

# A PILOT GRADUATE-RECRUITING PROGRAM

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**D**orothy and John are two outstanding seniors who are beginning to anticipate graduation. Dorothy has worked in a chemical engineering summer job with a company that is eager to have her take a permanent position, while John has worked summers helping professors in various research projects in his department. Both students are vital learners and want to investigate graduate school as a career option.

As they look through graduate school ads and brochures, talk to other students and professors, and read the fall issue of this journal, Dorothy and John begin to generate a list of candidate schools. They notice several marked differences in regard to research emphasis, size of programs, and location, but they are particularly interested in the differences in graduate stipends. Although it appears that the funding differential is less than 10% for the best candidate schools, small discrepancies become significant when their own current budgets are considered.

In early fall both students mail "inquiry forms" to various graduate schools, and a few weeks later they begin to receive the requested information/application packets. By October or November they have submitted several applications (limited somewhat by their student budgets of time and money). Of course, since neither Dorothy nor John want to restrict their other options, they also interview several companies that come to campus. They are interested to note that industrial salaries are a factor of three greater than academic stipends, and that some in-

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**Dendy Sloan** has three degrees from Clemson University and did postdoctoral work at Rice University. He spent five years in industry at four DuPont locations. He has been at the Colorado School of Mines since 1976.

**Bob Baldwin** is a native of Iowa. He received his BS and MS from Iowa State University and his PhD from the Colorado School of Mines, all in chemical engineering. He joined the faculty in 1975 and is currently starting his third year as Department Head.

**D.J.T. Fiedler** has worked as administrative assistant in the chemical engineering department at the Colorado School of Mines for the last two years. Prior to that she spent three years at California Institute of Technology in the Environmental Engineering Department

**Tom McKinnon** has been an assistant professor at the Colorado School of Mines since August of 1991. He received his BS from Cornell in 1979 and his PhD from MIT in 1989. His research interests are in gas-phase chemical kinetics, combustion, hazardous waste destruction, and fullerene synthesis.

**Ron Miller** obtained his BS and MS at the University of Wyoming and his PhD from the Colorado School of Mines, all in chemical engineering. He is currently associate professor on the CSM faculty, where he has taught since 1986.

terviewers discourage participation in graduate work.

The company interviews go well, and both students are subsequently invited for several site visits, at which time challenging and exciting work is displayed. The companies are quite aggressive in their personal contacts. In fact, Dorothy is contacted every month or so by her former summer supervisor for a friendly chat, during which they discuss Dorothy's future plans. In late November, while they are waiting for the first personal contact from a university, both students are being pressed for positive answers to job offers from several companies.

Dorothy, under some pressure for financial security from her family, accepts an offer from a mid-western biochemical firm, and in her natural excitement she tells her friends of her decision. When she subsequently receives a call from Professor Jones of Whatsamatta U. about an interesting research project, she feels she cannot change her mind concerning the industrial position without embarrassment before her peers. The graduate school option is closed in her mind.

John, however, has not applied to the same graduate schools as Dorothy. One graduate school has sent him a video tape of their program, along with

their application packet. A few weeks later the mail brings a follow-up letter and a research summary from the school, inquiring if he has received the packet and requesting the completion of a card that ranks his interests in various research projects.

Because John seems to be an excellent candidate, the department continues to communicate with him about every three weeks. Faculty members (including the department head) call John several times to express their interest in his application. A department administrative assistant, who seems genuinely interested in John's application, serves as the focal point for all written communications. In each letter John receives from the department, he is asked to return some kind of information (in a postpaid envelope) which then provides the department with a progressive exploration of his personal interest in graduate school. With this kind of communication, John keeps the possibility of graduate school alive, though he makes no definite commitments either to industry or academia.

In December the department extends an invitation for John to visit the campus in January, at the school's expense. When John's plane arrives on Thursday evening, he is met by Dr. Chehead, the department head, who takes him directly to a bed-and-breakfast lodging on the edge of campus. Friday is spent in taking departmental tours and in discussions with faculty. Then John's faculty host takes him to dinner on Friday evening, and they discuss all the possibilities and questions raised during the day. John spends Saturday skiing with prospective colleagues who are already graduate students in the department, and a pizza dinner completes an exhausting, but fun-filled, day. Early Sunday morning, Dr. Chehead takes John to the airport for his return flight.

