A Fulbright Experience in Engineering Education in a Developing Country: A Year at the Polytechnic of Namibia

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Abstract
The US Fulbright Scholar Program is sponsored by the US government and provides the opportunity for educators and professionals to lecture and perform research at institutions throughout the world for periods of two to twelve months. The goal of the program is to promote mutual understanding and benefit through contributions to host countries as well as home institutions upon the return of grantees to the United States. In the 2001-2002 Fulbright Awards Catalog there were 41 awards listed in the engineering discipline for assignments in developing countries but only ten of these were filled with engineering educators or professionals. The purpose of this paper is to provide information about the Fulbright experience in engineering education in a developing country to those considering such an experience, and to possibly spark an interest in those who have not.

The paper will be based on my experience as a Fulbright Scholar at the Polytechnic of Namibia in 2002. In it, I will discuss the application and selection process, and financial arrangements for Fulbright Awards. In addition to this, I will talk about preparations taken for living in a developing country and some aspects of living there, and will cover the differences and similarities of engineering education and engineering in general in the United States and Namibia. Finally, I will discuss the potential benefits and challenges to both professional and personal development from such an experience.

Background
The Fulbright Program was established in 1946 and is currently the U.S. government's flagship academic exchange effort. Its aim is to increase mutual understanding between the peoples of the United States and other countries through the exchange of persons, knowledge and skills.[1] It is funded by the U.S. government and administered by the Department of State, Bureau of Educational and Cultural Affairs with the assistance of the Council for International Exchange of Scholars (CIES).

There are several programs that are encompassed by Fulbright. Some programs bring Non-US scholars and students to the U.S. for study and work. Other programs allow U.S. scholars and students to go to other countries. These include the Student, Distinguished Chair, Senior Specialist, and Fulbright Alumni programs. The program I participated in was the Traditional US Scholar Program.[2] Awards are given for scholars to lecture and/or perform research at a host institution for a term that can range from two months to an academic year. Eligibility is limited to US Citizens and a Ph.D. is require for engineering applicants coming from academe.

Over 94,000 Americans have participated in the program so far with nearly 800 U.S. faculty and professionals sponsored each year.[1] In 2004-05 there will be awards offered in 45 disciplines or fields in 140 countries.[3] A majority of these awards are for assignments in developing countries[1]. A list of developing countries with awards in Engineering for 2001-2002 is shown in Figure 1 for an example.

Application Process
The application process begins with a request for a U.S. scholar generated by the host institution. In my case the Polytechnic of Namibia had not ever requested a scholar before and was encouraged to do so by the Public Affairs Section of the US embassy in

Argentina	Oman
Armenia	Pakistan
Bosnia and Herzegovina	Poland
Botswana	Romania
Cameroon	Rwanda
Cote d'Ivoire	Senegal
Croatia	South Africa
Ethiopia	Sri Lanka
Honduras	Tanzania
India	Thailand
Kenya	Turkey
Macedonia	Uganda
Malaysia	Ukraine
Mauritius	Uruguay
Morocco	West Bank
Mozambique	Zimbabwe
Namibia	

Figure 1: Developing Countries with Awards in Engineering for 2001-2002.

Windhoek. Requests are approved by a bi-national commission in the host country. In March, a list of the approved award is released in what is called the Awards Book. Figure 2 shows the description of the award I applied for as a typical example.

Candidates are generally allowed to apply for only one award although they can list subsequent choices. We used several criteria in deciding which award to apply for. First we wanted to live and work in a developing country preferably in South America, Central America, or Africa. Secondly we wanted a country that was stable enough that I, my wife, and four children (ages 17, 15, 13, and 10) could move around fairly freely without to much worry. Thirdly I wanted a position where the requested skills matched up with mine. Finally I needed English to be the medium of instruction.

I quickly became interested in the Namibia award because I had experience and an interest in curriculum development. We used the U.S. State Department travel advisories[4] and other online resources to get information about the other criteria. We also talked to colleagues and students at Ohio University who had lived in Namibia to get their assessment of the country.

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[1] The World bank classifies economies by gross national product (GNP) per capita. Generally countries in the low-income and middle-income groups are considered developing. This would include countries such as Argentina (GNP per capita = US$7460), Czech Republic (US$5250) and Mexico (US$5070) on the upper end and countries such as Rwanda (US$230), Mozambique (US$210) and Ethiopia (US$100) on the lower end.

After deciding on the award, the next step is to complete the application. It includes a project title, list of accomplishments, list of accompanying dependents, and description of past international experience. There is a five-page project statement that addresses topics such as how the applicant's background relates to the needs of the host institution, the activities planned for the term, and how the experience will incorporate into the applicant's work when they return home. Also needed are references including a teaching report and sample syllabi of courses relevant to the proposed activity. Applications are due August 1.

