

Academic Program of Review
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William Yslas Vélez
Department of Mathematics
University of Arizona
Tucson, Arizona

My first reading of the Self-Study of the department left a positive impression of the teaching and culture in the department. This positive impression was further solidified by my interactions with the teaching staff and undergraduate students in the department.

In talking to the different constituents of this department I was surprised as to how positive everyone was about the teaching staff of the department. The undergraduates were uniform in their praise for the dedication and teaching ability of the faculty. In fact, I was surprised that the students commented that the teaching was more effective at SSU than it had been at their community college. Mathematics majors stated that they were better cared by the mathematics department faculty than by their own advisors in other departments. Moreover, the students said that they had experienced positive growth during their period of study at SSU.

The lecturers in the department were also very positive about the welcoming culture that exists in the department. They expressed the point of view that they were respected by the tenure-track faculty. They were invited to participate in departmental functions.

I was very impressed with the program of study as described in the Self-Study. It is very rare for a mathematical sciences department to have such a broad spectrum of study programs. A student in this program can pursue studies to prepare for graduate school in the mathematical sciences, prepare to become a pre-college teacher, use the mathematics to apply to graduate programs in other academic areas, pursue employment in industry and the actuarial field. I believe that this program of study has the potential serve the mathematical needs of the student population at SSU and to support university-wide initiatives to prepare a more quantitatively educated workforce.

The department has strived to restrict their class size to about 30. Rarely do I see this and I applaud the department to this. It is the teacher-student interaction that is so important and the effectiveness of this restriction comes from two directions. First of all the students rave about the teaching environment in the department. There is also evidence for this effectiveness in another quarter, and that is its graduates.

As an indication of the quality of the graduates of this program I would like to bring up a project that I have been working on as Chair of the Data Committee of the American Mathematical Society. We have unpublished data on Baccalaureate origins of those individuals who earned doctorates in the mathematical sciences from 2005 to 2104. There were 6903 doctorates, out of 15,174 doctorates, with Baccalaureate origin in the US. There were slightly over 900 departments on this list who had at least one student go on to a doctorate in the mathematical sciences. Berkeley had the largest number, with 163. My department, in a research intensive environment, had 34. This department had 8 and this places this department among the top 200. That is very respectable and speaks of the quality of instruction.

Evidence for the quality of instruction is also found in the number of prestigious teaching awards that the faculty have obtained. Faculty are involved in scholarship activities as evidenced by books published, activities in mathematics education, grants, and many other activities. Publication in mathematical research is not high, but then this department does not have a Master's degree program.

The department and the university

It is not clear to me what the goals of this university are. This is an important question because academic units should formulate their own goals and curricula in support of those university goals.

Mathematics plays a unique role in university studies. Quantitative literacy is more important now than ever before and the curricula and programs of study in mathematics are vital to the education of SSU students. SSU is fortunate to have a dedicated and very capable teaching staff in the department of mathematics and statistics. It is important that the university recognize the contributions that this department has made and more importantly, the vital role that this academic unit could have in the education of SSU students.

Site Visit conversations

I had conversations with several different constituents and I would like to report on these conversations.

Undergraduates

The students were overwhelmingly positive about the teaching staff in the department. They stated that faculty were available and always willing to help. One student commented that when a desire to obtain a summer research experience was expressed, the faculty member jumped right in to help. The student successfully obtained a summer research experience.

I have never been to a department where the students were so positive about the teaching staff.

Concerns: Students did comment that it is difficult to complete the math major in four years because important courses are not offered on a timely basis. In one class that I visited about 40% of the students indicated this was a problem. This is a problem in many departments with small numbers of majors. The department should have a discussion about how this should be addressed in the future. Perhaps by increasing the number of mathematics majors one could offer these courses in a more timely basis.

I asked students if there were many non-math majors in their upper division math courses. I know that there are many double majors in these courses, but how many non-math majors were there. The students said there were few of these students and perhaps indicated the prerequisites for these courses might be a reason for this. I am not sure about this but the issue of having students from other majors taking advanced math courses is important for the university and in making students more competitive upon graduation.

The Math Lab was mentioned by many students. Students appreciated the lab but several made comments about its size. It was suggested that a computer or two in the lab would be helpful.

