ASEE Student Chapters: Avenues for Promoting Future Engineering Educators

Elaine R. Chan, Sean P. Holleran, Alan J. H. McGaughey, Chadwick C. Rasmussen
University of Michigan, Ann Arbor, MI

Abstract

The University of Michigan (UM) ASEE Student Chapter continues to thrive as an active graduate student organization dedicated to providing a forum for furthering excellence in engineering education. The organization sponsors numerous events to help graduate students prepare for careers in academia, to help undergraduate students prepare for graduate school, and to support the involvement of underrepresented minorities in higher education. In this paper we highlight the activities of the ASEE student chapter at UM and demonstrate the important role that the student chapter has in promoting the nation's future engineering educators. The strategies employed by the student chapter to sustain viability will also be presented to encourage the formation and growth of ASEE student chapters at other institutions, and thereby build upon the mission of the national ASEE organization to develop the nation's future engineering educators.

Introduction

The UM ASEE Student Chapter was established in 1994 as a graduate student-based organization dedicated to furthering education in engineering and engineering technology. The student chapter has maintained an active presence in the College of Engineering community and has matured into one of the most active ASEE student chapters in the nation[1]. The student chapter at UM provides a variety of services to achieve its three primary missions:

- prepare graduate students in their pursuits of careers in academia
- inform undergraduate students about graduate education and prepare them in their pursuits of graduate school
- support the involvement of underrepresented minorities in higher education[2].

Through these activities, the student chapter contributes to the continuous improvement of the educational environment in engineering and functions as a fundamental channel for cultivating the nation's future engineering educators. Here, we describe the student chapter's activities and illustrate how they contribute to the development of prospective engineering educators. The strategies employed to encourage student member participation and sustain chapter viability will also be discussed. This information is provided as a resource for those interested in initiating or renewing ASEE student chapters at other institutions.

Promoting Future Engineering Educators – Graduate Student Level and Beyond

One of the primary missions of the ASEE student chapter at UM is to assist those who are interested in pursuing careers in academia. This is accomplished by meeting the needs of graduate students (and post-docs) through sponsored workshops, panel discussions, seminars, and luncheons that address pertinent aspects of the engineering educator development process.

Workshop on Academic Career Preparation

In November 2001 the UM ASEE Student Chapter organized a one-day workshop featuring Dr. Richard M. Reis from Stanford University and author of *Tomorrow's Professor: Preparing for Academic Careers in Science and Engineering*[3]. The workshop was entitled *Preparing Now for Your Future Academic Career* and was supported by ASEE, the UM College of Engineering, the UM Medical School, and the Horace H. Rackham School of Graduate Studies at UM. A similar event featuring Dr. Reis also occurred in 1999[4]. The targeted audience was graduate students in engineering and the sciences, but a large number of post-docs and junior faculty also attended. The workshop was divided into morning and afternoon sessions that consisted of presentations by Dr. Reis, a panel discussion featuring faculty at various points in the tenure process, and an open discussion among attendees.

In the morning session, entitled *Preparing for an Academic Career: What You Must Do as a Graduate Student and Post-Doc to Obtain the Best Possible Academic Position*, Dr. Reis presented a background on the academic enterprise, developed his "three-pronged preparation strategy" for career preparation, and discussed strategies for finding and getting the best possible academic position. In the first talk of the afternoon session, entitled *The Thriving Academic: Building a Successful Career in Academia and Professional Life/Personal Life Balance*, Dr. Reis discussed the need for "focus, leverage, and balance" in the first years as a professor. He presented anecdotes that addressed these themes in the context of teaching, research, and service within the university community. The workshop then proceeded with a lively panel discussion with faculty whose positions ranged from lecturer to full professor, including young faculty who had successfully completed an academic job search within the past three years and senior faculty who had chaired faculty search committees. The discussion covered several relevant issues, including the academic job application process, the tenure process, establishing a research group, balancing the various duties delegated to young faculty, and negotiating a job offer. The workshop concluded with Dr. Reis' second talk of the afternoon, *Integrating Research into the Teaching Environment (I-RITE): New Approaches to the Integration of Teaching and Research*, which addressed the challenges faced by faculty and students to find effective ways of combining research and teaching responsibilities. The event was a great success with nearly one hundred participants.

