

## **Influence of the ASEE Student Chapter on College-Wide Pedagogical Issues**

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### **Abstract**

The University of Michigan ASEE Student Chapter has grown significantly from when it began seven years ago to its current status. During its growth, the student chapter has consistently influenced the College of Engineering's pedagogical climate by focusing on three of our major missions. First, the chapter serves to prepare graduate students better for their pursuit of academic jobs by having panel discussions and workshops about professional development issues. We have organized daylong programs about the job search and challenges for beginning faculty. We've also organized panels of professors from smaller teaching institutions. Secondly, we facilitate panels for undergraduate students about the application to and choosing of a graduate program. We promote the increased involvement of underrepresented minority groups in higher education through workshops for faculty and graduate students that discuss how to develop a better classroom climate. We organize outreach programs to area inner city junior high schools to encourage the students to think about the possibility of studying engineering or sciences in college. Finally, we are committed to the continuous improvement of the educational environment in engineering. This goal is achieved on campus in a couple of ways. We invite faculty and graduate student instructors to ASEE sponsored seminars and workshops about various teaching methods and pedagogical issues. We also promote high quality teaching by recognizing five outstanding Graduate Student Instructors and one professor at an annual award ceremony. We contribute to the entire educational community by sending student members to various educational conferences (i.e. ASEE, FIE) and having them present at these conferences. Also, upon their return from the conference, we organize discussion sessions during which the students can share the ideas from the conference that they found exciting with interested members of the College community. These activities of the ASEE Student Chapter have led to an increased focus on pedagogical studies at the University of Michigan College of Engineering. They have also led to greater collaboration between graduate students, faculty, and administration regarding the continued improvement of engineering education.

### **Introduction**

Since the inception of the University of Michigan American Society for Engineering Education (ASEE) Student Chapter seven years ago, we have been dedicated to furthering excellence in engineering education. During this time, the student chapter active membership has grown from a handful of graduate students to the 15-20 graduate students who attend the regular planning meetings. As the chapter has grown, we have consistently influenced the College of

Engineering's pedagogical issues by focussing on our major missions that were outlined by the first members of the student chapter in the mission statement:

*... [The University of Michigan American Society for Engineering Education Student Chapter] provides services to prepare interested graduate students better in their pursuit of careers in academia; to provide undergraduate students with a better understanding of graduate education; and to support the increased involvement of underrepresented minorities in higher education.*

With this mission in mind, the student chapter has sponsored numerous events to accomplish these three major goals which contribute to the continuous improvement of the educational environment in engineering. Through these events, the student chapter has consistently influenced the College of Engineering's pedagogical climate.

In the following parts of this paper, the events, that have been organized by ASEE in order to fulfill each part of the mission statement, will be discussed and their effect within the College will be highlighted. The events described in the following sections have been funded by a grant from the University of Michigan Rackham Graduate School, the College of Engineering administration, departmental funding, and various student government associations.

### **Professional development for graduate students**

As part of our continued mission "to prepare interested graduate students better in their pursuit of careers in academia," on Saturday, October 18, 1999, ASEE sponsored a one-day workshop entitled "How To Prepare For, Find, and Succeed At an Academic Career in Science and Engineering." This workshop featured Dr. Richard M. Reis from Stanford University and author of *Tomorrow's Professor: Preparing for Academic Careers in Science and Engineering* and was aimed towards graduate students in engineering and the sciences but also open to post-docs and junior faculty. The workshop was divided into morning and afternoon sessions, both of which consisted of a presentation by Dr. Reis, a discussion with a panel of faculty in the sciences and engineering and then an open discussion among participants.

The morning session was titled "Preparing for an Academic Career (What You Must Do As A Graduate Student And Postdoc To Obtain The Best Possible Academic Position)." In this session, Dr. Reis presented a background of the academic enterprise and developed his "three-pronged preparation strategy" for making oneself as competitive as possible for academic positions. Following the presentation, Dr. Reis facilitated a panel composed of three junior faculty who had successfully completed an academic job search within the past two years and two established faculty that had chaired faculty search committees in the past. The discussion that ensued was lively with many interesting and valuable questions and comments raised by the attendees.

