

Annual Report

ASEE's
OCT. 2012—SEPT. 2013



President's Letter



It has been an honor and a privilege to serve as ASEE president during the time we celebrated our 120th birthday, an opportunity to look back on the history of engineering education (as we did with our remarkable anniversary issue of *Prism* magazine) and to consider how ASEE can influence and facilitate the education of the next-generation engineer.

The characteristics of the incoming students we hope to transform into quality engineers change with the times. Today we find young people who are much more ethnically diverse, more socially aware, and more technologically savvy than the students of even 15 years ago. These aspiring engineers have been exposed all their lives to – and in many cases have deeply considered – concepts that still seem “new” to people my age: adaptation to climate change, online learning, and socio-culturally appropriate design projects. The way we embrace, educate, and train them must keep pace with new attitudes and paradigms.

Considering this, during my presidency ASEE participated in activities geared to look beyond the typical places from where we draw our students. For example, as a faculty member, I am well aware of the talent that exists at engineering technology

schools. Further, we must take advantage of the talent coming out of our robust community college system and continue efforts to welcome populations typically not well represented in engineering.

In February we hosted a workshop, supported by the National Science Foundation, examining pathways into engineering careers for veterans. Many vets leave the military with technical training but may not know how to navigate the academic environment and may not receive proper information about the benefits of engineering careers. Further, higher education institutions are not necessarily prepared to give proper credit for military experience or assimilate vets culturally. This event brought together stakeholders to begin a process of breaking down these barriers.

We also launched a series of meetings this year to develop a new strategy for educating students, called Transforming Undergraduate Education in Engineering and funded by the National Science Foundation. Recognizing that we are preparing students for jobs that don't yet exist, we are engaging in a thoughtful and purposeful effort to explore a possible “reboot” of engineering education. The first workshop in the project sought industry input, defining what current and future engineers should know and be able to do upon graduation. The project is ongoing.

Diversity is consistently a centrally important part of ASEE activities. At our Engineering Deans Institute meeting in New York City in April we held a diversity workshop, helping deans understand the important issues and challenges of diversifying their faculty and student populations. In addition, we held a meeting in conjunction with the National Academy of Engineering and Virginia Tech in the fall examining impediments to diversity in engineering education.

Retaining quality students once they've chosen to study engineering is an important part of what we do as educators. ASEE continued its work, with funding from the Sloan Foundation and others, to collect data on student retention and highlight best practices from around the country. A video project to accompany our previously published “Going the Distance” report is forthcoming.

We made a significant addition at headquarters in January 2013 to help our efforts in reaching new populations. Ashok Agrawal, a respected community college administrator and longtime ASEE member, joined headquarters staff as the director of outreach and engagement. In this role Ashok is leading our efforts to build awareness of, preparation for, and success

in engineering and engineering technology careers through engagement of communities of educators, students, and administrators at all education levels (K-12 through lifelong learning).

We have been vocal in the K-12 arena as well. In the summer of 2012 our members formed an ad hoc committee to discuss how we can be involved with helping to implement the Next Generation Science Standards (NGSS). While the standards, which have been adopted by several states, explicitly included engineering design and concepts, there was no ongoing effort to develop teacher competencies derived from and aligned with the NGSS. In addition, the NGSS were developed with very little concerted input from the engineering and engineering education community. Early in 2013 ASEE voiced five specific recommendations to better integrate engineering concepts into the standards.

Our headquarters staff continues to provide quality services for members. *Prism* magazine mixes excellent writing with remarkable design and aesthetics to report on the latest developments in our field from around the world. *Profiles of En-*

gineering and Engineering Technology Colleges is a valuable resource for administrators and helps ASEE maintain its position as the source for data on our institutions. The Fellowships and Research Opportunities department administers thousands of positions across dozens of federal programs that may be of interest to both our faculty and student members. And our Conferences department manages an extremely popular annual meeting as well as several other workshops and sessions throughout the year.