The workshop with Dr. Reis was part of an annual series of panel discussions and workshops organized by the UM student chapter for graduate students aspiring to become engineering faculty. These events have been developed and modified throughout the history of the student chapter, and have recently been organized into a formal series. The series provides an avenue for

graduate students at different stages in their careers to become and remain informed about the academic job process and the types of careers available. It consists of four events that each address distinct topics.

Future Faculty Series

The first event in the series, entitled *Future Faculty Series #1 – Faculty Experiences at UM*, is a panel discussion held early in the fall semester that focuses on the academic job hiring process and balancing the demands of research and teaching responsibilities at research-oriented universities. The panel consists of faculty at various points in their academic careers. The event was attended by over sixty graduate students in 2002 and topics such as when to apply, what is expected in the application, and what qualities the search committees seek in a faculty candidate were eagerly raised by the audience and discussed with the panelists.

The second event in the series, entitled *Future Faculty Series #2 – Experiences Outside of UM*, is another panel discussion held in the middle of the fall semester focusing on careers at universities that emphasize teaching skills more than traditional research universities. Faculty members are invited from such institutions in Michigan (Lawrence Technological University, Kettering University, Eastern Michigan University, Western Michigan University, and Oakland University) to share their experiences. Several interesting topics, such as the differences between the environments at teaching-oriented and research-oriented institutions, the advantages and disadvantages of a career at a teaching-oriented school, and the panelists'reasons for selecting their respective school of employment were raised in the 2002 event. This event was attended by nearly sixty graduate students, many of whom had not attended the first event in the series on careers at research universities. This was a promising indication that the *Future Faculty Series* is successfully helping to fulfill a need to inform a diverse body of graduate students about various careers in academia.

The third event in the series, entitled *Future Faculty Series #3 – Academic Interview Workshop*, is held early in the winter semester. In 2003 this workshop was attended by thirty-five students who learned about the interview process for prospective faculty members, including the types of activities that typically transpire on the day of the interview. A panel of experts from UM engineering faculty search committees was present to provide relevant information and advice on the interview process and to answer questions from the audience.

The final event in the series, entitled *Future Faculty Series #4 – Running a Research Program*, occurs in the middle of the winter semester. In 2003 this panel discussion consisted of engineering faculty who spoke on three topics – managing and recruiting graduate students, writing grant proposals and managing resources, and administrative responsibilities. Fifty students attended this final session.

Making it Through Graduate School

An integral part of the path towards a career in academia is the doctoral degree. The UM ASEE

Student Chapter realizes that the retention of graduate students in doctoral programs is essential for cultivating the nation's future engineering educators. Subsequently, the student chapter created the event *Making it Through Graduate School* for graduate students who had yet to pass their preliminary research examinations. The students learn about the inevitable obstacles that will occur along the road to obtaining the doctoral degree and the diverse experiences of senior UM graduate students in different engineering disciplines. An informal luncheon was held in the spring of 2003 to discuss these issues and was well attended by thirty-five graduate students and seven senior graduate students. Some of the matters that were broached included difficulty in obtaining funding, balancing teaching and research commitments, preparing for the qualifying and preliminary examinations, and the thesis advisor not receiving tenure.

Presentation and Teaching Skills

One of the goals of the UM ASEE Student Chapter is to enhance the presentation and teaching skills of prospective educators[5,6]. The student chapter has developed two events, *Summer Seminar Series* and *Improving GSI* (graduate student instructor, or teaching assistant) *Instruction,* to address these objectives.

The *Summer Seminar Series* was initiated in 2001 to offer senior graduate students the opportunity to improve their presentation skills. Participating students present their research to an audience of peers from the UM College of Engineering, faculty members from their respective departments, and expert observers from the UM Center for Research on Learning and Teaching[7] (CRLT). Engineering doctoral candidates were invited via email to submit a research abstract. Brown bag lunch seminars were held for five weeks during the summer and featured ten speakers. Each seminar consisted of two fifteen-minute presentations that ranged from very general introductory talks to highly focused conference or faculty candidate talks. Each presenter began with an introduction describing the purpose of the talk, and informal feedback was provided immediately after the talk by the audience and the CRLT observers on the appropriateness of the presentation for the intended purpose. Audience members were asked to complete a form rating the speaker's presentation skills, the appropriate level of the talk, and the quality of the visual aids. The series was successful at encouraging interaction among different engineering disciplines.