In the afternoon, we switched focus and the session was titled "Keys to Success: (Surviving – and Thriving – in Your First Years as a Professor)." Once again, Dr. Reis began the session with a presentation, this time emphasizing on the need for "focus, leverage and balance" in your first years as a professor. In that context he presented anecdotal evidence about focus and leverage

with respect to teaching, research and service within the university community. This presentation was once again followed by a panel discussion, this time composed of faculty with four to eight years of service and at various points on their road to tenure. Once again, the discussion was lively and focused on the culture differences, especially with respect to tenure requirements, between the sciences and engineering.

Overall the workshop was very well received with almost 100 participants from engineering, science, public health, pharmacy and the medical school. In addition from support from ASEE, the College of Engineering, the College of Literature, Science and the Arts and the Horace H. Rackham School of Graduate Studies sponsored this workshop. A workshop focused on academic careers similar to this is organized every two years to allow graduate students at various stages of their careers to attend and benefit.

The ASEE student chapter also regularly organizes a seminar to inform graduate students interested in a career in academia about opportunities at small to mid-sized schools. The most recent one was held during the Winter 2000 semester. The focus of smaller schools is frequently more teaching oriented than the University of Michigan. Therefore, academic demands at these schools are very different than those at the large research driven institutions that many graduate students experience. The seminar included short presentations by the faculty from such smaller institutions followed by a panel discussion. The seminar was attended by 40 graduate students and lasted well past the scheduled time. The feedback on the seminar was very positive and will be scheduled every other year.

By providing these opportunities for professional development to the graduate students in the College, we are promoting careers in academia. These events serve to educate the graduate students about the various roadblocks that can be encountered along the academic career path and better prepare them to overcome these obstacles. Therefore, the fine researchers and teachers that the College produces will share their wealth of knowledge with the next generation of engineering students.

### **Graduate school informative events for undergraduate students**

Each year, ASEE student chapter organizes three informational panels regarding graduate school for interested undergraduate students. "Getting into Graduate School" consists of a panel of two department graduate chairs, one undergraduate advisor, and two first year graduate students. Initially, each panelist discussed his/her role in graduate school and funding applications and gives advice to the audience. Between the different panelists, information on entrance exams, personal statements, letters of reference, and funding is mentioned. This is followed by a question-answer period during which undergraduate students can ask more specific questions. The difference between MSE and PhD programs and funding opportunities are often questioned. This program is held twice a year, in the beginning of the fall term and the end of the winter term due to the high attendance and great interest. We also organize "Choosing a Graduate School" in mid-February for undergraduate students who are planning graduate school visits. Multiple graduate students from various programs discuss what they evaluated at different schools and how they made their decision. A large focus is on climate, program reputation, and choice of advisor. This is followed by a question-answer period. These programs are a means for ASEE

to provide professional development services to undergraduate students and to promote graduate school, research, and teaching.

### **Minority programs**

As part of our mission, the student chapter supports the increased involvement of underrepresented minorities in higher education. In order to accomplish this portion of our mission, we have focused our efforts on organizing events that will compliment the College of Engineering's existing recruiting and retention programs.

We have designed outreach programs to the community and to the minority student groups within the College that are focused on informing students about undergraduate and graduate engineering programs. We visited middle schools in urban areas surrounding Ann Arbor, where we were able to address 7<sup>th</sup> and 8<sup>th</sup> grade students, and to generate interest in science and engineering related areas of study. At these middle schools, we conducted a small science fair, which included experiments and hands-on demonstrations that displayed scientific and engineering related principles. Using these demonstrations, we explained such things as lift on an airplane wing, erosion, and the cause of tornadoes. This year we participated in the Society of Hispanic Professional Engineers regional conference, which was held at the University of Michigan. There were about 100 undergraduate students from six different states in attendance at the conference. Members of ASEE volunteered to sit on a panel of graduate students that shared their experiences with the students in attendance. At the conference's career fair, we hosted a table where we answered a variety of questions about graduate school and also did recruiting for the University of Michigan's engineering graduate schools. These outreach events allow the members of ASEE to see some of the hurdles that need to be overcome in order to achieve an increased participation of minorities in higher education

As a result of these outreach activities, we have decided to focus on organizing events that would work toward creating a better climate for minority students within the College. In celebration of Martin Luther King (MLK) Day January, 1999, ASEE hosted a campus-wide dialogue centered on the theme, "Implementing the Dream in the Sciences and Engineering." This dialogue was intended to promote a widespread and true understanding of Dr. Martin Luther King's vision and to examine the issues that hinder the increased involvement of minorities in higher education in the sciences and engineering. This event consisted of a seminar and panel discussion focused on better understanding of the measures required to eliminate the impediments that hinder diversity in engineering and the sciences. As a result of this dialogue, several perspectives of diversity in the sciences and engineering were presented which led to a productive discussion of these issues.

