Experimental Study Group

The Experimental Study Group (ESG), now in its 41st year, continues to offer innovative opportunities in teaching and learning to MIT undergraduates, faculty, staff, and alumni. In keeping with our original mission, ESG provides first-year students at MIT with personalized instruction in the core subjects within a close-knit community while continually looking for new ways to engage and educate our students. Our teaching philosophy includes flexibility in pace and scheduling and small classes where students are encouraged to ask questions and get to know fellow students and instructors. Over the years, students have consistently said that ESG's small group learning and community atmosphere were some of the most rewarding aspects of their MIT education.

Each year, ESG offers approximately 40 undergraduates the opportunity to assist in some aspect of teaching at ESG. All student instructors receive midterm and end-of-term evaluations from freshmen and meet regularly with staff members for supervision. New student instructors participate in a weekly teaching seminar (SP.231/SP.232) run by ESG staff member Dr. Patricia Christie. Experienced student instructors who have demonstrated excellent teaching skills are able to develop their own pass/fail seminars or teach core subjects under faculty supervision.

Over the past 20 years, ESG has served as a center for educational innovation in the undergraduate program by offering a series of hands-on, interactive seminars on a variety of subjects not otherwise offered at MIT. These seminars provide all MIT undergraduates with the opportunity to participate in the ESG style of learning (small interactive classes). Non-ESG students who take these seminars frequently remark that these seminars were the only opportunity they had since their freshman year to participate in a small interpersonal class with a hands-on focus. This year we were able to run seven seminars through a combination of funds from the dean of the School of Science and our own alumni. We are strongly committed to continuing these seminars and promoting their growth by working closely with various parts of MIT, outside sources, and our own alumni to secure more permanent funding.

Student Statistics

Fifty-seven first-year students were enrolled for one or more terms in ESG this year, with another 31 students waitlisted in the fall term. Our student population was 49% female, 42% underrepresented minorities, and 12% international. In addition to our regular ESG students, we enrolled 35 students in our teaching seminars (SP.231 and SP.232) and 46 students in our undergraduate seminar program. 42 undergraduates served as teaching assistants, graders, and student instructors. They collectively maintained an impressive 4.6 grade point average.

Staff and Faculty

ESG's administration was headed by mechanical engineering professor Alexander Slocum and included associate directors Dr. Peter Dourmashkin and Dr. Holly Sweet and program coordinator Graham Ramsay. The physics staff was headed by Dr.

Dourmashkin and included Dr. Analia Barrantes. The mathematics staff was headed by Dr. Jeremy Orloff and included Dr. Gabrielle Stoy. The chemistry and biology offerings at ESG were taught by Patricia Christie. Writing subjects were offered by David Custer (21W.732) and Dr. William Haas (21W.781). Dr. Lee Perlman taught SP.2H1 Philosophy of Love and SP.2H3 Ancient Greek Philosophy and Mathematics.

Faculty Advisory Committee

Members of the ESG faculty advisory committee included professors Robert Silbey (chair), John Belcher (Physics), John Guttag (Electrical Engineering and Computer Science), Hazel Sive (School of Science), Charles Stewart (Political Science), David Vogan (Mathematics), and Graham Walker (Biology). Ex officio members of the committee included professor Kim Vandiver (former ESG director) and Professor Slocum (current ESG director). The committee met twice during the year to provide oversight for the ESG program, including staffing and funding issues, educational policy, and exploration of academic initiatives for the program.

Alumni Steering Committee

The ESG alumni steering committee was headed by Richard Hilliard ’76, and included Peter Fiekowsky ’77, David Henkel-Wallace ’86, Jeremy Hurwitz ’08, George Hu ’89, Andrea McGimsey ’87, Gregory Moore ’73, James Rising ’03, Jocelyn Rodal ’06, Matthew Wilbert ’80, and Raja Bobbili ’08. The committee met several times during the year to give input to ESG staff about a variety of issues, including finding ways to fund the ESG seminar series, organizing reunions, and reviewing current educational policy and initiatives.