The *Improving GSI Instruction* workshop is offered early in the fall and winter semesters to enhance graduate student teaching skills. One goal of the workshop is to follow up and complement the GSI orientation offered by the College of Engineering. The College requires all graduate students who have not taught previously at UM to attend a GSI orientation. Students are provided with information and tips on leading effective recitation sections and office hours, grading assignments, handling student honor code infractions, and accommodating different student learning styles. However, the orientation is typically offered at the beginning of each semester before the students hold their first recitation section or office hour. The purpose of the *Improving GSI Instruction* workshop is to give students an opportunity to improve their teaching skills once they have had some classroom experience. The Fall 2003 event consisted of four

members of the student chapter who gave ten-minute presentations on incorporating four effective teaching techniques into the teaching repertoire – formulating interesting engineering example problems, designing effective handouts, incorporating active group learning, and leading an effective recitation section. After each presentation, the attendees were asked to form groups and worked on an exercise for twenty minutes that allowed them to practice the presented teaching technique.

Teaching Recognition

To promote and reward superb student teaching efforts, the UM ASEE Student Chapter organizes the College of Engineering's *Outstanding Student Instructor Awards (OSIA)* program. These awards have been presented annually in April to exceptional graduate student instructors since 1994. An OSIA ceremony is held that includes opening remarks from the UM College of Engineering's Dean of Graduate Education emphasizing the strong institutional commitment to engineering education, a talk by a UM faculty member distinguished in teaching, and teaching award presentations. Five outstanding student instructor and five honorable mention awards were presented to ten graduate student instructors in 2003. Graduate student instructors were nominated by their undergraduate students and professors during the academic year and were selected by an evaluation committee at the end of the winter semester. Both the outstanding student instructor and honorable mention awards included a certificate of honor and free membership to the national ASEE organization for one year. The outstanding student instructor awards also consisted of a $500 cash prize provided by the College of Engineering. The Society of Women Engineers and Tau Beta Pi also presented their teaching awards (Creating a Better Classroom Climate and Outstanding Student Instructor and Faculty Awards, and Outstanding Faculty Teaching Award, respectively). This event allows ASEE to collaborate with primarily undergraduate student societies in recognizing outstanding instruction.

Non-Academic Careers for Ph.D.'s

Although a primary goal of the ASEE student chapter is to inform students about various aspects of a career in academia[6], ASEE recognizes that many Ph.D. students decide to pursue careers in non-academic environments, and that a substantial number of students are often unsure whether to pursue careers in academia or elsewhere. To help address these matters, the student chapter organizes the event *Non-Academic Careers for Ph.D.'s* to provide students with information on job opportunities and the work environments in industry and government for doctoral graduates. In this panel discussion students learn that their Ph.D. degree is applicable to a wide variety of industrial and government positions and gain an understanding of employment at these institutions. In 2003 the panel consisted of former doctoral students who were working in industry and government in southeastern Michigan. The attendees raised several engaging issues, such as why the panel members earned a doctorate, how the degree affects them now, what they would do differently if they were given the chance to earn their doctorate again, and advice for current doctoral students on preparing for a non-academic position. This event was first offered in November 2001 and has been held annually since then. It is one of UM ASEE's most successful events and consistently attracts an audience of over seventy students.

In summary, the UM ASEE Student Chapter offers a number of diverse programs to promote the development of future engineering educators at the graduate student (and postdoctoral) level. These programs have focused on several important themes, such as academic career preparation, retention of graduate students in Ph.D. programs, good presentation and teaching skills, and non-academic career options. The events have been successful at reaching large and diverse audiences and student feedback has thus far been positive.

Promoting Future Engineering Educators – Undergraduate Student Level

A second mission of the UM ASEE Student Chapter is to educate undergraduate students about graduate education and assist them in their preparation for graduate school. To accomplish this goal, ASEE sponsors an annual series of events entitled *Gearing Up to Graduate School*. This consists of four events and is designed to meet the needs of undergraduates interested in pursuing graduate school in a manner analogous to how the *Future Faculty Series* functions to meet the needs of graduate students interested in pursuing academic positions.

