WAYS TO ATTRACT AND RETAIN WOMEN FACULTY AND GRADUATE STUDENTS IN ENGINEERING

Ann Holmes[1] and Márta Ecsedi[2]

Abstract — *In 2002, the Women's Issues Committee that advises the Dean of the Faculty of Applied Science and Engineering at the University of Toronto undertook to plan activities to attract and retain women faculty and graduate students in applied science and engineering. This paper describes the process undertaken by the Advisor to the Dean on Women's Issues and the Committee to analyze best practices in North America for attracting and retaining women graduate students and faculty. In considering strategies, most sources said the institutional climate needed to be welcoming and supportive before women were attracted or retained in academe. This paper also describes the plans of the Committee over the last year that have built on the collected North American models. Faculty activities are documented as they have developed in the time frame of the conference deadlines. Further results will be provided at the 2003 WEPAN conference.*

Index Terms — Faculty attraction and retention, graduate student retention, Women in Engineering.

INTRODUCTION

Founded in 1873 as the School of Practical Science, the Faculty of Applied Science and Engineering at the University of Toronto (U of T) is widely recognized as Canada's leading engineering teaching and research institution and is among the best publicly funded engineering schools in North America.

As part of the Faculty's efforts to sustain its leadership position and reputation for innovation and excellence, the Dean of the Faculty created the position of Advisor on Women's Issues in January of 2002. This appointment was in response to recommendations made by the Women into Engineering [1] project, a Partnership between the Professional Engineers Ontario (PEO) and the Ontario Women's Directorate. The Council of Ontario Deans of Engineering had received the recommendations, one of which was that each Dean of Engineering appoint an Advisor on Women's Issues. The University of Toronto was the first to act on this recommendation. The person appointed, Márta Ecsedi, was already in the position of Director of Alumni Relations for the faculty and had significant involvement in Women in Engineering task forces, committees and associations over the past 30 years. Márta was the first Chair of the Women in Engineering Advisory Committee of PEO and participated in the Decanal Task Force in 1989 entitled "U of T Faculty of Applied Science and Engineering: Creating a Warmer Climate for Women". She also organized the Women in Engineering Forum held in Toronto in 1990 for the Chair of Canadian Women in Engineering during a national fact finding tour. Márta's mandate is to increase the gender diversity of the faculty to be more representative of the population served by U of T and to support and improve existing outreach initiatives.

At present, the Faculty has an enrollment of 4,099 undergraduate students (25% women) and 1,416 graduate students (18% women). There are currently 261 faculty positions (6% women), including some that are unfilled. Although the enrollment of women in the undergraduate and graduate programs has increased significantly since the 1980s, the increase of women in faculty positions has been very slow and retention has been poor. The Advisor to the Dean decided that recruiting more women into graduate studies and encouraging them to stay and apply for faculty positions at the university would make the most significant impact. The first task was to create the Proactive Program for recruiting women faculty, outlined in this document.

INITIAL STEPS

A Proactive Policy document was created by the Advisor to the Dean on Women's Issues. The objective was to initiate action to increase the numbers of women faculty members by recruiting qualified and capable women engineers into the Faculty of Applied Science and Engineering at the U of T. Actions would be undertaken by the Women's Issues Committee, chaired by the Advisor to the Dean. The members of the Committee include faculty members and representatives of Human Resources, Communications and the Registrar.

The policy suggested several tactics to support the desired increase. These included creation of a database of qualified women engineers in graduate studies; conducting Faculty Recruitment Workshops for the entire Faculty; collection of Search Committee statistics; analysis of the magnitude of the issue; review of the composition of Search Committees; use of broad and flexible definitions of positions; identification of appropriate Opportunity Appointments [2]; increase of the number of women enrolling in Graduate studies; investigation of the reasons a

[1]Ann Holmes, Ann Holmes & Associates, 112 Robinson Street, Toronto ON Canada M6J 1L9 annholmes@sympatico.ca
[2]Márta Ecsedi, Professional Engineer, Director of Alumni Relations, Faculty of Applied Science and Engineering, University of Toronto, 35 St. George Street, Toronto ON Canada M5S 1A4 ecsedi@ecf.utoronto.ca

woman might not want to work at U of T; and establishment of retention strategies.

