Problems and Successes with NSF Scholarship Grant

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Abstract

In an attempt to attract minority and first-generation college students to engineering, math, and computer science degrees, the National Science Foundation funded several Scholarship programs. Texas Tech University competed and received one of these grants. This grant has been a major benefit to minority students who met the qualifications. Initially all students had to be eligible for a Pell Grant or Title IV need if they went to graduate school. We had difficulty in finding students with this severe degree of financial need. This requirement was later relaxed, and we have been successful in finding qualified students to award scholarships.

We will also report trends in grade point average, percentages of students who have graduated, and percentages who have graduated and gone to graduate school. Results from this report should be useful to other institutions writing proposals or administering similar programs. We also provide a list of recommendations for future programs of a similar nature.

Introduction

Knowledge is power. Knowledge plus skills to use knowledge is engineering. Even with the current economy, engineering graduates are still in demand. Thus, it is important for our nation to enable financially needy and minority or first generation college students to complete engineering, computer science, and math degrees. Financially needy students often try to supplement their financial resources through work. Excessive work while attending college reduces time available to learn and prepare for exams. Students often try to make up study time by cheating sleep. As sleep debt increases, student performance declines. Thus, financially needy students can easily become trapped in a system that leads to poor academic performance, delayed graduation, or even academic failure.

The National Science Foundation, NSF, has provided two- and four-year colleges an opportunity to compete for grants to award scholarships to computer science, engineering, and math students who qualify as minority, female, or first-generation college students. Texas Tech University competed and received funding to award scholarships to students who met the selection criteria. In addition to being minority, female, or first-generation college student, our students had to have a grade point average, gpa, of 2.5 cumulative or better, be a US citizen, and be within two years of graduation (junior in major).

Students receive $3125 per year for up to two years. At Texas Tech University, this scholarship amount is about one-third of the total cost to attend college for two long semesters. This amount plus work with industry through a co-op or internship can almost pay the cost of education and greatly relieve financial stress. Our students can also apply and interview to become a Peer Mentor or College of Engineering Ambassador. Each of these opportunities provides leadership training and additional financial help.

We also wanted to provide the right mix of encouragement and safety net without robbing them of valuable time needed for study. We have a battery of tools now packaged at a website, **E— COACH** (**C**ollege **O**ptimal **A**dvisor and **C**areer **H**elper) that can be used to provide just-in-time information and assessment to help students succeed in college.[1] **E—COACH** can be accessed from the College of Engineering web page at www.coe.ttu.edu. Students can use this site for assessment and feedback of information in selecting a major, determining type of leadership strength, learning how to learn including study and time management, and sleep management. **E—COACH** also provides access to **QUICK Advisor**, which includes online scheduling and registering for classes. While all students at Texas Tech University have access to these tools, we monitor the gpa of NSF scholars (our small test group to determine who the processes will

apply to the entire college) and intervene when needed. We originally planned to be more involved in their lives, but decided that too much involvement would actually work against the success of the students.

The objective of this paper is to report the outcomes of the students benefiting from the NSF scholarships awarded at Texas Tech University. We also have re-thought the process of helping students succeed in college. We will discussed these ideas and make a few recommendations.

Results

To date, 44 students have been funded at least one semester. Twelve will have been funded the limit of two years at the end of Spring 2003. All 44 students were minority or first-generation family college students. Most, approximately 90 percent, were minority or female. We have continued funding for all NSF scholars from junior colleges with the exception of one white male who is not a first-generation college student in his family. He did not qualify by the rules we established early in our selection process.

Of our 44 students funded, 22 qualified for Pell Grants. During our first year of awarding scholarships, we had difficulty finding qualified students. The primary problem was the need to qualify as Title IV for graduate school or Pell Grant for undergraduate programs. The NSF program goals were to encourage students to complete four year degree plans and/or graduate programs. A success was measured by completion of a B.S. degree or enrollment in a M.S. program. A directive from NSF allowed us to relax these rules. From that point on, we were able to grow the number of students funded. This growth is shown in Figure 1. We also applied for and received a one-year extension with no funding increase but one year of extended time to use the current funds. We have now committed our remaining funds and are not awarding scholarships to new students. We are keeping an alternate list of qualified students to be partially funded for one semester if a current student drops out of the program.

