

Small Colleges Can Get Big NSF Grants

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Abstract

This paper describes my personal journey from a concept to a successful Computer Science, Engineering and Mathematics Scholarships (CSEMS) grant from the National Science Foundation. It explains the steps taken by a new project director at The Richard Stockton College of New Jersey, a small, primarily undergraduate institution with limited experience and support for grant-seeking. The message is that even in a context of inexperience, a small college can persevere and find ways to compete with the big institutions.

Keywords: Writing grant proposals, grant-seeking, National Science Foundation, scholarships, computer science

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1. INTRODUCTION

This article describes my personal journey in pursuing and obtaining a National Science Foundation (NSF) grant of \$395,934 for Math and Computer Science Scholarships for Stockton College. Stockton is a public, primarily undergraduate institution of liberal arts, sciences and professional studies. Opened in 1971, Stockton now has approximately 5351 students, 95% matriculated, with 206 faculty members. Ninety-seven percent of our students are New Jersey residents. Stockton offers undergraduate degrees in 27 programs, and in 1995 began offering professionally oriented master's programs.

My journey began in October 2000 when I traveled to Arlington, Virginia in order to be part of an NSF team that reviewed Computer Science, Engineering and Mathematics Scholarships (CSEMS) grant proposals. As part of a six-person panel that included people from both the academic and business worlds, I read through and reviewed numerous grant proposals. I had never applied for an NSF grant before this, nor even considered it, but my interest was piqued. If they can do it, why can't I? Then I started to answer that question. My

small college does not have a big research support department nor does it have much experience with big grants. Furthermore, in small colleges the teaching load is more demanding than in research institutions. And the excuses multiplied. However, I had a dream. I wanted to get an NSF grant for Stockton and I was going to try my best to get one. I hope this article gives some insights, suggestions and lessons learned from my quest for an NSF grant and inspires others to write a grant proposal.

2. DO YOUR HOMEWORK

Much information is available on NSF grants. To begin, the NSF has a large web site (<http://www.nsf.gov>) that includes a list of the many NSF programs that are available along with the dates when their applications are due. The site also includes NSF publications and abstracts of awards. This is a good place to discover the scope of projects funded by NSF and identify successful project directors who might offer guidance and copies of their proposals.

At many conferences NSF representatives make presentations and are available for questions, advice and sug-

gestions. The Program Officers for particular grants are also available through email and phone and generally welcome the opportunity to discuss ideas, especially if these conversations happen with enough time before the deadlines so that grant writers can act on their suggestions.

However, my most valuable experience was when I was invited in October 2000 to be on the NSF review panel of their CSEMS funding program. This program is named well in that it provides scholarship money for students majoring in computer science, engineering and mathematics. Even if I had never applied for an NSF grant, the panel experience was invaluable. It was invigorating to read many wonderful proposals and be exposed to the interesting and unique programs going on in colleges across the United States. It was refreshing to see the creativity and diligence that is used to solve academic and social problems in these various schools.

After the panel members individually read the proposals, the panel then met to discuss them as a whole. The panel was diverse in many ways. My group of six members came from six different states: Connecticut, Tennessee, New Mexico, Virginia, California and New Jersey. We represented community colleges, state colleges, universities, and businesses. We were male and female and different nationalities. But, we had a common concern: we cared about the education of our future computer scientists, engineers, and mathematicians.

It was enlightening to hear the different viewpoints of the members of the CSEMS panel. We sometimes varied as to what we thought was most important or what was strongest about a proposal. But, we had an opportunity to explain our viewpoints to each other. I felt I was growing as an academic and as a person. I was no longer in my own little world. I learned of colleges in the United States where everyone qualifies for financial aid and other colleges where very few students speak English as a first language. My world was opened up. My horizons were expanded.

I learned that there is no specific formula for successfully receiving an NSF grant. Instead, it is the fit between the demonstrated particular needs of your college and how you propose to satisfy those needs. Adequate documentation for both of these areas is extremely important.

Although the students at Stockton were better off financially than students in some of the other colleges, I nevertheless felt that Stockton students also had a significant need. Many students at Stockton work full-time in order to pay for their tuition. So as I left Arlington, Virginia I was determined to try to obtain scholarships for Stockton students.