The requirement of the software package, Matematica, came up. Some transfer students thought that this requirement was difficult for them since transfer students took different courses in their curricula.

Students also expressed an interest in having more upper division mathematics courses be listed as GE courses. In particular, they would like to have the history of math course be so listed. Having more upper division math courses listed as GE would allow math majors to take more mathematics courses.

Lecturers

The meeting with the lecturers was as positive as with the undergraduates. There were some concerns expressed and I will suggest some changes to the lecturer position.

A very important concern was wages. It was mentioned that some lecturers have two full time jobs, one at SSU and another at a community college. A lecturer with two full time jobs cannot possibly be engaged with students and meet their needs. Though salaries are always an issue at universities it important for the department, in conjunction with the administration, to develop a long-term plan to provide a living wage to its lecturers.

Child care services at SSU was also brought up as an issue. Lecturers who are starting families certainly need such a service. Apparently SSU offers such services but there is a long waiting list for the use of this service.

Across this country mathematics departments are confronting the necessity of utilizing the talents of the lecturer workforce. Lecturers at other universities are provided with a path which recognizes their contributions to reaching the goals of the department and an advancement ladder has been created for them, with different pay scales.

In my own department I have seen that lecturers have taken over several administrative tasks (course scheduling, evaluation of transfer credit, organization of placement exams, course supervision, etc.) which have alleviated the pressure on tenure-track faculty demands and allowed the faculty to function as they should.

Given that there are dedicated and talented lecturers in the department, it would serve the student body well if the lecturers were allowed to more fully participate in the administration of the department as other universities have done.

Conversations with department heads

I met with the department heads of physics, an engineering program, and chemistry. They were all very positive in their evaluation of the mathematics department. The mathematics department has a good reputation for teaching and has good working relationships with other departments.

I brought up the issue of the software package Mathematica, which is used extensively in mathematics courses. Both physics and engineering use Matlab. Given that the mathematics department is so student focused it seems odd to me that they would use a different software than these other departments. I think that there would be a more seamless system of education to have one software system in use. If students would become more proficient in one software system, they would be more competitive upon graduation.

The program of study for the mathematics major in the department

Mathematica and programming skills of mathematics majors

Programming skills are now such an important component for competitiveness, both in employment and in pursuing graduate studies. It appears that this department only requires a course in Mathematica. I think the students would be better served if they graduated with more programming skills. In my own experience with mathematics majors I have found that good programming skills opens up opportunities for them while they are undergraduates and upon graduation.

The degree options for mathematics majors

I am very impressed with the flexibility of the mathematics major program of study. Students at SSU are well served by these options. I am particularly impressed with the opportunities for students to double major in the Bi-Disciplinary program. There was an issue that came up that was of concern. Apparently this program was designed with the idea that students would graduate with another major, but not all have. Also, it does not appear that mathematics majors are required to have a minor in some other academic area. At the very least students in the Bi-Di program should have what is essentially a minor in some other area.

The statistics program

This program is poised to provide great service to the students of SSU. Certainly everyone recognizes the importance of statistical training for today's workforce. This program of study has two components, one aimed at post-graduate study and another for those students who want to join the workforce. Excellent.

I suggest that this program of study would be made more effective if the department created a GE course in data science that would encourage students to pursue studies in statistics. Here is a link to some ideas of data science courses.

<http://www.stat.berkeley.edu/~nolan/Papers/Data.Science.Guidelines.16.9.25.pdf>

The Self-Study pointed to the lack of faculty in statistics. It is clear that a teaching force in statistics is necessary. It is important to recruit statisticians to the faculty and I urge the department to focus on this. However, it is also understood that it is difficult to recruit statisticians.

I suggest that the department be proactive in addressing the need to have a teaching force to teach statistics. There are many talented faculty in the department and if the administration put in funds to help faculty learn not only the subject matter of statistics but also the latest pedagogy used in the teaching of statistics, this would alleviate some of the pressure.

Moreover, there is another opportunity here. From conversations with faculty I learned that there are actuarial firms nearby. As part of the learning process I mentioned above, I suggest that faculty take the first two actuarial exams and use all of this to make contact with these firms to open up opportunities for the SSU students and also for summer positions for faculty.