The first event in the series is entitled *Getting Into Graduate School*. In this panel discussion, undergraduate juniors and seniors in engineering disciplines learn about the graduate school application process. The event is held at the beginning of October to ensure that students applying to graduate school that academic year can gain the beneficial information early in the semester. The 2003 program began with a brief presentation by an undergraduate advisor (e.g., UM ASEE faculty advisor Susan Montgomery) on the logistics and timing of the steps involved when applying to graduate school. This was followed by a panel discussion led by graduate admissions chairs in various engineering departments, an undergraduate advisor, and current UM graduate students from other engineering departments who had completed the graduate school application process within the last two years. Topics of discussion included the difference between programs for masters and doctoral students, the qualities the admissions committee seeks in the applicant, and from whom to obtain recommendation letters. This program is our most popular undergraduate event, typically drawing over thirty students from all engineering disciplines and even a small number of undergraduates from the sciences.

The second event in the series is the *Fellowships and Financial Aid Workshop*. ASEE began offering this workshop in October 2002 after recognizing that students often had many questions about funding during the *Getting Into Graduate School* event. The student chapter acknowledged a need to inform senior undergraduate and first year graduate students about ways to secure financial assistance in graduate school through academic grants and fellowships. Students with additional funding sources have several advantages, such as more freedom in their choice of thesis advisor and project, and are more desirable candidates to admissions committees. The workshop consists of a panel made up of a variety of speakers who stress different aspects of the fellowship application process. In 2002 the panelists included a financial aid coordinator from the UM Electrical Engineering and Computer Science department, two UM faculty members who review grant applications for the National Science Foundation, a representative from the UM Sweetland Writing Center, and several UM graduate students who

had recently received national fellowship awards. The workshop covered many pertinent subjects, such as how to find financial aid sources, good essay writing techniques for the application, the timing of the steps during the application process, and the qualities of a good fellowship application.

The third event that ASEE offers for undergraduates is *Choosing the Right Graduate School*. This panel discussion occurs in February to assist students with the graduate school selection process after their admission offers have been received. The annual event functions to aid students in choosing the appropriate graduate school by preparing them for their recruiting visits. In 2003 a panel consisting of UM graduate school recruiting coordinators and current UM graduate students from various engineering programs discussed with the audience what factors to evaluate at different institutions and how the students made their graduate school decisions. The topics of university climate, program reputation, and choice of thesis advisor were discussed in depth.

The final event in the series is entitled *Meet and Greet Future Graduate Students*. It was developed to provide senior undergraduates who will be entering graduate school in the following fall semester the opportunity to chat with current UM engineering graduate students about the matriculation process to graduate school. An informal luncheon is held where undergraduates can ask graduate students about what to expect during the first year of graduate school. The undergraduates also have an opportunity to talk with other undergraduates about their graduate school application experiences and potentially set up a support network with other students who will be entering the same graduate institution.

Promoting Future Engineering Educators – Minority Students

As part of the UM ASEE Student Chapter mission, ASEE seeks to support the increased involvement of underrepresented minorities in higher education. ASEE is committed to providing engineering outreach to the community and an improved educational climate for minority students by sponsoring events that complement the College of Engineering's existing recruiting and retention programs. In the past, the student chapter has organized engineering outreach programs for 7th and 8th grade students in urban areas, hosted a campus-wide dialogue on the issues hindering the increased involvement of minorities in higher education in the sciences and engineering as part of a celebration of Dr. Martin Luther King, Jr.'s (MLK) vision, sponsored a seminar series on classroom climate issues that affect diversity in the curriculum and the university, and participated in the graduate student panel for the Society of Hispanic Professional Engineers regional conference[4.8].

