college to become a teacher. I thought that chemistry in particular was interesting. Although we learned about atoms in general science, what the juniors were doing in their chemistry class looked a lot more interesting. Strange and horrible smells came out of the room. They heated mercury and got some red powder. I couldn't wait until my turn came in a couple of years.

But fate intervened, and my mom, a single mother with three kids who had gone back to college to become a teacher, married a fellow student who also had three kids. Our blended family moved to an even smaller town in Kansas with a population of 250. The high school had physics, but no chemistry class. None.

The physics teacher (also the Principal) was excellent, and I did well in spite of his doubts that I would survive as the only female in the class. I always say that I chose chemistry because I had missed out on it in high school. When it came time to choose a college major, I read the descriptions in the catalog. Chemical Engineering! Plastics! Why not?

At this point I had no role models whatsoever for a college-level academic career, and no idea at all about what I wanted to be when I grew up.

At Kansas State I did well in general chemistry lecture. I didn't really like my lab classes, but being the only female major in chemical engineering major wasn't much fun either. So when the chemists offered me a summer job if I changed majors, I bought in. During my college years I worked for a summer at Kansas State and then two summers in the research labs at Kodak Park in Rochester, NY.

Travel was not something my family did. I had seen the ocean only once, on a Christmas trip with a classmate during college. I barely knew what a bagel was. Visiting New York City on that trip and later when I worked for two summers at Kodak convinced me that I would love to live in the big city. So I applied to Columbia, University of Chicago, and as an afterthought, to UC Berkeley.

In fact, going to graduate school was partly a way to avoid taking a job as a technician in a chemistry laboratory. I had no college role models in my family other than teachers. I didn't even know what graduate school was until I met my grad student TAs in freshman chemistry. In my hometown as a kid I remember

gossip about the son of a prominent family who was so irresponsible that he was still a student in his late 20s. I later realized that he was a graduate student! That was not a recognizable beast in small-town 1960s. Being a TA would pay my way, so off I went, but not to Columbia.

In the end the attraction of California, where I had never been, was irresistible. I was 21 years old. That turned out to be a good choice for many reasons. My relatives were worried about me driving alone, and by coincidence, the son of a lifelong friend of my great aunt in Nebraska was also going to Berkeley in Chemistry. I asked him to ride along. Guess what? He did, and we got married in Golden Gate Park a year later in front of our grad school friends. We celebrated our 42nd anniversary this year. But that is getting ahead of the story again.

During my first year at Berkeley I was assigned to be a TA for freshman chemistry. As I recall, the course structure included a 1-h recitation session and two 3-h labs per week. My first obstacle was my shyness and my fear of speaking in front of any group. My parents and grandmothers were high school teachers, but I had no intention of following in their tracks. I never intended to become a teacher of any sort.

However, explaining the chemistry concepts in recitation seemed to come naturally to me. The faculty member assigned to my section complimented me on my teaching. Students liked me. Still, giving lectures in front of an audience (the only way science was taught back then) was not something I could picture myself doing. In fact, I was so terrified to give my first presentation in front of my new research group that I cried during a practice run with my future spouse. Amazingly, my advisor and lab mates complimented me on the clarity of my talk. And it was fun.

In grad school my students, peers, and professors found my presentations and explanations to be very clear. I enjoyed explaining scientific concepts very much. Lab work did not interest me as strongly. I continued as a TA in general chemistry at Berkeley, and later in introductory organic chemistry. During the following months I continued to find lab work rather tedious. I started hearing about the community college system in California and the possibility of teaching college chemistry with a master's degree. By the end of my first year, I had decided. I got my M.S. in organic chemistry the next year and started looking for a part-time job to test the waters while my by-then-spouse completed his PhD at Berkeley.

In 1972, I got my first position. It was half-time with full benefits, teaching two sections of introductory chemistry with labs at Diablo Valley College. I was their first-ever daytime adjunct. That quickly changed, and colleges all over the country started hiring part-timers to save money. No more benefits. Luckily, my spouse had access to benefits via his postdoc position and later from his professorships. At that point I did not know how many years it ultimately would be until I had my own tenured position.

I have never regretted my decision to teach in community college. If I had known how long the pathway to a tenured, full-time, and permanent job would be, I might have hesitated. I'm glad I didn't. After finishing grad school I taught part-time at two colleges in the San Francisco Bay Area and as an associate instructor

back at Berkeley. Later on I taught at two different community colleges in the Seattle area and at the University of Washington. Later still, we lived in Amherst, MA, and I taught at a nearby small college in Springfield. Ultimately, we ended up in Arizona. But I'm getting ahead of the story again. Perhaps you are wondering when the mother part will begin. We will get there eventually. As you will soon see, travel (both with and without your children) is one of the best perks of being a college faculty member.