I have greatly enjoyed my time working with the ASEE Executive Committee, Executive Director Norman Fortenberry, the ASEE staff, and other board members during my year as president. I look forward to working with our new president, Ken Galloway, in my remaining year on the Executive Committee and seeking to keep ASEE positioned as a forward-looking organization essential to the careers of engineering and engineering technology faculty.

— Walter W. Buchanan

Executive Director's Letter

The 2013 fiscal year represents my second full society year as ASEE's executive director. Over the past 12 months ASEE has made strategic positioning efforts to allow us to fully serve you, our members, and remain an important and relevant voice in the shaping of engineering education and engineering graduates in the years to come.

Walt Buchanan's letter on page 38 details some significant activities we've undertaken; it's obviously been a busy year, and I'm proud to head a staff of talented people who carry such work forward with passion and creativity. We advance engineering education in a variety of ways, including developing networks of important stakeholders, convening thought leaders and decision makers, writing quality reports, and creating other products informed by the latest data points.

I have reorganized the headquarters staff and made prudent investments in order to better position us for future

challenges and opportunities. We have added a director of outreach and engagement who will connect more deeply with constituents, enhance professional development opportunities for our current membership, grow our membership in under-participating communities, and better prepare future generations of students for entry and success in engineering and engineering technology studies. We have added a director of council affairs to better leverage the ideas and energy coming out of ASEE's multiple councils, and we added a director of sponsored programs to ensure that we better meet the obligations imposed by the ever more complex agreements we enter with various agencies and authorities.

Like many nonprofits, ASEE remains constantly challenged to stay solvent, particularly in times of uncertainty regarding federal investments. Remaining financially sound has been a constant focus of mine, and we are doing

this in a variety of ways. We chose to carefully invest in programs and products that will be of use to our members and have trimmed expenses in efforts yielding little value. In addition, we have received external funds to pursue a variety of projects, including retention studies, data analyses, project evaluations, and conference management assignments, which help to offset costs. Further, we are exploring an effort to repack-age several current programs under a larger conceptual umbrella showcasing our broad role as a leader in engineering education and appealing to new sponsors in new ways.

Other fiduciary issues have been addressed with the addition of a new CFO, who is applying strategic ideas for ASEE's financial management and planning, and the addition of a new director of business development and corporate partnerships, who is implementing



Membership

newly integrative and creative ways to approach funders across sectors.

Our Fellowships and Research Opportunities department remains robust and continues to secure grants that help ASEE's bottom line. This reflects well on many areas of the organization; in addition to recognizing quality staff in the Fellowships department, these contracts are frequently awarded based on the quality of work performed by staff in our IT, Conferences, and Art and Production departments.

Unanticipated legal activities continue to challenge our budget, as we are compelled to pay lawyer fees even on issues where we are confident we will be exonerated. One case involves repeated suits by a single actor that have been filed over the past several years. We continue to prevail, yet the suits continue to be filed, despite court orders offering us relief. Our director of sponsored programs also serves as our in-house counsel and actively works with outside counsel to stay on top of our defense in these matters.

Despite the challenges we've faced, you will find that ASEE remains vital, relevant, and a respected leader in our space. We continue to offer services you value, such as the annual conference and regional meetings, data and analysis, and quality publications. Everything I do at headquarters is with members in mind, and I hope that that focus comes through in this document.

— Norman L. Fortenberry



A SEE remains the premier society for professionals with interests in engineering education, technology, and research. We continue to make inroads to expand our base by recruiting more individual and institutional members. We strive to enhance our member benefits and resources so that our members can be informed, connected, and engaged in critical areas that mean the most to them.

Our professional membership gained a lot of momentum this year. Our K-12 membership category hit an all-time high with 221 members, an increase of 30 percent compared with last year; the share of ASEE members who are women rose to a high of 24 percent, as women continue to join at disproportionately high rates. Nearly one third of all new members in the past two years are women.