Since 2001 the student chapter has organized a *Cultural Fair* every February to celebrate the diversity of the student body within the Colleges of Engineering, Art and Architecture, Urban Planning, and Music in the spirit of MLK. The annual cultural fair serves as a forum for student groups to share their native culture's food, music, clothing, and art, and provides an avenue for students to develop an understanding of the diverse cultures present in the student body. In

February 2003 the event featured displays from eight student groups representing the cultures of China, Greece, Persia, Europe, South Asia, Taiwan, Bangladesh, and Lebanon. Each student group received $300 for supplies from ASEE and the College of Engineering. Highlights of the fair included an abundance of tasty food samples and a thrilling ballet by the Chinese Students Association featuring authentic costumes and swords. The cultural fair is a very successful event for ASEE and draws nearly two hundred students, faculty, and staff each year.

Sustaining ASEE Student Chapter Viability – Lessons Learned

Since its inception ten years ago, the UM ASEE Student Chapter has successfully matured into one of the most active ASEE student chapters in the nation and maintained an active presence both in the UM College of Engineering and the national ASEE organization. The subject of how student chapters can sustain viability once they are initiated and how to revive dormant student chapters was recently discussed at the Student Chapter Meeting of the 2003 ASEE National Conference[9]. The UM ASEE Student Chapter has learned many valuable lessons during its ten years of experience and many of them have already been documented in detail elsewhere[6]. The reader is also referred to other papers that discuss starting a student chapter[10] and lessons learned[11] at other institutions. Provided here is a summary of the key factors that the UM graduate student chapter has found to be important for maintaining activity. The most important aspects of the organization are a devoted faculty advisor who is a member of the ASEE national organization, a core group of students who comprise the executive board of officers and organize the chapter's programs, a steady source of financial support, and a good communication network. The types of programs organized by the student chapter can also contribute to chapter success.

Our faculty advisor (Susan Montgomery) is fundamental to the UM student chapter's success because she is a source of guidance and support, and is a liaison between the student chapter and the university as well as with the national ASEE organization in her role as ASEE campus representative. She also teaches a course, "Teaching Engineering," offered every two years to graduate students interested in academia, which provides an additional source of active members and officers for the chapter. Our faculty advisor aids us in disseminating information on the ASEE student chapter's programs to the university engineering community and helps the organization secure funding from engineering departments and the associate deans. She also encourages student member participation in regional and national ASEE conferences by informing students about the opportunities to write papers and present talks about the student chapter's endeavors.

A core group of student chapter officers (president, vice president, secretary, treasurer, engineering department representatives) is vital for sustaining chapter viability. The student chapter at UM holds biweekly meetings to formulate ideas for events and organize programs to be offered. An email list solely for the executive board exists to discuss administrative matters and a separate email list exists for graduate student members who simply attend ASEE-sponsored events and may be interested in helping to plan events or to volunteer to be part of a panel discussion. Officer turnover and transition is especially critical for maintaining the student

chapter's activity from year to year. New members are welcome at the biweekly officers' meetings and the officers encourage them to assist with event planning to help them become familiar with the process, help them improve their leadership skills, and help them transition to officer positions. One such way is through the ASEE department representative program, wherein students are responsible for publicizing events in their respective engineering disciplines. Every semester ASEE officers distribute an informational pamphlet about the organization and its programs at the College of Engineering's GSI orientation to recruit new members and advertise events. These efforts have resulted in a sustaining of graduate student interest that has enabled the UM student chapter to maintain a consistent level of activity.

A steady source of financial assistance is necessary for the student chapter to fund its programs. The UM ASEE Student Chapter has been fortunate to secure annual funding from the offices of the associate deans of undergraduate and graduate education in the College of Engineering. One of the main reasons why the student chapter has been successful in securing funds from the College of Engineering is because ASEE encompasses all engineering disciplines and hence contributes positively to the entire engineering community. In addition, by bringing in nationally recognized speakers, such as Richard Felder and Rebecca Brent, the chapter has benefited not only graduate students but also faculty members in the College of Engineering. Other sources of funding in past years have included College of Engineering departments, the UM graduate school, student government associations, and the Educational Research and Methods division of the national ASEE organization. Access to funding sources has enabled the ASEE student chapter at UM to make its events free to all participants.

