Engineering Ambassador Network: Establishment of Successful Engineering Ambassador Programs at Four UTC Partner Schools

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Ms. Elizabeth Herkenham is the Education Outreach Director for the School of Engineering at Rensselaer Polytechnic Institute. Her responsibilities include managing and coordinating pre-college STEM-related educational outreach activities across the institute’s campus as well as remotely in K-12 classrooms. This includes managing the Engineering Ambassadors program consisting of approximately 30 undergraduate students. Ms. Herkenham is also the Pre-college Educational Outreach Director for NSF funded Smart Lighting Engineering Research Center (ERC) and CURENT ERC. Prior to the position at Rensselaer, Ms. Herkenham was the Co-founder & Executive Director of the Workforce Consortium for Emerging Technologies (Workforce Consortium), a 501 (c) 3 not-for profit organization. The Workforce Consortium’s mission was to bring awareness to the full spectrum of new high technology career opportunities in the upstate New York Region and the global marketplace. Ms. Herkenham is an elected School Board Member official of a NY public school district for thirteen years. Her involvement has provided the keen understanding and the experience to develop meaningful and relevant student and educator professional development programs and strategies.

Ms. Melissa Marshall, Pennsylvania State University, University Park
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Introduction

The Engineering Ambassador Program helps undergraduate engineering students develop important professional skills, such as communication and leadership. Recognizing the need for a new generation of technical workers with these skills, United Technologies Corporation (UTC) took an interest in Penn State’s successful Engineering Ambassador Program. Al Brockett, Vice President of Engineering – Module Centers for Pratt & Whitney, proposed the idea that three additional universities, namely the University of Connecticut, Rensselaer Polytechnic Institute (RPI), and Worcester Polytechnic Institute (WPI), work to establish an Engineering Ambassador Program with guidance and training from Penn State faculty.

The initial meeting of the four universities and UTC took place at the University of Connecticut in January 2011, and included representatives from each university’s Dean of Engineering Office, as well as from Corporate Engagement, Women and Diversity Programs, and Communications Departments. The goal of the day-long meeting was essentially for each university to learn about Penn State’s program, and for everyone to address important questions to fellow schools and UTC about the launch of these programs. At this meeting, Penn State invited the universities to a three-day workshop in April 2011 with the objective of training the first Engineering Ambassadors from each university. This training has now developed into an annual fall weekend workshop for Ambassadors from the four partner universities.

In addition to supporting the Engineering Ambassador Program on a financial level, UTC also offers real-world work experiences through internship opportunities for a selected group of Ambassadors. In reflecting on the collaboration among the four universities, Al Brockett acknowledges the strategic benefits from establishing what he good-humoredly describes as a “forced marriage;” however, what grew out of this powerful union is a true sense of community, a partnership, and a genuine desire to collaborate. Each school quickly realized the benefit of having three other institutions with programs at various levels of development. The partnership was essential to building successful programs because it allowed the four partner universities to:

- Exchange best practices, from day-to-day operations to long-term strategic goals;
Benefit from the energy and enthusiasm of other program participants and advisors;
Develop a community among the four universities, but also a healthy competition
between students and programs;
Encourage the Engineering Ambassadors to feel part of a larger mission;
Extend and share resources, and;
Take advantage of group training and networking opportunities.

Another important aspect of the Engineering Ambassador Program is the way that each
university adapted the program to meet its unique institutional needs. Even though each
university organized the program differently, there is a shared vision incorporating three
important points. Each program:

1. Communicates messages from National Academy of Engineering’s *Changing the
   Conversation*\(^5\)
2. Performs outreach to middle and high schools
3. Focuses on the Ambassadors’ professional development through academically-based
   programs

The sections below describe each institution’s program.

**The Pennsylvania State University**

Penn State established the Engineering Ambassador Program’s outreach mission by employing
the marketing lessons from *Changing the Conversation* through the partial support from the
National Science Foundation.\(^6\)

Established in 2009, the mission statement of the Penn State Engineering Ambassadors is:

*Sharing our passion and pride, we inspire middle and high school students to challenge
conventional ideas about science and engineering. Through communication and leadership, we
strive to become world class engineers and seek to motivate the next generation of engineers to
impact the health, happiness and safety of our world.*

After having learned advanced presentation skills and the messages of *Changing the
Conversation*, select undergraduate engineering students, mostly females, traveled to high school
science classrooms across the Commonwealth of Pennsylvania to give presentations and show
their passion for the engineering profession. The Engineering Ambassador Program grew
quickly. In 2009-10, the Penn State Ambassadors visited 8 schools and spoke to more than 1000
middle and high school students. In 2010-11, they had 10 school visits and spoke to 2500
students. And in 2011-12, the Penn State Ambassadors had 11 school visits and spoke to 2900
students.