Individual membership	2007	2008	2009	2010	2011	2012	2013
Total professional	9,614	10,071	9,911	9,246	8,703	8,944	9,009
Total contact	881	1,055	1,178	1,299	1,364	1,527	1,522
Life	717	712	704	719	702	672	675
Retired	524	540	546	546	498	476	460
Student	622	663	684	728	796	826	770
K-12	139	108	133	129	145	170	221
Global	662	674	834	847	855	112	32
Total	13,159	13,823	13,990	13,514	13,063	12,727	12,689

Institutional membership	2007	2008	2009	2010	2011	2012	2013
Engineering college	311	318	324	323	310	313	319
Engineering technology college	83	83	89	94	89	89	88
Affiliate college	37	38	38	36	34	30	26
Canadian	14	15	16	16	16	16	16
Non-U.S./Canadian	11	15	18	17	15	14	14
K-12 School membership	1	2	2	6	3	3	4
Academic total	457	471	487	492	467	465	467
Corp/Gov association	97	117	136	147	141	164	144
Total	554	588	623	639	608	629	611

FELLOW SPOTLIGHT

SPACE EXPERIMENTS

NDSEG Fellow for 2011 (Contract FA9550-11-C-002) Karthik Balakrishnan, pursuing a Ph.D. in aeronautical and astronautical engineering at Stanford University, has been working on ultraviolet light-emitting diodes, a joint program between NASA/ARC, Stanford University, and the King Abdulaziz City for Science and Technology (KACST) in Saudi Arabia.

Balakrishnan splits his time between Stanford and NASA Ames, designing small satellites that perform tests of fundamental physics in space. Balakrishnan says, "I have been interested in aeronautics and astronautics since I was a child, and developed a love for physics and astronomy as I went through school." He has parlayed his love for those subjects into working with NASA Ames on a small satellite, which is scheduled to launch next year. In Balakrishnan's words: "Being on the fellowship gave me the opportunity to build a satellite from mission conception to lab implementation of the payload, all the way through construction and test of the flight unit." He has presented this work at several conferences domestically and abroad, including the CubeSat Conference, two Spacecraft Charging Technology Conferences, Space Horizons, and COSPAR. Balakrishnan states that "travel to these conferences would have been difficult without NDSEG supporting me and freeing up resources for conference travel." Prior to being awarded the NDSEG Fellowship, Balakrishnan worked at NASA Ames on a robot designed to navigate in the dark. This robot is intended for use in permanently shadowed areas of the moon.



ASEE is dedicated to providing a platform for engineering educators and professionals to engage in dialogue, networking opportunities, and professional development. It is paramount that ASEE continues to provide access to information and resources that enable our members to be more effective educators and professionals in their fields.

Conferences

ASEE members consistently rank opportunities to network and connect as among the best benefits of membership. The annual conference, our premier event for such interactions, was held in Atlanta in 2013 and again presented a large variety of offerings. The 3,750 conference participants enjoyed social events like the division mixer, 350 technical sessions, professional interest-specific division meetings, and a robot football competition and model-design competition. The conference featured more than 1,400 published papers and 120 business meetings, and drew 130 exhibiting companies and 23 sponsoring companies.

In addition to the annual conference, headquarters office staff supported several other meetings, including:

- Engineering Deans Institute Annual Meeting
- Engineering Research Council Annual Meeting
- Public Policy Colloquium
- National Effective Teaching Institute
- ASEE Workshop on K-12 Engineering Education
- ASEE International Forum
- Workshop on Transitioning Veterans to Engineering-Related Careers

ANNUAL CONFERENCE

2009	2010	2011	2012	2013
3,269	3,248	3,832	3,751	3,758

GLOBAL COLLOQUIUM / INTERNATIONAL FOURM

2009	2010	2011	2012	2013
387	405	106	112	143

Our annual international meeting changed name and format starting in 2011.

