

## Essay for the Excellence in Doctoral Student Mentoring Award

by

**David A. Jorgensen**

My philosophy of mentoring doctoral students is really quite simple. It consists of three basic interrelated premises: *Pay it forward*, *Pass the torch*, and *Promote graduate studies in mathematics*. I will explain in some detail these three premises.

*Pay it forward*, aka, *lead by example*. I was fortunate enough to have had a fantastic Ph.D. advisor. He is an internationally renowned mathematician, travels a ridiculous amount (especially at the age of 70), and is still very actively involved in research in mathematics. Besides teaching me the ways and means of research in algebra, and how to write mathematics clearly and concisely, he served as an amazing role model for me, as both a mentor and steward of our profession. **The best way I can repay him is to do the same and be the same for my students.** I remember very clearly the day when I asked him to be my Ph.D. advisor. It was in the spring of 1991, nearly 25 years ago. I had no idea at that time what a profound decision this would turn out to be, how instrumental he would continually be in the success of my career, and what a warm, personal relationship we would have developed these many years after my graduation. I work very hard to ensure this too will happen with my students. I am honored to have this opportunity to continually help their careers, and be a part of their professional development, and personal lives. I will give a few specific examples of what I am paying forward.

During my days in graduate school when mathematicians in our field visited to give a colloquium or seminar, my advisor and his wife would have a party at their house in honor of the visitor. In the course of my graduate education I wound up meeting so many important and influential mathematicians this way. It was incredibly beneficial to me to be able to meet them in an informal setting, and to discuss mathematics in such a low pressure situation. There is no telling how dramatically these personal introductions impacted my career down the road, especially when it was time to be on the job market, and seeking letters for promotion. Needless to say, whenever one of my collaborators visits Arlington, my wife and I have a party at our house in their honor. All interested graduate students are invited, not just my students. Very likely, these will become very important events in these student's lives, just like they were for me.

As another example, my advisor always encouraged his students to attend and give talks at conferences and workshops. I believe it is extremely important for students to be involved as much as possible in networking with their peers and established mathematicians. A major means of doing so is by attending conferences, seminars and workshops, giving talks, and presenting

posters. Many of my students' collaborations with other mathematicians are direct consequences of my having introduced them to colleagues at various conferences and workshops. I have supported my students to attend these events using my grant money, and by encouraging them to apply for outside funding. There are too many talks and poster presentations my students have made at conferences and workshops to recount here, so I will just give a few notable examples. In the fall of 2011, I used my grant money to bring three of my students for a two-week stay each in Trondheim, Norway, while I was on leave and teaching at the Institutt for Matematiske fag, at the Norwegian University of Science and Technology. I successfully applied and paid for a student to attend a prestigious and competitive workshop at the Mathematics Research Institute in Oberwolfach, Germany, May 2010. Therefore my students have had even international exposure. I successfully applied for a student to attend the very prestigious and very competitive Mathematics Research Communities Program in Snowbird, UT, June 2010. I helped my student land an IMMERSE Early Career Faculty Mentor position at the University of Nebraska, Summer 2010. I believe all of my students who have now graduated realize the importance of having been involved in these activities, and the associated networking. As the last notable example shows, *they* have already starting paying it forward. They have also organized their own regional student workshops and routine student seminars in our department.

***Pass the torch.*** In academia, in general, and mathematics, in particular, we have a quite fragile system whereby the cumulative knowledge of mankind is continually bestowed onto the next generation. It takes the entire global mathematical community to do this, made up of countless specialists, passing on their knowledge to their students. In theory, all of this knowledge is preserved in books and journals, but let's not kid ourselves, any break in this delicate cycle could be significantly detrimental to the creation, enhancement and advancement of knowledge in mathematics. I get this. And I preach it to my students, that they going forward will need to pass the torch of their particular mathematical knowledge, gifts, and insight to the next generation.