A week later a letter of admission and a stipend offer is sent to John, preceded by a call from Dr. Chehead telling him that the faculty was impressed with his potential. Another faculty, Dr. Egghead, also calls John to discuss concepts in reprints which interested him during his visit. After deliberating for another week, John formally accepts the department's offer and tells friends of his decision.

## PLANNING REVISIONS TO GRADUATE RECRUITING

The above composite case studies of Dorothy and John emphasize recent applicant contact changes in our graduate recruiting program at the Colorado School of Mines. Our program objectives were to increase the number and quality of accepted appli-

cants to both our traditional program and to a new non-thesis MS program for industrial engineers in the Denver area. Our target population was students with a traditional or a non-traditional background allied to chemical engineering.

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example, the national number of PhDs in science and engineering has been forecast by Atkinson<sup>[1]</sup> to have an annual shortfall from 1,000 to 10,000 degrees during the period from 1995 to 2010. Atkinson indicates that this will be the result of a "cumulative shortfall of several hundred thousand scientists and engineers at the baccalaureate level by the turn of the century." While many such studies differ in quantitative predictions, the qualitative trends are almost always similar.

The basis for our recruiting changes was obtained from a study by P.B. Brown<sup>[2]</sup> of 250 graduate programs which ranked the reasons that resulted in a graduate student's choice of a particular school (other considerations being equal). The five criteria highest on the list were:

- *Competitive financial assistance*
- *Personal contact (letters, phone, etc.)*
- *Referrals exchanged with colleagues*
- *Promotional materials on programs*
- *Subsidized visits for promising students*

Most academics could easily list other, less tangible and perhaps more vital, criteria—such as expertise in a research area, size of faculty and program, reputation, location, etc. However, such changes are more far-reaching and less easily addressed by a pilot program than the five criteria listed above.

The principal ingredient of our program was the intellectual and energetic commitment of department personnel. Since the faculty were already occupied with other important projects, our first step was to determine resources in the form of time and funds. These were obtained by a re-

organization of department committee priorities and through the funding of a two-year pilot program by the Graduate Dean.

The departmental involvement in graduate recruiting increased from 10% to 40% of the faculty during this period. Most importantly, an able administrative assistant consistently managed the program details (communications, record keeping, expenses, etc.) as one of her primary functions. For example, letters progressively tailored to an individual's interest are initiated by the administrative assistant to ensure that only a small amount of time separates communications between an inquirer/applicant and the department. Any student who has his/her GRE scores sent directly to the school is automatically sent an application packet.

The Graduate Dean was naturally concerned about graduate recruiting across the institution. He agreed to fund our two-year pilot program with two provisos: (1) that we obtain a mid-point program evaluation by a consultant, and (2) that we make the results of the pilot program available to the entire campus.

### HIGHLIGHTS OF THE PROGRAM

In addition to our efforts to address Brown's five criteria for cost-effective recruiting, some innovative aspects of our program are:

- We made a professional-quality video tape, complete with music and voice-overs, that describes faculty research, the department, the school, and the living environment. As a rule-of-thumb, the cost of such a tape is \$1000/minute for a nominal fifteen-minute tape. At the suggestion of our consultant, we shipped a copy of this tape to every U.S. inquirer.
- Each year we took part in the Student Career Fair held at the annual AIChE conference, via a visually attractive display booth staffed by a faculty member. About five hundred students attend this event each year.
- We held an annual Department Open House, principally for people from local industry who hold undergraduate degrees in chemical engineering or chemistry. The event included brief presentations, a poster session highlighting departmental research, and laboratory tours. About 1500 letters of invitation were sent to members of AIChE and ACS in the Denver area, resulting in twenty attendees and about forty requests for more written information.
- We identified sister institutions which might be sources of incoming students and began an exchange program of seminar speakers with them. At each seminar away from campus, faculty invited interested students for a meal to discuss graduate school.
- We revised the review process so that each of three faculty members independently evaluated the completed applications, both for ad-

mission and for financial support. Soon after each application was evaluated, the review committee met to finalize admission/aid decisions and to resolve discrepancies between recommendations.

- We began to be more consistent in obtaining international students. Two examples: we began record-keeping on applicant performance from schools abroad, and we began to organize recruiting visits to fine chemical engineering schools in Eastern Europe and the Middle East.

### THE PERSONAL TOUCH: CAMPUS VISIT AND FOLLOW-UP

Of all the components of our enhanced recruiting program, one of the most important to its success was the visit of prospective graduate students to our campus. The close faculty interaction with prospective students and our location both make us think the campus visit deserves a ranking close to the top of Brown's list of cost-effective recruiting measures.