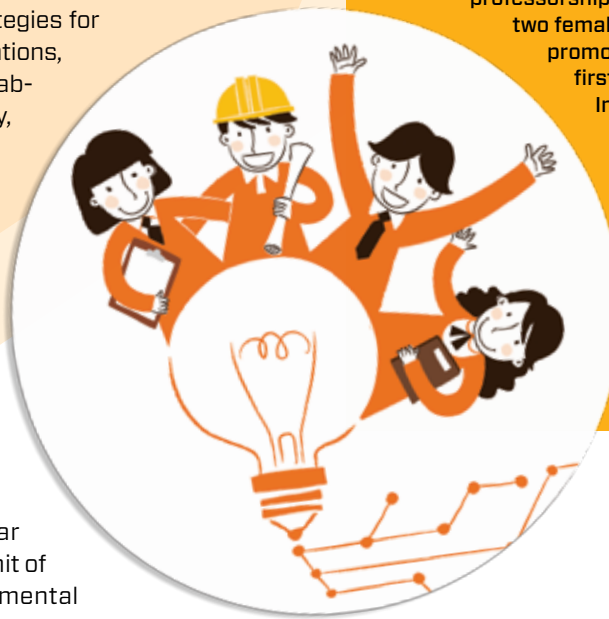
Outreach and Engagement

Faculty development, K-12 outreach, student engagement, and collaboration with engineering societies and national organizations are the primary focal activities of the Outreach and Engagement department. The operating budget for these activities includes financial support from federal agencies and private foundations, as well as registration fees from event participants.

ASEE has organized faculty development workshops geared toward enhancing diversity in engineering education and improving classroom instruction by creating a community of faculty who are focused on improving instruction. We are also experimenting with ways to transform teaching through scaling up innovative teaching methodologies.

We have launched a series of conversations with stakeholders to prepare the next generation of engineers. The Transforming Undergraduate Education in Engineering project, with support from the National Science Foundation, is designed to develop a consensus and a clear understanding of the qualities next-generation engineering graduates should possess. In addition, it explores strategies for universities, industry, public-sector organizations, and professional societies to promote, collaboratively, the changes in curricula, pedagogy, and academic culture needed to instill those qualities.

During a February 2013 meeting on transitioning veterans to engineering-related careers, community colleges were identified as a critical avenue and pathway for veterans to secure credentials as engineering technicians as well as to prepare for bachelor's-level education in engineering or engineering technology. As a continuation of that effort and through a grant from NSF, ASEE is convening a group of two- and four-year colleges in Spring 2014 for a one-day Summit of academic, veterans-focused, non-governmental organizations, the military service arms, other governmental representatives, accrediting and industry certifica-



DEANS' UPDATES

The University of Delaware's College of Engineering has raised more than \$2.5 million to improve opportunities for women in engineering. This has enabled the college to create professorships for female faculty members in engineering disciplines in which women are especially underrepresented; bring nationally recognized female leaders to campus, and provide faculty and student career development opportunities, including workshops and networking and mentoring programs. Since 2002, the College of Engineering's female faculty representation has increased from 4.5 percent to 16.3 percent. Over the past decade the share of women doctoral recipients in the college has increased from 23 to 35 percent. Dean Babatunde Ogunnaike attributes the college's track record to proactive programs designed to mentor faculty, department chairs, and deans on best practices for faculty recruitment and retention, and to robust faculty support.

Dean Gary Gabriele's commitment to women in engineering has generated funding and headlines for Villanova University. The academic year began with the addition of three new women faculty members as the result of a grant from the Clare Boothe Luce Program of the Henry Luce Foundation. The grant marked the first time the CBL Program awarded a single university three professorships in one year. Also this year, two female faculty members were promoted to full professor - a first in the college's history. In addition to increasing numbers of female faculty, the college has been recognized for the number of female undergraduates in its program - 30 percent versus the national average of 18.2 percent.