One may wonder how I was invited to be on this panel in the first place. I have wondered that myself. Previously to being invited to be on a panel I had made international presentations at ACM Conferences in Sweden, Spain, Poland and Finland. Also, I had made presentations at various conferences in the United States. As I mentioned earlier, NSF representatives quite often attend conferences. My guess is that someone knew of me through a presentation that I made at a conference and thought that I could contribute to the program. However, since my panel experience I have been asked to be on subsequent panels and I have also been asked to recommend other panelists. Therefore if one desires to be on an NSF panel, he/she should send an email to the proper program officer with a short description concerning his/her interest and credentials. NSF has many grant panels and needs many good people.

3. STUDY THE PROGRAM SOLICITATION AND GRANT PROPOSAL GUIDE

Each NSF grant program comes with its own Program Solicitation. This includes General Information, Eligibility Information, Award Information, Proposal Preparation and Submission Instructions, Proposal Review Information, and Award Administration Information. The program solicitation is one's Bible. One must know it thoroughly and follow it exactly. Martincic and Carlson (2003) do a fine job in their article describing the CSEMS program solicitation.

In addition, one must read and study the standard Grant Proposal Guide. This gives general information that must be followed for all NSF grant proposals.

One may obtain these documents on the website, by sending an email: pubs@nsf.gov, or by calling: 301-947-2722. Everything one needs to know can be found in these two documents. The documents also include contact information if a person has questions.

4. WRITE THE PROPOSAL

It takes much thought and effort to write a good proposal. And a college professor has multiple demands on his/her time. I felt that I needed to work on the proposal in the summer when I had more time, but I did not want to give up income from teaching summer school. Therefore, I applied for an internal grant at my college to pay for the time that I would commit to NSF-grant-proposal writing in the summer. To my surprise, I was the first faculty member to apply for an internal grant in order to write for an external grant; however, the committee said yes and I spent the summer of 2001 writing the grant proposal.

There are many good reasons to try for an internal grant if one is available besides the obvious monetary gain. In

giving me the internal grant the college is showing me positive reinforcement. Also, it is good for NSF to know that the college is demonstrating support.

Some help in writing the proposal was given to me by Stockton's one-woman grants office. Since that time additional employees have been hired. The grants officer had some experience with NSF grants. She assisted me with many challenges and gave me much needed moral support.

It is not my intention in this paper to go into all of the specifics of the writing of the NSF CSEMS grant for which I applied, but rather to give general information for writing an NSF grant. The first significant concept is that when it comes to educational programs, NSF does not want a one-man or one-woman show. NSF wants to see across-the-college support. NSF wants many stakeholders that will care for and enable the grant. Of course there is only one PI (principle investigator) who has the ultimate responsibility, but NSF wants to see a strong support group as well.

Quite often NSF programs encourage efforts to increase the number of members of underrepresented groups such as women. This is true for the CSEMS program as well. Therefore, we included in our proposal that Stockton only had 27% (104 females out of 384 students) female computer science majors and that one of our goals was to provide support services particularly for them. Although 27% female was slightly higher than the national average, we wanted to do better. This was partially achieved by a course called, *Women in Computing*. This course targets freshmen and serves to recruit women into a computer science major. Incorporating research findings, this introductory course was designed to help interested women build computer skills and confidence before enrolling in their first programming course (Davis 1996). In addition to this course, we emphasized in the proposal that we had three female faculty mentors for our female students.

It is important to highlight what is good about your present program but you may also mention a void or two that the grant might fill. In our case, Stockton had no tutoring in computer programming. One of the goals of our CSEMS project was to provide this tutoring for our students. In our proposal we pointed out that tutoring in computer programming would lead to better retention in the computer areas.

For another school's viewpoint of CSEMS activities and support services, check out Saint Vincent College NSF-CIS web page (Saint Vincent 2004).

5. LEARN FROM MISTAKES

Our first try at an NSF grant, in the Spring of 2002, resulted in a "No." Someone once said that a smart

person learns from his/her mistakes, but a really smart person learns from others' mistakes. Maybe the reader can learn from my mistakes.