The UM student chapter has also found that communication is essential for achieving success. It is important to inform others about the organization and to advertise the organization's programs, especially because one primary measure of success is event attendance. Currently, the UM ASEE Student Chapter maintains a regularly updated web site that lists its events and information about the organization[2]. College-wide email lists for graduate students and undergraduate students are utilized via the UM Computer Aided Engineering Network to inform the relevant subset of the student body about sponsored events that may benefit them. This method of communication has proven to be extremely effective and rewarding. ASEE department representatives are also instrumental in sharing information about the chapter's activities with students in the same engineering disciplines. Posting fliers around campus has been found to be somewhat helpful.

In addition to the four factors discussed above, the UM ASEE Student Chapter has found that the types of programs offered by the student chapter can contribute to chapter success. The organization of the events into coherent series appears to be more popular with students versus a random assortment of programs. Although seminars and workshops featuring distinguished scholars in engineering education outside of UM are highly desirable, only a small number of these events can be offered in one academic year due to budget constraints. In the past few years, the UM student chapter has achieved much success by offering a larger number and a

wider variety of programs featuring UM faculty, UM students, and guest speakers from institutions in the surrounding area who graciously volunteer their time to participate in the events. The additional funds made available by this approach allow the organization to concentrate on other aspects, such as program advertising and student member recruitment. For instance, more money can be allocated toward supplying "free food" at events, which consequently tends to attract larger audiences.

Conclusion

Since its inception in 1994, the UM ASEE Student Chapter has flourished as a graduate student organization that seeks to promote excellence in engineering education. The student chapter serves as a valuable resource for cultivating the nation's future engineering educators. This is accomplished by offering a variety of programs, such as the *Future Faculty Series*, *Gearing Up to Graduate School* series, and *Cultural Fair*. Examples of the diverse programs offered by the UM student chapter have been presented in this paper to illustrate the ways in which they help promote preparation of future faculty and enrich the climate of the engineering community. ASEE student chapters are fundamental avenues for improving engineering education. They are an integral component in helping to fulfill the national ASEE organization's mission to encourage youth to pursue studies and careers in engineering and engineering technology and to encourage the recruitment and retention of young faculty and minority groups[12,13]. In this paper, the important factors contributing to the success of the UM graduate student chapter have also been presented as a guide to help initiate and renew ASEE graduate student chapters at other institutions. This information has been shared in recognition that student chapters provide an invaluable forum for students to become actively involved in improving the nation's engineering education environment and to promote change.

Acknowledgements

The authors wish to thank all of the current and past UM ASEE Student Chapter members for their dedication and for making the important programs that improve the educational environment in the College of Engineering possible. Susan Montgomery has been the UM student chapter faculty advisor since its inception and her contributions are gratefully acknowledged. Finally, the authors wish to thank the UM College of Engineering Deans of Graduate and Undergraduate Education, Office of Student Leadership & Academic Services, the University's Rackham Graduate School, and engineering departments for financial support.

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ELAINE R. CHAN
Elaine R. Chan is a doctoral candidate in Chemical Engineering at the University of Michigan. She currently serves as Treasurer of the UM ASEE Student Chapter. Elaine received the UM Society of Women Engineers Outstanding Student Instructor Award and an honorable mention award for UM ASEE Outstanding Student Instructor in 2003. She is a peer reviewer for the *Journal of Engineering Education* and a GAANN fellowship recipient.

SEAN PATRICK HOLLERAN
Sean Patrick Holleran is a doctoral candidate in Chemical Engineering at the University of Michigan. He is currently serving as President of the UM ASEE Student Chapter. Sean has worked as a teaching assistant at Cornell University (NY) and the University of Michigan, and as a physics lecturer at Corning Community College (NY).

ALAN J. H. MCGAUGHEY
Alan J.H. McGaughey is a doctoral candidate in Mechanical Engineering at the University of Michigan. He is currently serving as Co-Vice President of the UM ASEE Student Chapter. Alan was the recipient of a UM ASEE Outstanding Student Instructor Award in 2002 and is a Michigan Teaching Fellow.

CHADWICK C. RASMUSSEN
Chadwick C. Rasmussen is a doctoral candidate in Aerospace Engineering at the University of Michigan. He served as President of the UM ASEE Student Chapter in 2002-2003 and is a National Defense Science and Engineering Graduate Fellow.