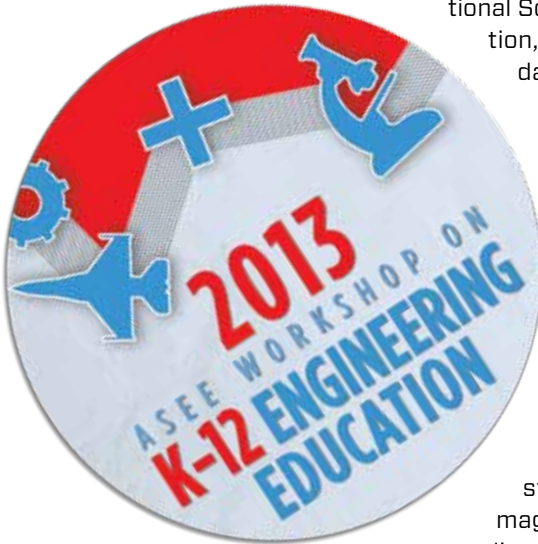
tion agencies, and other stakeholders to define an associate's-to-baccalaureate degree framework for the smooth transition of veterans and active-duty personnel into careers in engineering and related fields.

K-12

In 2013, ASEE held its 10th annual K-12 Workshop the Saturday prior to the Annual Conference in Atlanta. This year the workshop attracted more than 275 attendees for a full day of hands-on learning activities as well as targeted curricular instruction for K-12 educators from around the country. In conjunction with the regional and national meetings of the National Science Teachers Association, ASEE continues to host day-long workshops across the country to meet with K-12 educators and disseminate best practices for teaching engineering to young people. ASEE is coordinating to host additional workshops, including at the annual USA Science and Engineering Festival in Washington, D.C. ASEE staff distributed the *eGFI* magazine and reached many audiences via the *eGFI* blog and social media sites, where subscribers and fans number in the tens of thousands.

A committee of nearly 20 ASEE members met to create a matrix of professional development standards for teachers tied to the engineering content in the Next Generation Science Standards.

K-12 Conferences	2009	2010	2011	2012	2013
ASEE Workshop on K-12 Engineering Education	74	298	202	303	249



Assessment, Evaluation and Institutional Research

The Office of Assessment, Evaluation and Institutional Research (AEIR) has expanded its work on funded projects as well as its internal support to ASEE. AEIR evaluated meetings funded by the National Science Foundation (NSF), including the S-STEM grantee meeting and the STEP grantee meeting. The office's STEP meeting evaluation was expanded to include the STEP Central project in FY14. AEIR provided survey and analysis support for the NSF diversity meeting and the NSF transforming undergraduate education in engineering reform meeting by using the Delphi method to collect insights and opinions of meeting attendees prior to the meeting and presenting the results to meeting participants, as well as conducting follow-up surveys. The office hosted a workshop in the spring in Washington D.C., to refine engineering student retention data collection, and it has taken over responsibility for conducting surveys after all ASEE meetings as well as supporting the society through performance measurement exercises. AEIR continues to produce *Profiles of Engineering and Engineering Technology Colleges* - the nation's premier source for data on engineering and engineering technology education - in addition to a faculty salary survey and an engineering student retention survey.



JEE

The *Journal of Engineering Education* is widely recognized as the premier journal for scholarly research on engineering education. Published quarterly, the journal receives more than 300 new submissions each year from authors in more than 40 countries. The journal has an international editorial board that coordinates the peer review of manuscripts. ASEE now publishes the journal in partnership with John Wiley & Sons Inc. The partnership began in January 2013, with a special issue on representations in engineering practice.



AEE

ASEE recognizes the growing number of outstanding, proven engineering education innovations in the peer-reviewed *Advances in Engineering Education (AEE)*, which incorporates creative use of media, including animation, audio, graphics, and video, as a means of enhancing the articles. In this manner, *AEE* strives to be on the frontier of engineering education and also set a standard for online journals. The journal is particularly interested in applications both inside and outside the classroom that document an increase in student learning and/or achievement and are based on accepted learning science principles. To date, *AEE* has accepted for publication approximately 25 percent of nearly 500 submissions. A special issue on engineering entrepreneurship will be published this coming year. Excerpts are now featured in the regular *Prism* column *Advances From AEE*.