Three students have graduated and gone to work in industry. Four additional students have graduated and are currently in graduate school at Texas Tech University. One additional student graduated and started graduate school at Texas Tech University but left the program. High paying jobs are a temptation to go to work after graduation. To date, we have had a total of eight students graduate after receiving funding. This represents 18 percent of the total number of students receiving funding. We currently have eight students either in graduate school or starting graduate school with an overlap with the last semester of their undergraduate program. This number also represents 18 percent of the total number funded. We are pleased with the number of students who have at least started graduate school. We have several more students about to graduate; thus, we are also pleased with the success toward graduation.
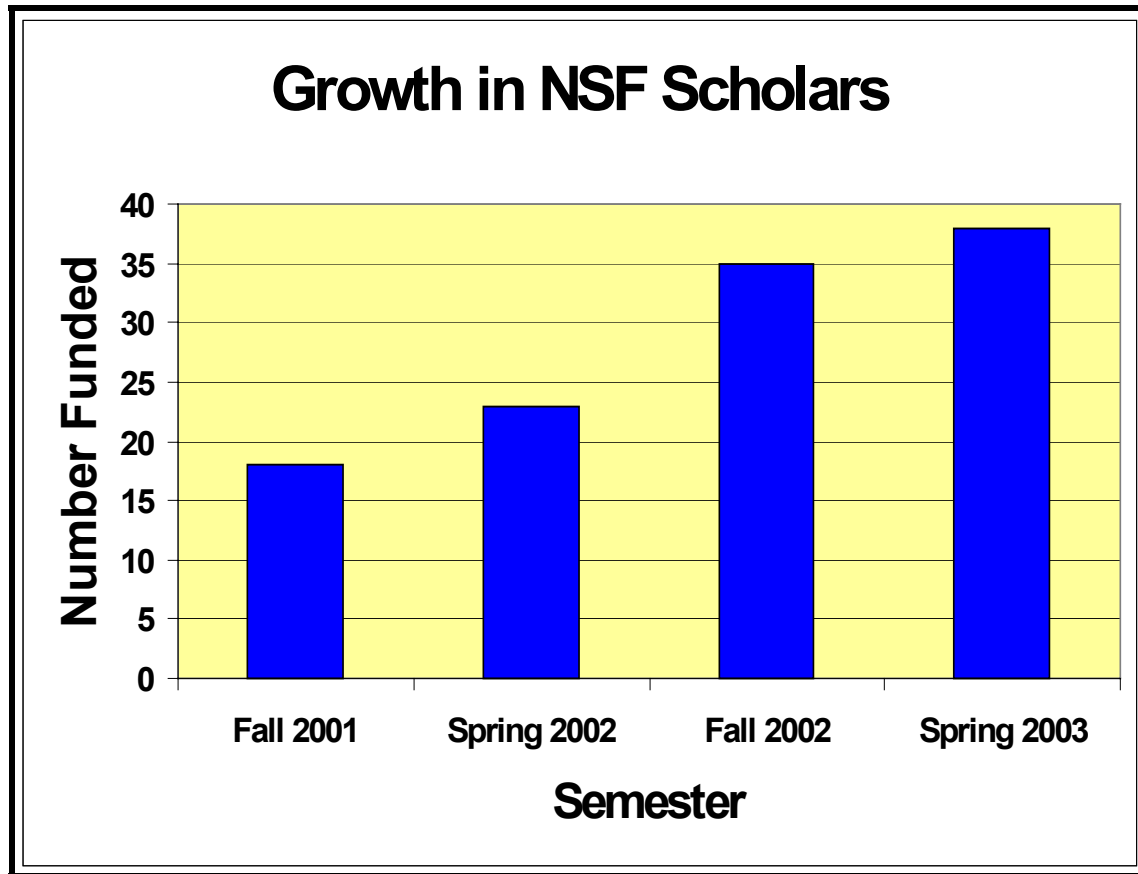
Figure 1. Growth in number of NSF Scholars.