It doesn't matter how brilliant a graduate student is, if they can't get a job after graduation they can't pass the torch. I dedicate a lot of time and care in writing letters for my students, for jobs and awards. Since the job market has gotten so much more competitive today, I also make sure my students understand the realities of the job market. I advise them as to what I think a particular college or university is looking for, and encourage them to find their niche in the market, and contemplate what they really want their future in the profession to look like. I am very proud of how my students have done in this extremely competitive job market. This undoubtedly is due in part to my mentoring philosophy. Meri Hughes (2009) landed an Assistant Professor position at the University of Mary Hardin-Baylor in Temple, TX, directly after graduation. She is currently Chair of the Mathematics and Physics Department there. Kristen Beck (2011) took after graduation a very prestigious 3-year post-doc position at the University of Arizona in Tucson. She is now an Assistant Professor of Mathematics at Saint Mary's College of California, in Moraga. Jared Painter (2012) is an Assistant Professor of Mathematics at

Houston Baptist University, a position he assumed directly after graduation. Denise Rangel Tracy (2014) is currently on a very prestigious post-doc position in the Department of Mathematics at Syracuse University in New York. Yousuf Alkhezi, who will graduate this December, has an Assistant Professor position waiting for him back in his home country at Kuwait University.

For my students I have chosen carefully dissertation topics that both reflect my own mathematical research, but also the topics they are attracted to. Although dissertation topics may be related, I never give two students the same topic. I want them to take ownership, and soon become *the* expert of their particular topic. I love the times where the student discovers something new, something I didn't know, so they are in fact now teaching me. This is one thing that makes mentoring graduate students really fun for me. In time they will have the opportunity to pass on this expertise to their own students.

***Promote graduate studies in mathematics.*** I have done this in several ways.

I have been very actively involved in the graduate program in our department for many years. I have served several 2-year terms on our Graduate Affairs Committee, and was chair of the committee for several of these years. Currently I am the Associate Chairman of the department, where I work very closely with graduate students, specifically in their role as GTAs.

I have advised 5 Fellows in our NSF GK-12 program. This is a program funded by the largest grant received by UTA from the National Science Foundation (NSF). It is a very interesting program where the GK-12 Fellows, being graduate students in Mathematics, share their research with selected math classes in local high schools. The Fellows are tasked with incorporating their research into 6 lesson plans to be given throughout the school year. As one can imagine, this is not easy to do. I really enjoyed helping the Fellows drill down to the essential concepts of their own research and then figure out how to tie these concepts in with the high school math curriculum. The high school students get some exposure to research in mathematics and graduate studies at the university, and the Fellows develop a better philosophical understanding of their research, and became better communicators of their research.

I organize an annual conference in algebra, called the *Southwest Local Algebra Meeting* (SLAM). This conference travels from university to university, and takes place the first weekend in February every year. The inaugural year (2010) SLAM was held here at UTA. Subsequent years it was held at New Mexico State University, Texas Tech University, the University of Arizona, Texas A&M University, and in 2015 it will take place at Oklahoma State University. The point of the conference is to provide a forum for interaction between graduate students studying algebra and established mathematicians in the Southwest region. There is a series of talks, at least one given by an early-career faculty member, and then three poster sessions, where graduate students present their research to the attendees. This conference has been a tremendous success. We have supported all the speakers and graduate students to attend, through grants

from the NSF and the National Security Agency (except the inaugural year, where support came from the UTA Dean of Science's Office, and the UTA Provost's Office.) It is interesting to note that the PI on the NSF grant to support the 2013 SLAM is my Ph.D. student, Kristen Beck.

Since 2006 I have been a Co-PI for the Department of Mathematics GAANN grant (Graduate Assistance in the Areas of National Need) from the Department of Education. The point of the grant is to help support American citizens or permanent residents, especially those of underrepresented groups, to successfully complete a Ph.D. degree in a STEM field. I feel very passionate about this mission. The nation can't keep importing mathematical expertise. We must train our own citizens. Women and minorities are also vastly underrepresented in mathematics. This grant helps to remedy the situation. I am very proud to be married to a woman mathematician. Moreover, I'm also extremely proud of the fact that of my 8 current or finished Ph.D. students, 4 of them are women, one being Hispanic in addition.

Perhaps one overarching theme of the three premises of my mentoring philosophy, is that the training of the next generation of Ph.D.s does not simply take place in the classroom or laboratory. It takes place at parties. It takes place at conference dinners. It takes place on hikes in the mountains of Norway. It takes place while writing grant proposals, letters of reference, conference talks and posters. It takes place as much in what you do, as what you say.