CORPORATE MEMBER UPDATES

National Instruments believes the best way to encourage students to pursue careers in engineering and science is to give them fun, engaging experiences with real-world engineering tools. In 2013, NI continued several companywide programs to inspire today's students to become tomorrow's innovators. We continued providing technology and funding for student robotics competitions such as the FIRST Robotics Competition and the World Robotics Olympiad. In addition, almost 150 employees volunteered their time to mentor robotics programs at local schools. For the university audience, NI traveled across the United States and Canada with the NI LabVIEW Campus Tour, a tour bus outfitted with the latest hardware and software tools for engineering students, professors, and researchers. The NI LabVIEW Campus Tour visited 109 universities and introduced thousands of students and educators to interactive technologies that can accelerate advanced research in the lab or bring relevance to complex science and engineering concepts learned in the classroom. The vehicle showcased a wide variety of teaching tools for multiple engineering disciplines. At each campus, NI experts invited engineering students and professors to try out technology demos and explore concepts in circuits, measurements, control, mechatronics, and RF communications.

Dassault Systèmes, the 3DEXPERIENCE company and ASEE premier corporate member since 2004, has for 10 years been a proud sponsor of major ASEE events, including the Engineering Deans Institute, the K-12 workshop, and the Annual Conference. ASEE federates a world-class ecosystem for understanding how new educational practices emerge and how technology catalyzes their successful adoption from primary school through university to employment. Dassault Systèmes recognizes that in several countries, the lack of interest of students in science and engineering will soon become a lack of engineers and technicians for employers. There is a real need for transforming education systems to grow the talent needed to address this century's challenges. Essential to this transformation are new educational practices to grow knowledge, skills, and abilities by leveraging digital technologies such as Dassault Systèmes' 3DEXPERIENCE platform. In 2013 this platform was used to do enable educational innovation in international collaborative learning, virtual learning devices, experiential learning, informal learning, experiential STEM learning, and flipped learning labs.

The National Council of Examiners for Engineering and Surveying (NCEES) advances licensure for engineers and surveyors, the first step of which is passing the Fundamentals of Engineering (FE) exam. In 2013, NCEES transitioned the FE from pencil and paper to a computer-based format. The new format provides examinees the flexibility to schedule their exam throughout the year at any approved Pearson VUE test center and provides NCEES with better uniformity in testing conditions and enhanced security for exam content. NCEES also encourages interaction between students and licensed professional engineers through its Engineering Award for Connecting Professional Practice and Education. The Cleveland State University Civil and Environmental Engineering Department was awarded the \$25,000 grand prize in 2013 for its submission, *Design, Funding, and Construction of the August Pine Ridge School/Hurricane Shelter in Belize*.

schools, colleges, and profession; and the International Forum provides a significant international opportunity for ASEE members as part of the Annual Conference.

NUMBER OF ATTENDEES

Conferences	2011	2012	2013
Engineering Deans Council Public Policy Colloquium	126	129	125
Engineering Research Council Meeting	122	142	126

External Affairs

ASEE stays actively involved in the increasingly complex landscape of STEM legislation. ASEE produces *Capitol Shorts*, a policy-focused newsletter; participates in meet-and-greet activities on Capitol Hill, where we disseminate information; and maintains membership in various coalitions that seek to educate legislators and the public on the importance of STEM funding and support. In February, ASEE holds its annual Public Policy Colloquium, strengthening the discussion of engineering education and research issues

between the deans of engineering and key public policymakers. This event helps deans refine their public policy agenda and message.

