

Notices

of the American Mathematical Society

R E P R I N T

Not Business As Usual

Mathematics departments are not taking care of business. Nearly 20 percent fewer mathematics bachelor's degrees were awarded in 1998 than in 1985. How can it be that at a time when higher-quality research is occurring at more and more institutions, interest in mathematics among undergraduates is decreasing?

It should be the department's responsibility to attract undergraduate students to the study of mathematics and to retain them. Departments have failed to accept this responsibility. They have placed an overemphasis on the creation of new mathematics instead of new mathematicians. Faculty fully understand the yardstick by which they are measured. It is not teaching, it is not outreach, it is not mentoring; it is research.

I value the excitement of carrying out a research project, the joy of discovery, the thrill when a proof comes together. Research is vital. Research brings with it the understanding of complex phenomena, it gives us insight into structures, it displays connections that were invisible. But our undergraduates simply never see this aspect of our work. Too often we view research as an esoteric activity, the end result of which is a presentation at a research conference or a publication in a journal. We need to share the excitement with our students and make the grand ideas visible in our undergraduate curriculum.

Departments have failed to understand how critical it is for our undergraduates to obtain a sound and working knowledge of mathematics and how important it is for departments to produce such students. Having more mathematics majors in the work force is beneficial for mathematics. With an increase in the number of mathematics majors, more students will think about advanced degrees. Departments nationwide have difficulty finding qualified U.S. students to enroll in their graduate mathematics programs. Many departments depend on a large cadre of foreign students to keep their graduate programs running. Although the NSF VIGRE program is intended to encourage departments to pay attention to the education of U.S. students, critics have complained about VIGRE funds being restricted to U.S. citizens and permanent residents! Graduate programs want the best students, somehow implying that these students do not exist in the U.S. It makes no sense to ignore the mathematical education of our undergraduates and then to complain about the lack of mathematical preparation of U.S. applicants for graduate school.

The focus on research and the corresponding lack of attention to undergraduate mathematics majors have also served to decrease the number of minorities going into mathematics. Traditionally underrepresented minority groups such as Mexican Americans, Native Americans, and African Americans have been excluded from our profession, and even now these minority groups are almost invisible in our graduate programs. The internationalization of our mathematics departments over the last

twenty years has resulted in very few from these minority groups being hired into faculty positions at our research universities. Since minorities are not part of the mathematical enterprise, minority concerns are not given voice in departmental matters. With so many other pressing concerns in a department, diversity issues are relegated to rhetoric. One doesn't need to have minority faculty in order to reach out to the minority students. However, minority faculty tend to be more concerned about diversity issues. It is just human nature.

I am not saying that our universities should exclude mathematicians trained abroad. I am saying that by depending heavily on this group to fill graduate school and faculty ranks, U.S. colleges and universities have managed to get by without giving proper attention to their undergraduates. Just getting by is a dangerous strategy, since American universities and American research efforts depend on U.S. tax dollars for their funding. Our attitudes toward undergraduates must change for the health of our subject, of our universities, and of our nation.

I would like to close with some recommendations for mathematics departments.

1. Departments should diversify their activities and their hiring. Research and scholarship; effective teaching; outreach to the local community; and recruitment of undergraduate mathematics majors, with special emphasis on integrating these students into the scientific life of the department, the university, and the nation, should be part of the portfolio of a department. Departments should hire and promote faculty who will be helpful in this endeavor.

2. Departments should substantially increase the number of undergraduate mathematics majors. Departments should establish collaborations with those mathematicians who have developed ideas and programs for increasing the number of mathematics majors.

3. Departments should recognize that the bachelor's degree in mathematics is marketable. Departments need to work with employers to ensure that mathematics majors are recruited by more firms.

4. Departments that have graduate programs should look upon their incoming graduate students as a national investment. Every effort should be made to insure that this investment pays off.

5. Departments should recognize that they are part of a neighborhood and that outreach to that neighborhood should be part of their portfolio. There should be faculty in a department that can achieve this goal.

6. Funding agencies like the National Science Foundation should require that all proposals include departmental documentation for the items listed above. The NSF is already asking this from Principal Investigators. An individual's efforts should reflect the activities of the department.

—William Yslas Vélez
University of Arizona
velez@math.arizona.edu