In order to inform the work of the committee in implementing these strategies, Ann Holmes was commissioned to research and document models of best practices to attract and retain women faculty and graduate students in applied science and engineering in North America. Ann's work in gender and education and her experience as a board member and Chair of the 1993 conference of GASAT, the international Gender and Science and Technology Association, qualified her to fulfill this task. The content information was gathered during the summer of 2002. The models were collected from the Internet and from personal interviews during the 12th International Conference of Women Engineers and Scientists, Ottawa, July 2002. The resulting report is entitled "A Better Place" [3].

BEST PRACTICES

Many examples of best practices were gathered from the United States and may be familiar to the readers of this paper. Where appropriate, the authors have focussed on the Canadian examples. The Report of the Committee on the Status of Women Faculty, Massachusetts Institute of Technology, [4] proved an excellent guide to activities to attract and retain women faculty and graduate students in applied science and engineering and was strongly reinforced by all the sources and informants to the report for U of T. Those interviewed recommended the development of a plan for related and complementary activities. It is worth noting that the MIT report says that a fully developed plan should include a hiring target.

In considering strategies, most sources identified the institutional climate as the overarching condition that needed to be welcoming and supportive before women can be attracted or retained in academe. An understanding of the importance of building confidence and high self-esteem heightens the importance of this condition. The report cites Maria Klawe, Ph.D., then NSERC/IBM Chair for Women in Science and Engineering (B.C./Yukon Region) and Dean of Science at the University of British Columbia (UBC), as stating: "To move women from masters to doctoral work requires faculty encouragement and reinforcement, including addressing the root cause of low self esteem." She believes that students listen to faculty members and need a confidence boost. Faculty need to send this message to encourage more women to apply -- "you belong in graduate school."

Several of the best practices models incorporate more than one of the U of T Proactive Policy goals. *Becoming Leaders, A Handbook for Women in Science, Engineering and Technology* [5] provides practical information and describes strategies for areas such as career development, work-life balance, and fair evaluation among others, for use by students, career women, faculty members and academic deans. Many sources noted the need for institutional transformation without which programmatic interventions can only provide encouragement in a climate lacking the conditions for success. The new ADVANCE program of the National Science Foundation in the United States is funding several innovative and comprehensive projects [6] that address the academic climate and include programmatic interventions. The results of these are worth watching for indicators of interesting models to come.

Database of Qualified Women Engineers

An electronic registry that holds data about the qualifications, experience and interests of women in engineering in graduate school, in industry and holding faculty appointments provides an important tool. Two examples of existing American registries are the Faculty For The Future web site [7] and the Minority and Women Doctoral Directory [8].

Faculty Recruitment Workshops

The main goal of such workshops is sensitizing department heads and search committee members to ways they can diversify their searches and make their processes gender sensitive and attractive to both women and men. Partner Positions, [3, Appendix B] a strategy used at Memorial University, are job opportunities that will attract the highly qualified partner of a recruitment target, contributing to an attractive recruitment package. The Faculty Recruitment Toolkit [9] developed by Dr. Denice Denton, Dean of Engineering at the University of Washington, provides valuable advice.

Search Committee Composition

The diversity, or lack thereof, of positions and groups represented on the search committees not only sends a message to the department and the applicants, but also is likely to ensure that those hired reflect the composition of the committee. In order to build the capacity and accountability of the search committees at the University of Calgary, the chairs of hiring committees report to the Dean about where they searched, who applied and who was interviewed. Search consultants are tasked with a mandate to find women. In her recruitment toolkit mentioned above, Dr Denton provides tips about the composition of search committees.

Welcoming Strategies

All new entrants need to feel welcomed. They need to see the faculty as one that supports women in many ways. Conferences, workshops, orientation, mentoring and networking all serve to demonstrate support. Potential entrants will be encouraged by such demonstrations. The faculty web site should echo this climate of support. As part of the suggested strategy of long term "courting" of women who are of interest to the faculty, several informants spoke about the need to invite women for faculty visits unrelated to a competition process. For example, such women can be

invited to speak as part of a seminar series for the year. While they are on campus, they can be welcomed and have informal meetings with other women faculty. Support for women faculty can be demonstrated though nominations to the Natural Sciences and Engineering Research Council of Canada University Faculty Awards program [10]. This program is designed to increase the representation of women and Aboriginal peoples in faculty positions in the natural sciences and engineering by encouraging Canadian universities to appoint very promising researchers from those groups to tenure-track positions in science and engineering. A maximum of 25 awards can be made each year. In 2002, all of the 21 appointees were women. There have been very few awards to women at Ontario universities. Only 4 of the 2002 awards went to Ontario universities and none to U of T, while 4 were won by UBC where the Dean had instituted a proactive policy to encourage applications to the program. The award needs to be recognized by the academic community and the recipients have to be treated well.