The CSEMS grant supports scholarships for low-income students in computer science, engineering, and mathematics. The academic institutions select the recipients and provide a student-support infrastructure that is necessary for the successful graduation of scholarship recipients.

In our first grant proposal we described various activities that we would provide as part of our infrastructure that would guide students toward graduation. For example, one of our ideas was a one-credit course called *Bridges Connecting Computer Science and Calculus*. The purpose of the course is to clearly demonstrate connections between calculus and computing, and give students practice and motivation in a female- and minority-friendly setting. It is meant to be taken in conjunction with a standard calculus course. We also described the new course called *Women in Computing*.

The following is a comment that we received from a reviewer the first time around:

"The new user-friendly calculus course has been neither designed nor tested. It appears the same is true of the Women in Computing course."

Originally we thought that the process in obtaining a grant was: a) describe good ideas in the proposal; b) receive an NSF grant; and c) implement the good ideas.

I realized after reading the reviewers' comments that the order should be: a) develop and implement good ideas as pilot studies or on a limited scale; b) describe the project's broad implementation in the proposal; and c) receive an NSF grant to carry out fully all the activities.

NSF does not want to waste their money. They want to support programs that will work successfully. They want good ideas with lots of detail and flesh on them. Preferably new programs should be designed, implemented and tested. Therefore, when we wrote our revised proposal we included a course description and syllabus for the *Bridges Connecting Computer Science and Calculus* course and an article (Mathis 2002) describing the piloting and testing of the *Women in Computing* course.

Another reviewer made the following comment:

"The proposal contains not much data on the department itself."

NSF wants to know the context in which the grant will thrive. Describe the members in your department and

how they will impact and support the grant in a positive way. It would probably be valuable to include a letter from your department endorsing the PI and stressing the department's commitment to the project.

One reviewer wrote the following:

"It is unclear how much support by administration is present."

Along with a letter from the department, request a letter from the administration as well. NSF wants to know that there is support throughout the college, especially from those who have authority for getting the job done.

6. LEARN FROM POSITIVE COMMENTS

Even though we were turned down the first time we still received many positive comments that we used to make our second attempt stronger. One should learn from the positive as well as the negative. I will only include general comments, not ones that are specific to the CSEMS proposal.

A sample of positive comments:

"Proposal is well prepared and proposers seem qualified."

"The proposal is very well documented."

"The proposal program is well designed."

"The management plan, schedule, and evaluation plan are solid."

7. TRY, TRY, AGAIN

After carefully studying the positive and negative comments, we rewrote the grant proposal. Of course, a year later, in Spring 2003, the NSF panel that reviewed the CSEMS proposals would be a different panel than the previous year. However, we had to work with the premise that various panel groups would have similar likes and dislikes. This is not necessarily true, but it was the best assumption that we could make. We also included any new wonderful ideas that we thought would strengthen the proposal.

8. ENJOY THE FRUIT OF YOUR LABOR

Well, it happened. In the Fall of 2003 we received notice that our grant proposal was accepted. The project is providing scholarships for 30 talented but financially disadvantaged students to encourage and enable their achievement of baccalaureate degrees in Computer Science and Information Systems or Mathematics. In addition to financial support, the students are receiving academic and nonacademic support in order to improve their knowledge and skills, to increase their retention, to improve their professional development and preparation

for employment, and to increase their placements in graduate school.

As PI I am busy working with people throughout the college in order to implement the grant. This is a real plus for me. Many people who were just faces for the past ten years I now call my friends. It is great to learn how other areas of the college work. I would strongly recommend that a PI request a course release from the college. The course release allows me to get the job done well without feeling that I am neglecting my classes.

After ten years as a college professor I was ready for a new experience. Pursuing, obtaining, and now implementing an NSF grant is a wonderful and challenging experience. Of course the implementing has only begun but I am looking forward to this new journey with excitement and anticipation.

This article was based on a one-time experience in pursuing and obtaining an NSF grant. Obviously, different grant programs have various requirements and the information that was described in this article may not pertain to every NSF grant program.

I hope this article gave some insights, suggestions, and lessons learned from my quest for an NSF grant and inspired the reader to write an NSF proposal. Indeed, small colleges can get big NSF grants.

9. REFERENCES

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