For the 2001 MLK Day Celebration, we are organizing a cultural fair, which will be used as a celebration of the diversity within the student body of the Colleges of Engineering, Art and Architecture, Urban Planning, and Music. This cultural fair will serve as forum that the students can use to display food, music, clothing and other items that are representative of their culture. This event will allow students to develop a better understanding of all of the cultures that are represented by the students in their classes.

This year we are also working with the College of Engineering to develop a seminar series focused on classroom climate issues. Faculty, staff, and GSIs will be strongly encouraged to attend these seminars. The first is a Dean's Seminar featuring Dr. James Anderson. Dr. Anderson is Vice Provost and Dean of Undergraduate Studies and Professor of Counselor Education at North Carolina State. He has presented extensive workshops on topics such as retention issues, the infusion of diversity throughout the curriculum and the institution, and critical thinking for diverse populations. This will be followed by seminars focusing on women in engineering, students with disabilities, and international students.

These programs compliment the already existing events that the College organizes to improve the recruitment and retention of underrepresented minorities. We have attempted to address the pedagogical issues related to diversity and have focused primarily on helping to improve the climate for minority students within the College of Engineering. These events allow for people to better understand the problems that the underrepresented minority students face and allow them to think about what they can do to improve the situation.

### **Improvement of educational environment**

The student chapter also sponsors events that are focused on the continual development of the teaching skills of the graduate students and faculty within the College. We have collaborated with the College to invite several well-known speakers to give seminars and workshops on wide range of pedagogical issues. Also, we have worked to further the training process for graduate student instructors. Every year, we recognize those faculty members and graduate student instructors who have distinguished themselves as excellent teachers. Finally, we send student chapter members to all of the ASEE conferences to learn about the most recent teaching developments so that we can share these ideas with interested members of the College. All of these events encourage members of the College to continually improve their pedagogical skills.

#### *Workshops*

In collaboration with the Center for Research on Learning and Teaching (CRLT) at the University of Michigan, the first workshop of the series was focused on cooperative learning techniques for the classroom and presented by Dan Budny of the University of Pittsburgh. In this session, we discussed the purpose of using cooperative learning techniques, how they benefit students in the classroom, laboratory, and in study groups, how they promote active learning, and how they differ from collaborative learning. A meta-analysis of sound research studies has shown that cooperative learning increases real learning, motivation, and retention. Dr. Budny presented a collection of principles to help design cooperative learning experiences that foster teamwork and improved learning. Small group experiences were used to illustrate several of the principles. Overall this workshop was very well received among the 39 attendees.

In March 2000, Richard Felder and Rebecca Brent conducted a two-day workshop on effective teaching at the University. The workshop was a condensed version of their popular week long "Effective Teaching Institute." Drs. Felder and Brent presented tools and strategies for the faculty, staff and graduate student in attendance to make their classes more effective. Answers were given to many common questions such as "how do students learn? How do teachers

teach?”, “how can I be a better lecturer?”, and “how can I get students actively involved in learning?” This workshop was very well received by the 90 attendees, which included graduate students and members of the College’s faculty, staff and administration.

In April 2000, we hosted Ron Miller from the Colorado School of Mines, who conducted a workshop focused on classroom assessment. In this workshop, we discussed proven assessment principles for improving teaching and learning in the engineering classroom. The workshop focused on simple methods any faculty member can do to better assess the learning of his/her students including classroom assessment techniques (i.e. minute papers, concept maps, and process journals), measurable learning objectives, performance assessment methods, and scoring rubric development and use. After a review of these techniques, participants in the workshop selected one or two methods and with the assistance of Dr. Miller developed a plan for implementation in their classrooms.

In September 2000, Barbara Olds from Colorado School of Mines presented a two-hour workshop overview of portfolio possibilities for student, course, and program assessment. Dr. Old’s discussed some of the advantages and disadvantages of using portfolios in a variety of contexts and provided examples of how she has utilized portfolios over the past fifteen years. Participants received a variety of handouts including scoring rubrics, a bibliography of key articles on portfolio assessment, and samples of portfolio materials. The seminar was well received by those in attendance.