Two students were dropped from the program because their current grade point average dropped below the minimum set in our rules. We give a one-semester grace period with a warning that their gpa have to increase before dropping students from the program. These students did not drop out of school; they are academically in good standing—just not qualified for the NSF Scholarship. Thus, we have lost seven percent of our students because of academic performance. We lost one student because of personal and family reasons but not because of gpa. He is a young father and has complicated his life with much responsibility for the limited resources that he has. He has successfully completed two co-op experiences. Academically, he is near graduation, and we expect him to eventually graduate as he works through his personal responsibilities. He is a very creative and talented student and has written a technical paper with the PI of this project. We, thus, have lost two percent of our students due to personal reasons. Our total loss for all reasons is 7 percent. Thus or retention rate for students in the NSF program is 93 percent. Of the 44 students who have received funding, 98 percent are still in school or

have graduated. While we have had a few students struggle with gpa, the average gpa of all students has been acceptable and has increased over time (Figure 2.).
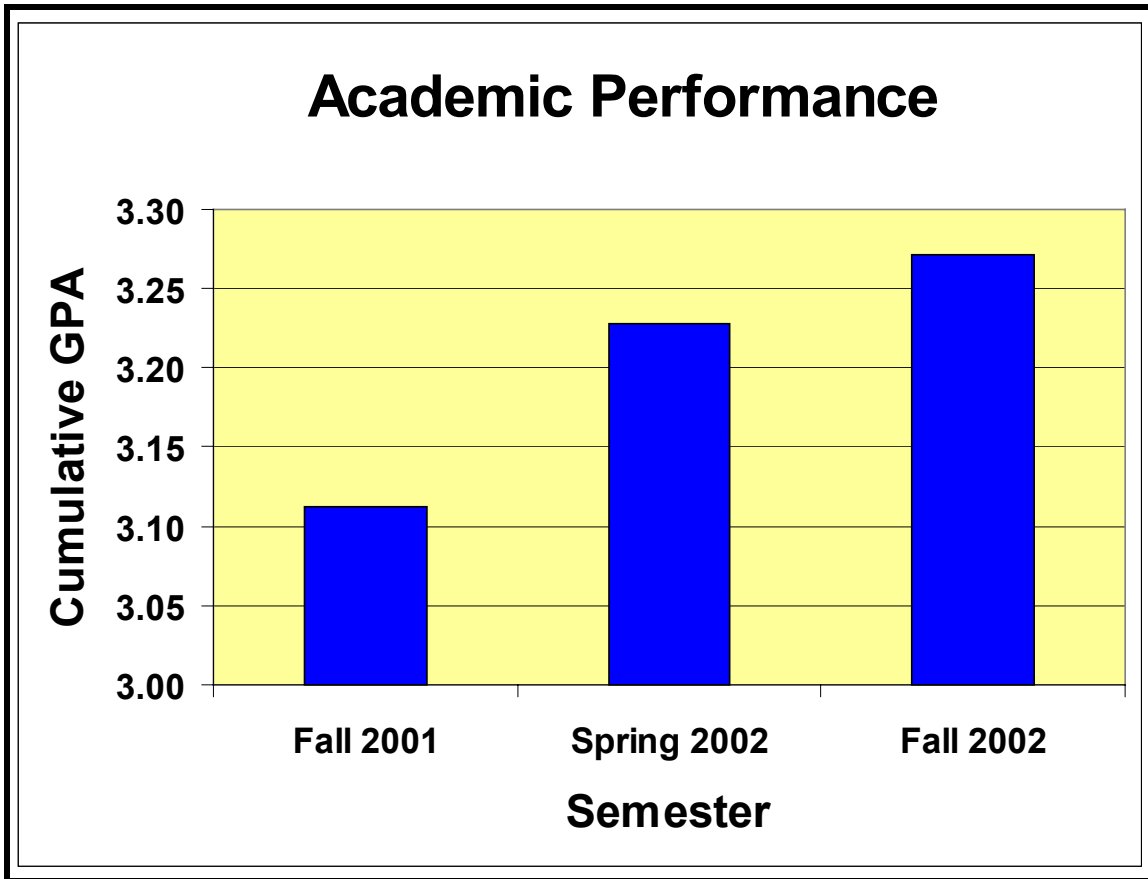
Academic Performance