Administrative Move

Discussions were held during the year about the possibility of moving ESG to the Office of the Dean for Undergraduate Education (DUE) under the aegis of the Office of Experiential Education, headed by Professor Vandiver. As of July 1, 2010, ESG has moved administratively to DUE where it will share advisory committee members and some staff with Concourse, another alternative learning communities for freshmen.

Educational Initiatives

In fall 2009, Mr. Custer taught a novel section of 21W.732 Science Writing and New Media, in which the communication assignments were based on mechanical engineering design of energy-related products. Students worked in small teams to create products of their own design and learned to communicate with passion and ownership.

In spring 2010, Dr. Dourmashkin and Dr. Barrantes were awarded a Class of 1954 Funds Grant for a proposed project to provide additional academic support to students who have done poorly on the Mathematics Diagnostic Exam. The project will include a weekly seminar, paired with subject 8.01, in which students will work on developing problem-solving abilities and review the mathematical tools needed to succeed in 8.01. The project will develop a series of modules with detailed teaching pedagogies and assessment exams that will be used both at ESG and in 8.01 during fall 2010.

21W.781 Communicating About Technology: Colossal Failures in Engineering was offered by Dr. Haas in spring 2010. This class, made possible by funding from the Office of Naval Research, dealt with failures whose underlying basis was problematic management. While the causes of these kinds of failures are diverse, the focus of this subject was on terrorist acts, including biological, port, skyscraper, and cyber security attacks. Guest speakers with expertise in each of these areas facilitated study. A novel feature of the course was a student-produced video about a fictional ESG course whose students are tasked with preventing terrorism.

In spring 2010, a new seminar was offered called SP.233 Vlogging the ESG Experience. This seminar was designed by Mr. Ramsay to illustrate to prospective ESG students and others what it feels like to be a freshman at ESG by creating weekly video blogs. These "vlogs" document the day-to-day goings on in the life of freshmen, from problem-solving sessions and classroom experiences to the more social aspects of the program. Each student commented on the program from their own unique perspective, allowing outsiders to get a real feel for ESG. Each week, these videos were uploaded to the ESG YouTube channel. During Campus Preview Weekend, the videos were shown to the incoming freshmen as a way to communicate the essence of the program. This seminar not only serves as a tool to recruit new ESG students for the fall, but also creates long-term historical documentation about the program.

In another experiment in pursuing MIT's stated mission of finding ways to combine undergraduate student life and learning, Dr. Sweet developed and taught a six-unit seminar, SP.271 Life at MIT: The Psychology of Adolescence, in which she covered developmental theory and related tasks that undergraduates face at MIT in becoming adults. These include handling peer pressure, looking at issues of identity, understanding one's racial and ethnic background, and exploring how gender impacts one's life. This seminar will serve as a starting point for the development of a 12-unit HASS class to be offered in spring 2011, called Beta-Testing Your Life: The Psychology of Emerging Adulthood. Dr. Sweet has met with professor Sally Haslanger who will be the faculty sponsor for this class, as well as staff from Residential Life and the Department of Athletics, Physical Education, and Recreation who will be working to develop co-curricular activities to be paired with the academic portion of the class.

Invited Presentations at Professional Conferences

Mr. Custer spoke at the Climbing Wall Association Summit (May 2010, Boulder, CO) and continued in his capacity as vice president and meeting secretary of the International Mountaineering and Climbing Federation's Safety Commission.

Dr. Dourmashkin spoke at the following conferences:

> "Active Learners: The TEAL Experience at MIT," Comunicare Fisica 2010, Istituto Nazionale di Fisica Nucleare (INFN), Italy, April 2010.
>
> "MIT Physics Education," Experimenta Conference, Italian Ministry of Education (Gruppo di Lavoro per lo Sviluppo della Cultura Scientifica e Tecnologica), Rome, April 2010.