Remedial level courses

The department has created stretch courses which are offered in a semester. This is being changed to be offered over two semesters. This might prove effective.

All universities are struggling with this issue. Recently Dr. Virgil Pierce from the University of Texas Rio Grande Valley gave a colloquium talk at the University of Arizona entitled, College Prep Courses for Local High School Partners, <http://math.arizona.edu/events/8314>. The mathematics department might look into the project.

I would suggest that there is another way of impacting some of these students who require remedial work. Why is this happening? Why are so many students falling into this category? One problem is that high school students do not understand the importance of mathematics. Another is that students spend the summer between high school and college not reviewing mathematics. When they take placement exams they simply are not prepared. Moreover, it is likely that students did not internalize the ideas in their high school classes.

I would like to see all entering college students to be aware of the following free on-line course-A course on learning how to learn. Here is the website for this course.
<https://www.coursera.org/learn/learning-how-to-learn/lecture/1bYD5/terrence-sejnowski-and-barbara-oakley-introduction-to-the-course-structure>

I suggest that the department obtain the emails of all students who have been accepted to this university, welcoming them to the university, referring them to review material for their placement exam, suggesting that they take the above course. In fact, it might be possible to develop a program whereby SSU students would help incoming students over the summer to prepare them for their first year in college.

Perhaps by making students aware of the importance of preparing for their up-coming college experience it might alleviate some of the reliance on remedial courses.

Managing the math major program

Besides recruiting students into the math major, it is equally important to develop a sense of professionalism among the math majors. Math majors should have resumes. Here is a link to a Sample Resume that I created for use by our students.

<https://mathalliance.org/wp-content/uploads/2014/05/Sample-Resume-2016-17-1.pdf>

I believe that by the time mathematics majors have graduated they should have functioned as mathematicians-learning mathematics, communicating mathematics, and creating or applying mathematics.

What opportunities are available for students to communicate mathematical ideas to others, besides tutoring?

Most of the summer research opportunities are for those students who have completed their junior year and it is difficult for students to be competitive for these national programs, especially for first and second year students. I suggest that mathematics faculty establish contact with researchers on campus in an effort for local researchers to have mathematics majors in their labs. Students with analytical skills and the ability to program would be competitive in these labs. Such experiences would be formative for mathematics majors in their early years.

The department might consider becoming part of the Alliance, whose website is below.

<https://mathalliance.org/about-the-math-alliance/>

Increasing the number of mathematics majors

Students would benefit by taking more mathematics. The phrase, “Increasing the number of mathematics majors” is a code word for “Increasing the mathematical content of an undergraduate’s course of study”. Certainly this is something that we would want for all of our students.

In the outreach letter that I mentioned above could be used to encourage students to add the mathematics major to their program of study.

I have found that sending email messages to transfer students has been very effective in encouraging students to take more mathematics.

Pre-service students

Students who plan to become teachers in K-12 should be encouraged to take the course on learning mentioned above and to take an active role in encouraging other SSU students to take this opportunity. This role could be viewed as a professional development opportunity for them.

I would also suggest that these students take an active role in encouraging high school students to take part in the MAA competitions, whose website I have included below.

<http://maa.org/math-competitions>

The problems that appear in these competitions are challenging but very interesting. If we could encourage pre-serve teachers to take an active role in these competitions then as in-service teachers they might be more willing to have their own students participate.

At my university we have a course on tutoring in the high schools that this department might consider adopting. In this course students are given guidance as to how to become effective tutors. Then students are paired with a local school to gain experience in tutoring and to be better understand if they want to join the teaching profession. When the students are in the schools the students are paid as tutors. Oftentimes, after the course is over the students are hired by the schools as tutors.

A model for establishing contact with local high schools

For several years our department has a program whereby we invited pre-college teachers to spend a year in the department teaching lower division courses. While these teachers were in the department, they would also participate in some educational activities that served as professional development. While they taught for us for that year they were paid by the school where they had been teaching and were considered employees of that school. The university provided replacement costs to the school to replace that teacher for a year. Due to severe budget cuts to our university, this program was discontinued.

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William Yslas Velez