When my spouse finished his PhD, we decided to teach overseas for 2 or 3 years. At that time he was thinking of looking for a small college teaching job when we returned, and I wanted a full-time community college position. We decided on the American University of Beirut in 1975 and had a great 5-week trip hopping from Japan to Hong Kong to Thailand, India, Nepal, and Afghanistan. Unfortunately, by the time we reached Beirut in September, the war had begun. We stayed there for 6 weeks in a great apartment with a sea view, but were never able to begin teaching. Hearing gunfire every night and watching documents being burned on the roof of the nearby British Embassy were the last straws. Faculty members and their families were evacuated eventually to Greece to wait until after Christmas to begin the school year. We spent an enjoyable 2 months in Athens and traveling the countryside, but by Christmas the fighting had not abated.

We returned to the USA. I took a sabbatical replacement position with my former employer, Diablo Valley College, and my spouse became a temporary postdoctoral fellow for his Berkeley PhD advisor. At the end of the spring, he was offered a postdoc in biochemistry at the University of Washington in Seattle. I auditioned for a part-time position at Seattle Central Community College and landed the job. During the 3 years we were there I also taught at Shoreline Community College and in chemistry at the University of Washington.

When we left Seattle I was in my late 20s, and we discussed when to start a family. I was very worried about never getting a permanent job and wanted to wait until I had a permanent position before having kids. However, the most favorable job offer my spouse got was nowhere near any community colleges. His least favored offer was. The middle course for him was near at least some small colleges, so we both compromised. After I got a permanent position, then we would discuss children. I should mention that beginning our relationship in graduate school meant that we both had the same demanding schedules. Neither of us was much of a cook yet, so we shared all of our household tasks, including cooking and cleaning. We always have. We each have our strengths and preferences, but we always negotiate. Work out a fair system early on, and be flexible.

I did get a position teaching laboratories and supervising the stockroom at American International College right away, but it was not what I wanted to do permanently. But before I knew it I was well over 30, and another compromise seemed wise. Our daughter was born when we had been married for 12 years. During her first 3 years I taught half-time at AIC. My spouse spent his first sabbatical at his home campus the semester after our daughter was born while taking care of her in his office 2–3 days a week. The second semester she went to day care on the days that I worked. I was not on the tenure track during her early

years, and that made time management much simpler. But I was very concerned that I would never be able to achieve my goal of a full-time tenured position at a community college. There are always trade-offs.

In the end, I worked half-time from when my daughter was born until my son was 3 years old and she was 7. I worried all those years that I would never find a full-time tenure-track job, but working part-time turned out to be a luxury I could afford. If I were doing it all over and a position came up sooner, I know I would take it just because there are no guarantees. But I was very lucky. Moving to Phoenix was also lucky, because there were far more community college opportunities in the western USA than in western Massachusetts.

When our daughter was 3 years old, my spouse accepted a position at Arizona State University. He had discovered that he really liked having graduate students and a full research program. I was also somewhat optimistic about my prospects because the Phoenix area is home to the largest community college in the country. I immediately started teaching general chemistry lecture and lab at Glendale Community College about 45 min drive from our home. I had child duty during the days, and I left for the GCC campus as soon as her daddy got home. A year later our son was born in late August, and that fall semester was the only time I didn't teach during the 14 years since I finished grad school. I went back to teaching evenings, eventually at Mesa Community College just a few blocks from our home. When my son was 3 years old I was offered a one-year-only sabbatical replacement position at MCC. My son was old enough for their Children's Center and my daughter started kindergarten. The following year I got a tenure-track position at Glendale, and my son was able to continue at the MCC Children's Center. I dropped him off on my way to GCC. I transferred back to Mesa after 3 years in Glendale to be closer to home. Two years later, I received tenure.

In my view, sharing childcare and household duties is something that is simply nonnegotiable for two professionals. We still share the cooking duties. After our daughter was born, we hired a college student to clean house once a week. When we eventually could afford it, we hired regular cleaners. We never stopped. Do it!

I was very worried that having kids too soon would interfere with my ability to have a fulfilling career. In those days, there were few role models who had successfully combined both. In the end, I taught as an adjunct in community colleges and universities for 10 years before deciding that it was time to have kids, or it might be too late. After getting my MS in 1971, I taught for 4 years in California, 3 years in Seattle, and 3 years in Massachusetts. My daughter was born in 1982, and my son in 1986. Between the two, we moved in 1985 from the east coast to Arizona. I taught part-time and as a full-time OYO (one year only) in the Maricopa Community College District in the Phoenix area for an additional 5 years before being hired full-time at Glendale Community College in 1990.

