

Brown University Faculty Forum
Subject: Improving Undergraduate Education in the STEM Fields at Brown
April 24, 2007

The Chair of the FEC, Professor Ann Dill, introduced the Chair of the Faculty Forum, Professor Tom Banchoff, at 12:00 PM in Petteruti Lounge. After introducing himself and the Secretary (Lecturer Laurie Heller), Professor Banchoff explained the format of the forum and gave the floor to Professor Karen Fischer, chair of the Undergraduate Science Education Committee (USEC). Professor Fischer explained that the purpose of the forum was to solicit wide-ranging comments on the draft document distributed prior to the forum which contains the USEC's recommendations. Professor Fischer then introduced those members of the USEC committee who were present and committee members expressed willingness to be contacted with questions after the forum. Professor Fischer then gave an overview of the four main areas for discussion: curricular (especially to introductory classes), undergraduate research (increased opportunities and funding), support/advising (e.g. a Science Education Outreach Center (SEOC), increased study groups and minority support), and admissions/recruiting (e.g. reconfiguring admissions materials and improving the pipeline from existing science-focused outreach programs in local highschools).

Professor Banchoff then opened the floor to discussion, beginning with the topic of admissions.

The first comment made about admissions was that science admissions could be improved with better publicity of Brown's strong points by the Office of the Vice President. It was pointed out that Brown faculty need to better support Brown's existing efforts to publicize student research such as poster sessions. It was suggested that we could attract gifted highschool students in summer school programs (although they would not be guaranteed preference in the admissions process). One professor has had success with enthusiastic students who learn by teaching in local highschools ("teach it forward"). It was suggested that publicity for undergraduate science research could be improved if UTRA support was tied to being required, at the end of a project, to sending a blurb to the admissions office.

Discussion turned to UTRAs as a success story at Brown with students truly participating in scholarship (not just in the sciences). Given this success, it was stated that students should not go wanting for research experiences and that increased funding for them should be a priority. It was suggested that particular students could be recruited by promising them research funds for a couple of years (contingent on good performance). It was pointed out that alum contributions would probably be high if they were specifically targeted for undergraduate research. One faculty member thought it would be good to be able to fund more than one year for a student so that older students in the lab could mentor younger ones. There was strong agreement among the faculty present that Brown is losing students to other universities because of the funding level for UTRAs.

Discussion turned to the responsibility of professors in the sciences to fund some undergraduates with paid research activities from their grants. NIH and NSF will no longer allow grants to pay the \$500 co-pay required for UTRA fellowships so it was suggested that this should be waived. Dean Targan said that the Dean's office is willing to negotiate about ways to split grant support of students and UTRAs. Professor Fischer pointed out that 60% of the UTRAs are funded by external grants and that these sources are tapped out in the current funding climate. One faculty member thought that asking what more faculty can do to fund research is missing the point, and felt the University should support research across all disciplines (not just science). Professor Fischer clarified that the additional 50 UTRAs per year that were proposed are across all disciplines. It was pointed out that junior faculty who don't have grants will be especially helped by increased UTRA funds. UTRA funds also help to fund students to try new directions because that is difficult to fund on existing research grants.

Discussion turned to support/advising, and the suggested Science Education Outreach Center. Dean Targan said he is currently in charge of the SEOC's proposed functions but the new facility would have support staff and would be "owned" by the departments and might be housed somewhere else e.g. on one floor of a library.

It was suggested that the tutoring budget could be put into Supplemental Instruction as an improvement. A request for clarification on the Supplemental Instruction program was answered by Professor Webster who explained that it is a national program that targets high dropout-rate courses. Seniors "retake" a class and hold study sessions. Minority and female retention is improved 30 to 40% with these programs that have been around over 20 years. Each professor would have to invite this into their class. Faculty supported this idea. Someone suggested the coordination of these sections could be part of the central facility's responsibility. It was suggested that Math17 (second semester calculus) could have a section with a history slant (Math in the 17th Century) but that such a supplement might not work with every type of class.

Discussion turned to how to encourage study groups in general. It was stated that a framework for instructors to encourage study groups, such as signup sheets, is needed. In Geo22, students are invited to come to a room at certain times to work in groups, with a teacher or TA on hand if needed. It was stated that we need a summary of best practices across the university. The Sheridan Center offered to cooperate, for example by organizing a seminar on Challenges in Teaching Introductory Courses. The mission of the Sheridan Center, the professional development of graduate students and faculty as teacher, strongly relates to the mission of the SEOC but the SEOC is focused on undergraduates getting information and help. The SEOC would also be a resource for encouraging student-run groups (e.g. WISE, Women in Science and Engineering) to be more stable over different leadership eras, and would provide institutional memory (e.g. Chemistry tried Supplemental Instruction already) and be essentially a continuation of the committee that made these recommendations.

It was stated that supplemental sections that are multidisciplinary may work better in some areas than others. Professor Fischer pointed out that this proposal would provide

incentives for departments to reorganize their introductory courses but it won't be forced on them. A mathematics professor thought that he could offload some service requirements and provide context for them in supplemental sections so that the main lectures could have a more consistent thread. In some genetics classes there are homework help sections that work especially well in large rooms.

A show of hands revealed that only 1 faculty member (out of about 40 present) was an assistant professor.

The editor of the faculty bulletin, Professor Peter Wegner, encouraged faculty to contribute short articles on these topics.

Discussion of the curriculum was delineated as (1) support and retention issues in introductory courses, (2) how to ignite students who are interested, (3) how to interest the non-scientists. It was felt that not enough humanities concentrators take science classes. It was stated that teachers need to see good teaching modeled. In former years, Science and Society lectures brought in eminent scientists and it was suggested that this type of thing could increase Brown's profile in science. Professor John Stein was asked to speak about his outreach into highschools. He felt that the trouble in bridging between good highschool classes and doing upper-level research is that some students lose interest during the introductory courses in college. In introductory Neuroscience classes, upper-level students compete for the opportunity to lead study groups. It was suggested that the supplemental interdisciplinary sections could help keep the momentum going through foundation classes by relating it to their specific interests.

The committee rejected the notion of special science courses just for liberal arts students in favor of using multidisciplinary classrooms with smaller sections and more freshman seminars. Professor Banchoff felt that the multidisciplinary aspect of the Modes of Thought Program was missing in the current Freshman Seminars so that students in humanities and social sciences might be less likely to try a science or mathematics seminar. It was commented that Modes of Thought classes were supposed to make Brown's open curriculum work. The Computer Science Department has talked about possibly teaching a few classes about Computer Science in humanities classes. It was claimed that freshman advisors in the humanities are not current in their information about the accessible science classes. It was pointed out that science across the whole curriculum is part of a broader curricular review. It was stated that it is critical to teach thinking outside of the box and networking.

Clarification of a "research-like experience" in the classroom was requested. In courses, this would be labs or other activities organized around an ongoing research project to which the answer is not already known. Eng03 has done that with a design project in an introductory class with good success. That class is pass/fail as are all first year classes at Johns Hopkins. It was stated that a number of years ago, chemistry gave the opportunity for good students to work in labs outside of the classroom; some students found out they didn't like it right away and others continued on to do 7 semesters of research at Brown; this was a success but it was too much burden on the faculty.

The hands-on activity in class in ENG03 was contrasted with faculty-supervised research. The Computer Science curriculum committee recommends that students not do research in their first two years until they have taken certain necessary courses. The committee was congratulated for their efforts.

The Forum was adjourned at 1:30 PM.
Respectfully submitted,
Laurie M. Heller
Secretary of the Faculty Forum
(Cognitive and Linguistic Sciences)