Nambia
COMPUTER SCIENCE OR ENGINEERING
Award#1804
Category · Lecturing/Research
Grant Activity · Teach undergraduate courses in computer software development, datatbase development or network administration; electrical or electronics engineering. Assist with curriculum development, in-service training and tutorials. Conduct research in area of specialization.
Location · Polytechnic of Namibia, Windhoek
Length of Grant · 11 months
Starting Date · January 2002

Figure 2: Typical Description of Award.

I had begun corresponding with the Polytechnic and was able to include a letter of invitation that specifically supported my application. I also found that the program officer at CIES, the Ohio University Fulbright Contact Person, and the Fulbrighters on campus were good sources for information, advice and critical review.

The first review of the application is performed by a multidisciplinary peer review committee from the U.S. Criteria used to judge application include professional qualification, match of expertise with needs of host institution, research design and methodology, and the ability to serve as a cultural ambassador. In January the applications that were approved are sent to the bi-national commission in the host county. This committee decides which of the approved applications will be funded. In my case there were four approved applications (three for the University of Namibia and mine for the Polytechnic) with funding for two positions. The Fulbright Board then ratifies the decisions. I was informed that my grant was funded on March 14.

A Pre-departure Conference was held in Washington DC in June for scholars and students going to Sub-Sahara Africa. At this conference there was the opportunity to meet other scholars and get details about such issues as health, security, and finances. The support provided varies by award. Mine provided a US$2600 per month stipend and US$2000 per month for maintenance for 11 months. In addition to this, there was US$14,800 for travel and relocation, US$1000 for educational materials, and up to US$20,000 reimbursed for the tuition for dependent's schooling. I also supplemented this with faculty fellowship leave support from my University.

Preparations

The two most difficult aspects of the preparation for the experience were getting the proper vaccinations and work permits. A travel medicine specialist at our clinic helped us with the former and a combination of the Namibian embassy in Washington, the US embassy in Windhoek and the

Polytechnic helped us with the latter. One other preparation that I found necessary was to give a trusted friend Power of Attorney so that he could take care of issues while we were gone.

It was fairly difficult do much preparation for courses I would be teaching ahead of time. As I found out, the Polytechnic typically does not know exactly what courses are going to be taught by whom even after classes start, so they were not able to give me a teaching schedule before I left. As part of the Fulbright Grant I was allowed to send four boxes of book through the diplomatic pouch. I used this to take some books that I had for courses I could teach but I did not special order any. I also took books and software that was requested by the Polytechnic staff as well as my laptop computer to use in my office.

Personal Activities
The Polytechnic provided housing and a vehicle for us until we could find our own. Within a couple a weeks we were able rent a nice four-bedroom house with a garden and swimming pool located in a good neighborhood. We purchased a four-wheel drive vehicle that allowed us to travel extensively in the country.

One of our major concerns was to find adequate schooling for the children. We tried to make arrangement for schooling ahead of time without much success. When we arrived in Windhoek we found that the desirable schools (both government and private) were completely full. It was not until just before classes started that through personal persuasion and some intervention by contacts from the Polytechnic that spaces were found for our children. After that, they had very good school experience. Each of the children was challenged in some areas but in general were much better prepared than their classmates. They were also able to make good friends that they were sad to leave.

In Namibia, as with most developing countries, security is also a big concern. In general the crime in Namibia is non-violent when the thieves are given what they ask for. There was a car-jacking and several break-ins in our neighborhood while we were there. Our only problems were my wife losing a few hundred dollars in an ATM scam and my daughter getting her purse and cell phone snatched. We tried to stay aware of our surroundings and be as inconspicuous as possible. The other dangers in Namibia are the elements and the animals in the wilderness. We found that discussing plans with Namibian friends and following their advice reduced the risks.

There was very little that we had to do without. We eventually had phone service, a cell phone, Internet access and satellite TV. While we had no major medical problems while there, for minor problems we found the practitioners to be competent and caring. The major lifestyle difference was that the pace at which you could accomplish standard chores was much slower. For example, going to the bank would usually take at least an hour. After being initial frustration we learn to relax, lower our expectations and enjoy visiting with people while waiting in line.

Professional Activities
The Polytechnic of Namibia became an independent and autonomous institution in 1994. It is located on a 16-acre campus just west of Windhoek City Center and currently has approximately 4000 students in four colleges: Business, Natural Resources, Communications, and Engineering

and Information Technology. Engineering education began formally in 1997 when the Polytechnic took in its first class of Certificate (one year of academic work and one year of practical training) and Diploma (two years of academic work and one year of practical training) students in Civil, Electrical, Electronics and Mechanical Engineering. In September of 2000 the Polytechnic inaugurated a new Engineering Building consisting of 15 classrooms, 13 laboratories, 34 offices, and auditorium and study areas for students. In 2002 the Polytechnic offered its first B Tech degrees in Mechanical and Civil Engineering. A B Tech in Information Technology is planned to begin in 2003 and the B Tech in Electrical and Electronics in 2004.