Three other annual events serve an important purpose to key member constituents: the Engineering Research Council meeting informs members of federal research trends and opportunities; the Engineering Deans Institute meeting allows deans to discuss crucial issues facing their

IT

ASEE's membership and paper management systems saw incremental improvements in several areas in FY 2013, such as reports, session scheduling, and financial integration (including an accrual report). A new module was added to our overall infrastructure software that helps in the management of exhibitor booths at the annual conference. A classified ads module was added, replacing the system that was on a legacy server.

We are enhancing the annual conference mobile app with an exhibitor list and the ability for attendees to see if a colleague has checked in at registration and send a message to that person. This mobile conference guide will be featured more prominently at the 2014 annual conference, along with a QR code to access it more easily.

A significant change is taking place in evaluating the applications for several fellowship programs we administer. FY13 marked the last year for panelists traveling to a central location for evaluations; we are creating a system to allow the panelists to do the evaluations remotely using a Web browser. Also in the fellowships arena, we performed a website redesign for the SMART program and created a website for NSF's Small



Business Postdoctoral Research Diversity Fellowship.

We undertook office infrastructure improvements, including local area network performance, wi-fi coverage, and domain name service redundancy. A new portal was installed to allow staff easier remote access to HQ resources, and a storage cluster was created to allow easy expansion, especially for archiving. In many ways the IT department was invisible. This is a good thing, as it means the department is providing service that was efficient, reliable, and steady.

Editorial

ASEE's Editorial department works closely with the Art and Production department to produce a number of quality products, several of which serve as our members' primary connection with the society. Our flagship magazine, *Prism*, was published eight times over the previous year and ran articles on topics important to our members, such as the federal government's brain-research initiative, Big Data, MOOCs, and how engineering schools adapt to growing numbers of students from overseas. Solid writing and reporting, combined with bold and creative design, garnered 10 awards for the magazine.

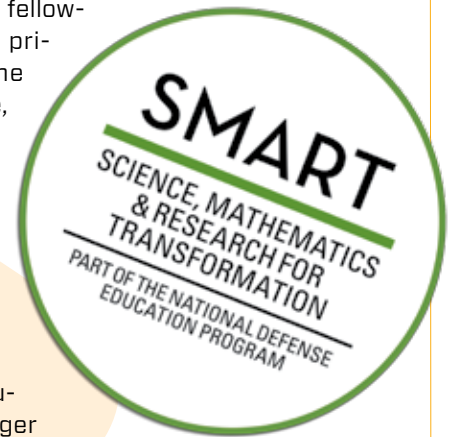
The Editorial department reviewed an ASEE report, *Transforming Undergraduate Education in Engineering*, and published four newsletters: The *eGFI* Teachers' Newsletter guides K-12 math and science teachers on ways to use engineering in the classroom; *The Accelerator* has news

for undergraduate and graduate students; *Capitol Shorts*, prepared in collaboration with the External Affairs department, is a weekly newsletter on public policy geared toward deans and department chairs; and *Connections* provides general news from the engineering and engineering technology education community, as well as statistics on U.S. engineering colleges

only available through ASEE. The department also helps coordinate content for *First Bell*, keeping membership abreast of recent news and information. Anecdotal feedback as well as open and forward rates indicate our members place high value on our newsletters.

Fellowships

For several decades ASEE has been a trusted manager of fellowships and internships, primarily working with the Department of Defense, the National Science Foundation, and NASA. These programs create a larger pool of potential faculty members, help engineering faculty develop professionally, and improve our national security by creating a stronger defense establishment and a better workforce. In FY 2013, ASEE managed 5,985 individual fellowships.



Students/ Faculty supported by ASEE	2010	2011	2012	2013
Middle & High school students	226	244	268	2,449
Undergraduate students	510	573	477	447
Graduate students	3362	3362	3,204	2,914
Programs for post-docs	92	67	64	76
Faculty	207	232	188	99
Total students & faculty	4,397	4,478	4,201	5,985

The full FY 2012 Annual Report, with financial reporting, will be available online at <http://www.asee.org/about-us/annual-report> starting in March.