If someone had told me in 1972 that I would not have a permanent full-time position until 1990, I'm sure I would have freaked out. But in the end, it worked out just fine.

The fact is full-time community college teaching jobs were just as hard to come by in the 1970s and 1980s as university positions. Things finally opened up, at least

in Phoenix, when the initial hires from the 1960s began to retire. In the end, I'm not sure that I would have found a full-time permanent position any sooner whether or not we had kids. Being a 2-body problem family perhaps had an impact, but even then there were no guarantees. But I love teaching, and could never see myself doing anything else once I figured that out early on in grad school.

One of the most valuable perks of being a professor is the opportunity to become a part of an international community of like-minded scholars. Getting help from and forming relationships with other faculty are important for both job satisfaction and career advancement. Teaching daytime classes during most of the years I was an adjunct allowed me to do this, but my disciplinary connections (in those pre-internet days) were mainly local. Once I had a full-time job, I wanted what my spouse had since graduate school—trips to professional conferences and a network of colleagues around the world. Luckily the community college district that hired me provided monetary support and encouraged these activities.

It wasn't long before my chemical education network began to expand and to inform my teaching. One of my first conferences was the 1992 Gordon Research Conference on Science and Education, the first-ever education GRC. Chemists at that meeting subsequently organized the first Chemical Education GRC in 1994. It is still going and now is known as Chemical Education Research and Practice. On the bus from the airport to the BCCE (Biennial Conference on Chemical Education) at UC Davis in 1992 I shared a seat with Kurt Sears, who was then a chemistry program officer (rotator) at the National Science Foundation in the Division of Undergraduate Education. By the time we reached the campus, he had already invited me to be on an NSF review panel. Later that week I met Susan Hixson, DUE Chemistry Program Director. Susan also invited me to review, saying that they needed reviewers with a community college perspective. My network was beginning to form. These conferences and panels and the friends and colleagues I met there laid the groundwork for some of the most rewarding activities of my entire career.

The Macintosh SE-30 computer in my office was already connected to e-mail in 1990 and to the campus network, but not much more. But in early 1993 I joined the recently established chem-l listserv and my love affair with online connections began in earnest. That day my Chem 101 students were extracting red cabbage juice to form an indicator solution that exhibits a rainbow of colors depending on pH. As I wandered back to my office to fetch something, I was wondering what kind of molecules were involved. I decided to ask online and sent a quick e-mail to the list. When I checked my e-mail at the end of the lab, I was amazed to find not just one but three detailed responses to my query. Remember, these were the days before Google and web browsers (let alone Facebook), so this was about as amazing as it could be. Chemist friends from chemed-l became in-person friends when we had our first face-to-face meet-up at the next BCCE at Bucknell University in 1994.

From my new contacts I learned about the availability of visual chemistry tutorials and software programs that illustrated reaction mechanisms step by step from CD-ROMs. I became a pesky early adopter who was always pressing my school and department to buy these cool toys for us to use in lecture, in the lab, and

in the campus computer lab. With the advent of the World Wide Web, the chime plug-in allowed students to view and rotate molecular models on-screen by using files from the Protein Data Base. I could create my own (horribly ugly) web pages and share my learning adventures with other chemists by passing along the links on chemed-l. Perfect synergy.

Travel is one of my very favorite things, and being a professor provides many chances for adventure. Do not pass them up! In 1999 we were able to go on sabbatical for 6 months in Australia. One of my new chemistry contacts helped me to arrange a position at the University of New South Wales, while my spouse did some research with a colleague at the University of Sydney. Our kids were in what the Aussies call Year 7 and Year 11, and had a great experience attending a local high school. They learned that our Math is their Maths, and that our Sports are their Sport. Surfing was one of their choices for sport, and I think they were crazy to pass that one up. But they did have a fantastic time. We negotiated with their school principals ahead of time and ultimately their credits transferred back with only a few glitches.

In the spring of 2003 I got a phone call I'll never forget. A community college-based chemistry program officer at NSF invited me to interview for the rotator position he was about to vacate in Washington DC. At my interview talk I spoke about my various classroom and lab teaching experiments, including the student video project that was going on in my qualitative analysis lab. I was hired. My son was a junior in high school, so I was reluctant to be gone from home. However, he was very supportive and I promised to stay only one year and to be back for his senior year. My husband was department chair in his university chemistry department at that time and could not take leave, but he also agreed that I should not miss this opportunity. In the end, my college age daughter moved with me and took some classes. I went home or my family visited us about once a month. Many of the other DUE rotators and program officers are still friends.