A very exciting and important aspect of the workshop series is the recognition and support we have received from the administration in the College of Engineering. Last year the ASEE student chapter was approached to co-sponsor the Dean's Seminar Series on Effective Teaching. With financial and institutional support from the College, we have been able to continue seminar sponsorship and organization and build a strong teaching and learning community within the College.

#### *Departmental Graduate Student Instructor Development Workshop*

We sponsored a workshop “Enhancing Departmental GSI Development” in July 1999. Facilitators from CRLT led the workshop. Faculty GSI coordinators, graduate advisors, undergraduate advisors, graduate support staff, and experienced GSIs from each department within the College of Engineering were invited to participate. Through this workshop, the participants gained a greater understanding of the needs of GSIs and the support that departments should provide and developed a strategy for enhancing departmental GSI development.

As a result of this workshop, a couple of departments in the College of Engineering have developed their own successful training programs. We plan on continuing this program and organizing a College-wide workshop on GSI development annually. We will be conducting a survey of participants in the middle of the academic year to assess the long-term effects of the workshop. We will also survey GSIs in each department to better understand the effectiveness of current development programs. The results from these surveys as well as the workshop evaluations will aid us in developing an even more effective workshop.

### *Conference participation and related events*

Every year members of the ASEE student chapter attend the regional and national ASEE conferences. At these conferences, our members have an opportunity to present papers sharing the student chapter's events or individual educational research with the engineering education community. We are also able to attend talks and workshops where we can meet and learn from several of the renowned pedagogical faculty in the country. After returning from the conference, we sponsor discussion sessions where the student members who attended the conference can share the ideas that they learned at the conference with interested members of the College community. Also, the student members meet with the College administrators and give suggestions about who we saw at the conference that we think would be good to invite onto campus to give a workshop and seminar. By attending the conference and returning to the College and sharing what we learned, we are able to share the information from the conference with a wider audience.

### *Outstanding Student Instructor Awards*

In addition to organizing events that improve the quality of teaching within the College, we also reward excellence in teaching. Every year our student chapter awards five \$500 awards to student instructors who have demonstrated the highest quality of teaching. The students submit nominations twice a year (once a term). A committee consisting of faculty members, graduate students and undergraduate students then selects the award winners. At the end of each school year, we have an award ceremony where the winners are recognized. This ceremony has grown to include awards given by the Dean of the College and also other engineering student societies. At the ceremony, a faculty member, who has been selected by the student chapter because of his/her dedication to excellence in teaching, gives a keynote lecture that shares secrets of the faculty member's success in teaching. This award ceremony is attended by engineering faculty, and the graduate and undergraduate students that have nominated the award winners. By presenting these awards and organizing the award ceremony, we motivate the engineering faculty and student instructors to dedicate themselves to excellence in education and then reward their dedication.

### **Conclusions**

The activities of the ASEE Student Chapter have led to an increased focus on pedagogical studies at the University of Michigan College of Engineering. Through the organization and sponsorship of academic professional development workshops and seminars for graduate students, we have been actively promoting the advancement of future faculty. We also promote graduate school to undergraduate student through informational sessions. The ASEE Student Chapter contributes to the improvement of the educational climate for underrepresented minority students through various cultural events and diversity panels and seminars. We work closely with faculty and administration to organize workshops for students, faculty, and staff that are focused on the continual improvement of the educational environment at the College of

Engineering. These events have all led to greater awareness of educational challenges and dedication towards the achievement of educational excellence.

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Sara Soderstrom is currently a Masters student at the University of Michigan pursuing degrees in Environmental and Chemical Engineering. She is currently serving as the Vice-President of the ASEE Student Chapter. Sara received her BSE in Chemical Engineering from the University of Michigan in 1999. She will graduate in May 2001 and will begin working at McKinsey and Company in August 2001.

#### **CHRISTIAN LORENZ**

Christian Lorenz is a doctoral student in Chemical Engineering at the University of Michigan. He is currently serving as President of the ASEE Student Chapter. He received his BSE and MSE in Chemical Engineering from the University of Michigan concurrently in 1998. Chris was awarded the ASEE Outstanding Student Instructor Award for excellence in teaching in 1998.

#### **MICHAEL KEINATH**

Michael Keinath is currently pursuing a combined Ph.D. in Environmental and Water Resources Engineering and Chemical Engineering. He served as President of the ASEE Student Chapter during the 1999-2000 academic year. Michael received his B.S. in Chemical Engineering from Stanford University in 1996 and has earned M.S.E. degrees in Environmental Engineering and Chemical Engineering from the University of Michigan.