"Active Learners: Instituting Change in Teaching Cultures," University of Udine, Italy, April 2010.

Workshop on highlights for high school, MISTI/Italy Program, MIT, April 2010.

Workshop on active learning in electricity and magnetism technology enabled active learning, Niels Bohr Institutet, June 2009

Talk on MIT physics education at the eastern SPIN-UP Regional Workshop, Rutgers University, June 2010.

Dr. Barrantes presented the following material (along with MIT professor David Pritchard) at the Physics Education Research Conference held in July 2009 in Ann Arbor, Michigan: "What Else (Besides the Syllabus) Should Students Learn in Introductory Physics?," "Modeling Applied to Problem Solving," and "What do Seniors Remember From Freshman Physics?"

Awards

Professor Slocum won the 2010 Arthur C. Smith award, given to a faculty member who has made "meaningful contributions and devotion to undergraduate student life and learning at MIT." Dr. Sweet won the 2010 DUE Infinite Mile team award for innovation and creativity while serving on a task force reviewing the freshman year at MIT. ESG gave its own set of awards in May, 2010, including the Peter and Sharon Fiekowsky Community Service Award (for outstanding contributions to the ESG community) and the Fiekowsky Excellence in Teaching Award (given to graduating seniors who have demonstrated excellence in teaching at ESG over a sustained period of time). Mr. Fiekowsky is a former ESG student and a graduate of MIT and has established funding for annual ESG prizes in these categories. Winners of the 2010 teaching award were graduating seniors David Farhi, John Kim, and Willie Mae Reese. Winners of the 2010 community service award were Fakhri Zahedy '13 and Joshua Hernandez '13.

Fundraising

ESG continued its fundraising efforts by reaching out to alumni on a regular basis as well as recruiting funds from other parts of MIT (Class of '54 Funds) as well as government agencies (Office of Naval Research). The majority of funds raised supported our innovative seminar series. We will work with fundraising officers at MIT towards our goal of raising a $500,000 endowment within the next ten years. This endowment will make it possible to continue to fund educational innovation at ESG that goes beyond our base budget.

Collaboration

In the spirit of more effective and efficient undergraduate education at MIT, ESG has sought to increase its connections with other parts of MIT this year.

- Department of Chemistry: Dr. Christie served as the 5.111/5.112 coordinator during the fall term.
- Concourse: ESG shared several staff members with Concourse this past year, including math staff members Jeremy Orloff and Gabrielle Stoy.

- DUE: In spring 2010, Dr. Sweet served on a DUE task force to study ways to make the freshman year more integrated and cost effective.
- Interphase/Office of Minority Education: Dr. Christie was the head chemistry instructor and taught chemistry in Interphase.
- Department of Mathematics: Dr. Orloff worked on continued development of math applets with professors Haynes Miller and Benjamin Brubaker.
- OpenCourseWare: Dr. Orloff collaborated with Professor Miller on the Stanton project which involved turning the 18.01 and 18.02 OCW into a full-fledged online course.
- Department of Physics: Dr. Dourmashkin served as a member of the Physics Education Committee. Dr. Barrantes served as a member of the Physics Education Research Group chaired by professor David Pritchard.
- System Design and Management: Dr. Orloff taught an Independent Activities Period course in probability and statistics for the System Design and Management program in 2010.

Conclusion

We are dedicated to offering undergraduates opportunities to teach and learn in a collaborative, interactive environment. We are proud of our history of educational experimentation, including our seminar series and the publication of books based on materials developed at ESG. In the coming year, we look forward to interacting closely with different departments within DUE, and we will continue to develop and promote successful ESG educational experiments for the regular curriculum and for educational settings outside MIT.

Peter Dourmashkin
Associate Director
Senior Lecturer in Physics

Alexander Slocum
Director
Professor of Mechanical Engineering

Holly Sweet
Associate Director
Lecturer

More information about the Experimental Study Group can be found at http://web.mit.edu/esg/.