I gave many talks on NSF programs and returned home with a much wider perspective on educational issues. I was sorry that I couldn't stay a second year and use the vast amount I had learned, but it was a good compromise. I was appointed to several NSF Project Advisory Boards and I continue to review frequently for NSF. Take advantage of this kind of opportunity and of all of the sabbaticals that are available once you are full-time. They create fantastic family stories and are opportunities that should not be missed.

The longest trip I took during my NSF experience was to the 2004 ICCE (International Conference on Chemical Education) in Istanbul. My talk about NSF programs inspired an audience member to tell me that his country needed an NSF. I innocently asked where he was from and he said—Iraq. Amazing. I didn't know it at the time, but contacts I made at that meeting would lead to some great adventures over the next 10 years. One of the keynote speakers was to be the chair of the Gordon Research Conference on Visualization in Science and Education in 2005. I had always wanted to go, but a flight to England was beyond my travel budget. When I mentioned this, he said: "I think I can help." And he did, with both travel and registration support. When I returned to the GRC conference at Oxford

(England) in 2007, I was elected as vice chair for 2009 and chair for 2011. As far as I know, I am the only community college faculty member ever to be a GRC Conference chair.

Liz and her family visiting Africa in 2007. For left to right: Sam, Bob, Liz and Larissa

My science and education conference and NSF activities ultimately created just what I wanted—a fantastic international network of colleagues, friends, and collaborators who work in science education and visualization, and more recently in educational technology, online communication, and virtual worlds. I have traveled to over 30 countries since 1972. Our kids both took their first trips to Europe at age one and remain inveterate and enthusiastic travelers.

As far as career influencing my family, I think that the kids were both proud of having "academics" as parents. The extensive travel opportunities tied to academic conferences and the extra time my summers off provided were both very good for all of us. To this day, we love traveling as a family, and try to schedule at least one trip per year to somewhere new and exotic. We plan to continue that tradition even after the kids have their own families.

I asked the kids recently about the best part of having professors for parents. My daughter says that she particularly loves the travel opportunities provided by family

vacations before or after academic conferences in exotic places. Some of her favorites include Australia, New Zealand, Fiji, Africa, the UK, China, Prague, and Rome. Says my son, the family wit: "The best part was being able to build dinosaurs out of their molecular models."

Liz and her children, Larissa and Sam, on a trip to China 2010

I think that making family choices is a very individual decision. Also, the times (and the rules) have changed for the better in many places. Partly my thinking is influenced by my experiences, and partly by observing grad students in my husband's and other professor's groups over the years. When I was a Berkeley grad student, none of the female students had kids either before or during their graduate years. I didn't see how they could. Most were unmarried. The "conventional wisdom" among male faculty (and probably some students as well) was that females were just going to drop out to have families either during or after obtaining their PhD. Only five of us were female in a class of seventy beginning PhD students. More than one of the professors questioned why I was there.

My advice is to choose an institution in a setting that provides the necessary support and resources, and to choose your spouse carefully. And I'm only partly kidding. We have always shared household duties and chores, including cooking and childcare. Negotiate a schedule, continuously revise, and let it evolve. One thing our kids missed was having grandparents close by. If your or your spouse's parents are true gems and live in a great place, consider the benefits if you can.

I believe whether kids and grad school (or a new professorship) can be balanced comes down to how organized and efficient the individual is. But then again, finding success as a professor at a major research university requires those same skills whether you are male or female. Balancing a family with a community college teaching career certainly is easier, but that's not why I chose it. It's more like "it chose me," and I loved it.

Main Steps in Liz's Career

Liz's teaching career began when she was an undergrad TA in Kansas in the late 1960s and then expanded over more than three decades and six states. After graduate school at UC Berkeley, she taught chemistry in two liberal arts colleges, three state universities, and seven community colleges, including 21 years in the Maricopa Community College District in Phoenix and her time at the National Science Foundation in Washington DC. She preferred Community colleges, as these diverse environments provided her with a broad view on the nature of chemical education and its evolution over the years. Liz's engagement with the research community around visualization in science and education has given her important insights into the nature and process of learning. Since 2006, her flexible schedule at Washington University has permitted Liz to continue reviewing for NSF and to attend and present at conferences with multiple perspectives on educational reform, collaborative online communities, and the effective use of technology. Liz hopes to continue teaching and learning for a long, long time.