Increasing Graduate Enrollment

Many American universities have implemented formal programs to provide support for graduate students in the way of seminars, role models and strategies to deal with specific issues. For example, the MAPPS: Managing Academic Personal & Professional Success program at Stevens Institute of Technology [3, p. 9] offers an interactive seminar to undergraduate and graduate students each month. The Graduate Experience Program at the University of Michigan [3, p. 9] funded by the Sloan Foundation, includes programmatic efforts to attract, recruit, and retain women students in Michigan's engineering and physical science graduate programs; and systemic institutional efforts to change the climate for women graduate students. One of the many activities of the Women in Engineering Program at Purdue University [3, p. 9] is to provide travel grants for women in graduate education to present at professional meetings and then to share those presentations on the Purdue campus to provide motivation to other women. The visibility of such programs can attract potential students. All those interviewed said that changing the climate starts with the Dean and Department Chairs. The Graduate Student Network [3, p. 8] at the University of Calgary was started four years ago by M. Elizabeth Cannon, Ph.D., former NSERC/Petro-Canada Chair for Women in Science and Engineering (Prairie Region), and is now run by the graduate students with an annual budget of $1000. The network includes a listserv that has been running for a few years. Success is shown by the fact that the students took over the network. About half of the 100 women graduate students come to each event.

Mentoring

Seeing a role model, someone they can identify with, in a particular position is a powerful way for women to learn about their own possibilities. Making a connection with that individual and benefiting from her advice and counsel goes even further to support the potential aspirations of women in all areas. Mentoring programs are implemented in a variety of ways and a diversity of activities can be offered. A Career Mentoring Workshop [11] has been developed and presented by the Computer Research Association's Committee on the Status of Women in Computing Research. This workshop provided a forum for women who are junior faculty members or graduate students in Science and Engineering to learn about the experiences of successful women in more senior academic positions. Maria Klawe has been a mentor in a program that invites senior women engineers to spend a week on campus as expert visitors. They deliver a public lecture and a research seminar and meet with undergrads, graduate students and faculty as encouragers. The cost of this program is relatively minimal, consisting of the mentor's travel and a $2000 honorarium.

REPORT'S CONCLUSIONS

The report concluded that there are many models of successful activities that can be used or adapted for use by the Faculty of Applied Science and Engineering at U of T. However, the path to change requires readiness and determination on the part of the faculty as a whole. The necessary factors for the success of any initiative are visible and credible support by the Dean and Department Chairs; realistic and measurable goals for the long term – perhaps starting in a pilot department that has a proactive Chair; and funds to support the implementation. With these conditions in place, the faculty can demonstrate commitment and begin to take appropriate steps toward the ultimate goal – to increase the number of women faculty members by recruiting qualified and capable women engineers.

STRATEGIC PLANNING

The Women's Issues Committee reviewed the Report prepared by Ann Holmes and concluded that there was a great deal of valuable information provided. In order to determine how best to use this information, Ann was contracted to lead the Committee in a strategic planning session. The session had several goals: to reconfirm the Proactive Policy plan developed by Márta; to develop the list of possible actions based on the policy and the report's identification of model strategies; and to clarify what participants understood by each strategy. The Committee also needed to determine its priorities for key activities in the next year. The session provided time for the group to determine which action plans would be initiated using the Proactive Policy and the "A Better Place" report, and to develop high level plans for the key activities.

Following the session, Committee members developed detailed action plans that answered the following questions about each activity:

- Who needs to endorse and buy in to this?

- Who should be involved?
- What are the steps to organize this?
- When should this start?
- How long should it last?
- How much will it cost?

The following list describes the activities the Committee chose as priorities and gives some details about the responsibilities, timelines and steps to be taken for each.