I found the academic environment in Namibia to be very similar to what it is in Ohio. Faculty members are primarily concerned with how to help students learn while fulfilling their other duties required in the job. In addition to this, they also worried about how to assess student learning, what employers desire from graduates, and what needs to be done to maintain accreditation.

In the Departments of Electrical and Electronics Engineering, beside myself, there were 3 native Namibians and 4 foreign faculty working on two-year contracts. The academic qualifications of the staff were 2 Ph.D.'s, 2 Masters, 1 Bachelors, and 2 National Higher Diploma. The standard teaching load was 3 courses or 15 contact hours. Reductions were granted for active research projects and administrative duties. However, very few of the staff were involved in research.

The technology infrastructure for staff was very good. The students' technology was not quite as good with lines waiting for computers in the labs and slow Internet access. The library was small and crowded and had a relatively small number of books and no periodicals. The availability of online resources helped some but I found it very difficult to perform a literature search. It was also very difficult to obtain institutional information such as the number of students enrolled in programs and the location of graduates. There was some secretarial and lab technician support but not the amount that I am accustomed to.

As part of my duties at the Polytechnic I taught 32 third-year students in Digital Electronics 3 during Semester I (Feb-June) and the following course Logic Design 3 during Semester II (July-Nov.). The courses were team-taught with a Polytechnic Lecturer so I was able to share some of my teaching strategies with the staff here as well as learn from them. The major adjustment I had to make in my teaching was be more flexible in the organization of my classes. Both semesters' classes did not start until a week after the scheduled date and we often had to cancel or modify classes for holidays, meetings, staff training and cultural festivals.

The standard load for students was six five-hour courses although some students did not keep up with this schedule and had fewer courses. They were generally very conscientious about class attendance and completing shorter assignments. They seemed to have trouble with longer and more complicated assignments due to underestimating the amount of work involved. The students were excellent at learning facts and figures and their math skills were generally good. Most of the students had an extremely difficult time with assignments that involved design.

About one quarter of the students lived on campus in the residence halls. Some lived in off-campus housing with other students but most lived with relatives in the townships outside the city.

Many of these lived in conditions that we would consider distracting to their studies, such as no electricity in the home for lights to study with in the evening or sharing rooms with several other family members. Despite these obstacles the students were very good-natured and optimistic about their future.

The other major difficulty they encounter is with language. Although English is the official language of Namibia and the language of instruction at the Polytechnic it is the native language of no one. In my class there were 13 different mother tongues not including different dialects of some of the indigenous languages. Even so, the students were able to adequately express themselves orally in English. Their writing was much weaker.

My major task was to assist the Polytechnic in developing a B. Tech (4-year) program in Electrical and Electronics Engineering. We also performed a complete review of their current National Certificate and National Diploma Programs. As part of this process, we developed a 30-page questionnaire that we sent to potential employers of engineering graduates in Namibia. The questionnaire addressed both technical and non-technical topics at the three program levels. As part of my research interest I plan to compare the expectations of employers in a developing country (Namibia) with those of a developed country (US).

Initially it appears that the desires of employers in Namibia are similar to those in the U.S. The major difference in engineering is that in Namibia, since there is not manufacturing, they tend to be consumers of technology rather than developers. This manifests itself in the job functions that are more concerned with adaptation, interfacing, and maintenance rather than design. The level of technology used by industry is current but is typically not state-of-the-art.

Conclusions
This opportunity posed several challenges in both my professional and personal life. One drawback was the disruption to my research program by being absent for a year. This was not a major problem for me as I was just leaving an administrative position. Another concern was the time it took for preparation for the experience. Upon my return I have found that I am not as productive since I became use to the more relaxed pace of the environment and I did not keep up with advances that occurred while I was gone. The major personal challenges for my family and me were leaving relationships and activities both going to Namibia and returning to the US. Finally, although we had no problems, there are definitely more risks involved in living in a developing country for a year.

We found that the benefits of the experience far outweighed the challenges. By teaching in a far different environment I have become a more adaptable teacher. I also learned new teaching techniques from my colleagues at the Polytechnic. The information I obtained on constituent needs could not have been obtained any other way and can also be applied to my department in Ohio. Finally I feel that I have a better appreciation for diversity that I had before.

In Namibia our family had wonderful experiences that we will always treasure. We also got to spend more time together as a family. We all made new dear friends. The experience has allowed me to see issues from a broader perspective. Seeing how the rest of the world lives has also lead

me to reevaluate my priorities. Finally the time away gave me time for reflection. I had not watched as many sunsets in my entire life as I saw in my year in Namibia.

References

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