Figure 2. Improvement in grade point average with progressive semesters.

Administration and Suggestions for Improvements

We think we are evolving to a practical system of education and tools to enable many students to achieve academic success who otherwise would not achieve success. At the same time we see the need to keep a human touch in our advising, coaching, mentoring, teaching and researching. One of our NSF graduates, now working for a major company, became depressed and overwhelmed with life problems when her parents divorced. We discovered that our student was sending money to her sister who was younger and just starting college. We did not undo the divorce. We were able to get her medical help, and we were able to help her focus on getting her degree as a priority so she could then better help support her sister.

As we grow in student numbers and as we see less state resources, we find ourselves very busy. Thus, it is important that we have a tool, such as **E—COACH** that aids the advisor and counselor. With this tool, we can empower students to be proactive and responsible for their own career development. We can also reduce the time that both students and the advisors spend in doing busy work of scheduling. Thus, web-based coaching tools are important assets to achieving academic success.

The NSF Scholarship process, in our opinion does not provide an adequate reward structure to the faculty providing the coaching and mentoring. In our case, the faculty doing the work of helping the students received funds to travel to a meeting of their choice. Funding was too limited to provide a significant addition to salary. People were involved because they want to help students and were often overloaded with other responsibilities. It is generally not a program that a non-tenured professor can afford to do.

Continuity may become a problem. If we are not successful in renewing our program, we will have developed a system that works. We, however, will not have the funding to help with the financial need problem.

Thus, we recommend to ourselves and to other schools the following:
1. Keep the program simple, provide help when needed, but do not harass the student with lots of meetings.
2. Let the financial aid office provide a master list of students who qualify as having a financial need, then update the list for student who apply for the scholarship but are not on the list.
3. Take advantage of other programs in the university that provide economic rewards for mentors, ambassadors, supplemental instructors, etc. These programs provide leadership training as well as financial help.
4. Work out long-term plans for students to include internships and co-op experiences with industry. This help from industry provides both financial help and greatly encourages students to do the assiduous work to achieve a degree. We are now working on a web-base software package that will allow students to develop long-term plans for when to take courses, working around co-op and other opportunities.
5. Use just-in-time coaching with education and advising tools now on the web.
6. Encourage the junior college path for students weak in math skills.
7. Train the advisors across departments to be sensitive to students with financial need and to encourage students not to overload in work and academic load. Also train advisors to question students about sleep management and symptoms of sleep mismanagement.
8. Develop and encourage students to take a professional communication class that integrates oral and written technical communications.

Summary and Conclusions

Overall, the NSF Scholarship program has been a success at Texas Tech University. It has greatly reduced the financial stress for 44 students. Retention of students in the program (Graduation is counted as successful retention) is over 90 percent. Only one student who has received an NSF Scholarship has dropped out of Texas Tech University without graduation. He dropped out of school for personal reasons and is expected to return to complete the last part of his senior year.

We also conclude that the advising system as provided with web-based education tools and the personal advising and counseling as needed is effective in helping students succeed in college. We believe that the recommendations given above can be applied elsewhere with similar results.

References

1. Gregory, J. M., Heinze, L.R., Bagert, D. J., Mengel, S.A., 2002, E—COACH: A Paradigm Shift for Efficient Advising, Frontiers in Education, Boston, Massachusetts.

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