- Develop a database of the pool of potential women faculty – to include graduate students and current faculty at U of T and other institutions and women with Ph.D's in Industry. The Manager of Human Resources and the Faculty Registrar will undertake to develop this in one year.
- Establish a tracking system and communicate regularly with women from U of T who go on to graduate school. The Manager of Human Resources and the Faculty Registrar are responsible for the following.
  a) Exit surveys of all graduating students will be conducted annually. Information about women graduates will be entered into the database.
  b) An annual mailing will be conducted every December.
- Increase the number of women going into graduate school. The Associate Director of Graduate Studies and the Advisor to the Dean are responsible. The goal is to increase the number by 5% each year for five years to a total of 23%.
  a) Conduct annual information sessions for women undergraduate students. The speakers will include the Vice-Dean of Research & Graduate Studies, the Associate Chair of Graduate Students from one of the departments, a women professor and a women graduate student.
- Improve the overall climate for women in graduate school. The Associate Director of Graduate Studies and the Advisor to the Dean are responsible.
  a) A Graduate Student Chapter of Women in Science and Engineering (WISE) has been created.
  b) Four networking events will be held each year.
  c) A mentoring program will be established.
- Develop proactive search and selection processes. The Advisor to the Dean and a professor from the Women's Issues Committee are responsible.
  a) Ensure that the database of potential candidates is used and candidates with the appropriate skill sets are approached to apply.
  b) Ensure that advertisements for positions are placed where women candidates would view them.
  c) Ensure that each woman applicant is fully considered.
- Develop an educational process for search and selection committees. The Advisor to the Dean and a professor from the Women's Issues Committee are responsible.
  a) Get agreement that the Dean will meet with each Search Committee Chair to determine the composition of the committee, ensuring its diversity. The Dean should attend the first committee meeting to address the issue of conducting a proactive search.
  b) Create an information package to be provided to each committee chair. This is for review by the Search Committee at the outset of each search.
- Ensure consideration of the whole candidate and create a welcoming environment for new faculty. The Manager of Human Resources and the Director of Communications are responsible.
  a) Create a document outlining the services offered to new faculty and describing the Faculty environment, in particular emphasizing the positive aspects for women.
  b) Establish an Orientation Session to be conducted for new faculty.
  c) Establish a mentoring program for new faculty. Women faculty should be mentored by other women where possible.
- Make the University competitive to non- and returning Canadians. The Manager of Human Resources and the Director of Communications are responsible.
  c) Prepare a high quality marketing piece that highlights the positive aspects of working for the Faculty.
  d) Prepare a list of commonly asked questions to assist the interviewers.
  e) Prepare a document outlining the services for new faculty relocating to Canada.
- Track the Faculty's performance in attracting and retaining women. The Manager of Human Resources is responsible. Tracking mechanism will be on-line in one year.
  a) Record the number of applicants for each position by gender. Identify the number that progressed to each step of the selection process.
  b) Identify the existing number of women faculty by Department and track any losses.
  c) Conduct interviews of all women who do not accept offers and those who leave before retirement (Exit Survey).

ACCOMPLISHMENTS AND NEXT STEPS

The detailed Action Plans will be presented for approval to the Faculty's Dean, Department Chairs and Directors. The Committee hopes that the Deans and Chairs will provide their full support. The ideal condition for success in these endeavours is to have the Dean and Chairs proactively endorse the Action Plans for implementation within the Faculty and the nine departments. Once this endorsement is given, the Women's Issues Committee will continue implementation of the plans they have developed. Some

actions are already underway even though all the detailed Action Plans have not yet been presented. For example, the Dean and Provost have spoken to the search committees for heads of departments about having a focus on women and other underrepresented groups. Since then, offers have been made to two women and each has received a publication created by the Women's Issues Committee. The publication is designed to demonstrate a welcoming climate and to highlight the services for new faculty offered by the University of Toronto such as childcare, and career resources in the region for their spouses. A graduating student Exit Survey has been developed and was administered for the first time in the spring of 2003. During the summer, a student will create and populate the database to enable tracking of students who go on to graduate studies. In addition, an article about the Women's Issues Committee was published in the Faculty magazine that goes to 35,000 alumni and friends of the Faculty; a Graduate School information session was held; the WISE Graduate Chapter has had three successful events; hiring statistics for the past five years have been gathered and a second document is being created outlining the supports available for non-Canadian or returning Canadian appointees with regard to immigration, resettlement, residency, etc. In order to promote the action plans and successes, to publicize the commitment of the Dean and Chairs and to raise awareness to the support for women in the faculty, a communications plan will be developed and implemented through the Faculty's various communications tools. This will ensure that all Faculty members are aware of the Proactive Program and the progress that is being made.

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[2] Opportunity Appointments can occur if a department has identified a high caliber member of a group that is under-represented on the faculty and the department does not have the budget or personnel quota space available to employ them. In such a case, the Provost's Office will make up the budget short fall and waive the search committee requirements in order to facilitate the appointment.

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