Prior to designing our procedures, we spoke with several of our own students regarding their experiences in interviewing at other universities as prospective graduate students. Several of the key points that emerged from these conversations which later guided the construction of our campus visits were:

- It is vital to have close personal interaction with at least one host faculty member who, ideally, should have the same responsibilities that were fulfilled by Dr. Chehead in the opening case study.
- Efforts should be made to have the student interview the faculty regarding his or her own research interests and programs; visits dominated by interviews with other graduate students and post-docs were not perceived as useful.
- Individual student visits are more useful than one group visit. Individual students relate to individual faculty, but students visiting in a group have more in common with each other than with the host institution.
- Quick departmental follow-up after the visit was a key in solidifying the student's interest and commitment.

**TABLE 1**  
**CEPR Graduate Recruiting Results**

Year	1992	1991	1990	1989
Total Applicants	103	51	30	26
a. National Origin				
Foreign Applicants	90	41	?	?
U.S. Applicants	13	10	?	?
b. Graduate Record Exam				
Verbal Score	511	497	510	427
Analytical Score	622	576	587	527
Quantitative Score	753	739	725	698
c. TOEFL Score (Foreign Appl.)	601	592	575	581
Total Applications Accepted	50	38	27	19
Total Accepting Offer	15	17	15	8
Total Registering in Fall	not avail.	14	12	7

Immediately following the student's visit, a recommendation concerning an offer was solicited from each faculty. Within one week, each qualified visitor received a personal letter from the Chair of the Graduate Affairs Committee (GAC) notifying the student that an offer would be forthcoming and recounting highlights of our research and educational programs. This letter was also used to remind the prospective student of acceptance deadlines. Official graduate school notification of the offer followed within one to two weeks.

Closing on prospective students was accomplished by two different mechanisms. Some candidates simply accepted the offer by returning the required materials. For others, further follow-up involved personal calls from the GAC Chair inquiring about the student's status and time-frame for a final decision. Again, the personal touch was perceived to be a key to successfully closing with our more highly recruited candidates.

## PROGRAM EVALUATION

The evaluation of the success of the two-year pilot recruiting program is quantified in Table 1. From the data in the table we conclude that our applicant pool has increased substantially both in quantity and quality over the course of the program. After the initial year of the program we invited a graduate recruiting consultant, Donald G. Dickason, to critique the program and to provide a campus-wide seminar on graduate recruiting.

## FUTURE PLANS: FEEDING THE PYRAMID

As outlined above, our effort at turning inquiries into applications, and applications into new students has been fairly successful. One area for future improvement is what we call "feeding the bottom of the pyramid," based on a metaphor by Don Dickason. The pyramid consists of the layers involved in the graduate school process, starting with inquiries and ending with degrees granted, each layer being smaller than the one below it.

We plan two additional recruiting efforts in the future. The first is to begin a summer internship program for juniors who are considering graduate school. This will provide exposure to challenging research problems and lead to more graduate applications, both to other institutions and to CSM. The summer research program will also be used to strengthen our women and minorities recruiting programs. NSF has an active program which funds such undergraduate research.

The second plan is to develop a hypertext recruiting document for distribution to prospective students. Hypertext is a method of communicating information in which the reader can move freely through a document, pausing only at interesting points by "clicking" on "buttons." (Modern Windows or Macintosh help systems are an example of hypertext.)

The hypertext document, which will complement our recruiting video, has a number of advantages. The first is that it can be modified quickly and at little cost; in contrast, our video has a shelf life of two years, with significant modification costs.

The second advantage of our hypertext document is that the reader can be highly selective from among a vast amount of information. For example, a reader could easily locate the syllabus of an interesting course, consider a research area in detail, or skip over these in favor of learning about living or recreational conditions in the Golden area. Such a wealth of information might be a boring read in a conventional document, but we believe that hypertext will render it manageable for both the reader and the producer. Our plan is to develop the document using existing hypertext shell/hardware for the Macintosh before porting it to a Windows hypertext system such as Toolbook.

The programs listed above have the potential, not just of increasing CSM's share of a fixed pool of applicants, but of increasing the size of the pool. Our observation, which we are sure is not unique, is that many talented students never consider graduate school simply because they have had little or no exposure to what faculty and graduate students do when they disappear behind their laboratory doors. Increased marketing efforts will, at a minimum, help students make more-informed decisions.

## ACKNOWLEDGMENT

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