Today, there are 65 Penn State Engineering Ambassadors with the following breakdown by
gender, ethnicity, and major:
Penn State Engineering Ambassadors: Gender

- Male: 25
- Female: 40

Penn State Engineering Ambassadors: Ethnicity

- Caucasian (86%)
- Hispanic/Latino (6%)
- Asian (3%)
- African American (5%)

Penn State Engineering Ambassadors: Majors

- Aerospace Engineering: 2
- Architectural Engineering: 3
- Bioengineering: 4
- Biological Engineering: 2
- Chemical Engineering: 7
- Civil Engineering: 4
- Computer Engineering: 4
- Electrical Engineering: 5
- Engineering Science and Mechanics: 3
- Industrial Engineering: 6
- Mechanical/Nuclear Engineering: 26
Since 2009, Penn State’s Engineering Ambassador Program has grown from 12 Ambassadors (all female) to 65 Ambassadors in 2012 (more than 63 percent female). In addition, the Program now includes a three credit elective course on advanced communications. Acceptance into the Engineering Ambassador Program has become competitive as a result of the strong interest from the engineering students. In 2012, 75 students competed for 40 open positions.

In the Engineering Ambassador Program at Penn State, students are required to enroll in a public speaking class as a part of their engineering curriculum before becoming an Ambassador. After being selected as an Ambassador, they enroll in an advanced communications course during the first semester of being an Ambassador. In the advanced communication course, the Ambassadors study innovative presentation techniques, communication strategies (written and oral) for varied audiences, and emerging web communication technologies. The outreach events of the Engineering Ambassador Program provide the context and practice forum for concepts and skills learned in the course. Attention is also given to strategies for effective leadership and networking.

Educational Outreach Events

The activities of the program focus on outreach, which fall into two general categories:

**Middle and high school outreach visits.** During the visits to middle and high schools, the Engineering Ambassadors, who are relatable role models, generally provide two types of presentations. Six Ambassadors arrive at the school in the early morning and provide age and subject appropriate presentations and activities that are integrated with the science and math curriculum. Because the Ambassadors present in pairs, they present in up to three parallel classrooms at a time during the school day. The Ambassadors show how engineering is relevant to these subjects such as highlighting an engineering project such as developing a spinal implant. In addition, the Ambassadors start or conclude the day with a presentation about Engineering Careers in the school auditorium. The audience for this presentation usually ranges from 100 to 300 students.

**On campus recruiting of prospective students and community STEM events.** The Engineering Ambassadors are active with campus recruiting as well. Each week, they provide tours of the College of Engineering facilities and give several presentations about the experiences and opportunities available to an engineering student. Tours consist of prospective students and families and range in size from five to 15 people. The audiences for the presentations average in size from 10
people for a regular, weekly event to 300 people for a major campus event. In addition, the Engineering Ambassadors are involved with promoting STEM through many local community events.

Funding Opportunities

The program is supported by the College of Engineering at Penn State as well as several industry partners. The College of Engineering provides significant program support. Additionally, United Technologies Corporation, Chevrolet, and Rockwell Automation provide support for about half of the program.

For example, we currently have 18 students that are designated as UTC Engineering Ambassadors, 5 students that are designated as Chevrolet Engineering Ambassadors, and 4 students that are designated as Rockwell Automation Engineering Ambassadors. Students that choose to be designated as Ambassadors for a company are interested in career and networking opportunities with that company. This model appeals to our industry partners because it provides an excellent recruiting tool to create a relationship with top student leaders. Our partners create special opportunities for their Ambassadors like site visits and networking opportunities with leaders in the company. Many of our partners offer internship opportunities to the Ambassadors.

Program Successes

Our program has had a positive impact on the teachers, students, and Ambassadors themselves, as exemplified by the following comments:

The students definitely had their misconceptions about what engineers do clarified. They learned that engineers solve problems that improve the quality of life and that they work in many different fields. Teacher from Hershey, PA

[The Engineering Ambassador visit] opened their eyes to the field of engineering. Especially the females in my classes! They may not have had the career of an engineer on their "radar" until meeting with the student ambassadors. Teacher from Mercersburg, PA

[Today’s presentation changed my opinion of engineering because] I did not realize it was such a worldly topic and so beneficial to life and the everyday. Female High School Student

[Today’s presentation changed my opinion of engineering because] I didn't know how big of a part of my daily life engineering is. Male Middle School Student

Being an Engineering Ambassador changed my life. It not only gave me the confidence to create and give effective technical presentations, but it also opened up a world of opportunity which I never knew existed in engineering; the ability to make a difference. Even after going through years of engineering schooling, I never knew the wide breadth of impacts that engineers have on our world and on our futures. I also had the amazing opportunity to present to, interact with, and hopefully change the lives of many eager
middle and high school students across the state. These school visits, I believe, were some of the most challenging yet rewarding experiences of my college career. Ambassador Alumna

Being a part of the Engineering Ambassador was a key moment in my life – I think of it as one of those “ah-ha!” moments in which I truly began to appreciate being an engineer. Communication, especially as an engineer, has been the best skill set I could have gained as an engineering ambassador. Knowledge is great, but being able to communicate takes it to a level where I have confidence to be a leader and a team player. Ambassador Alumna

Engineering Ambassadors taught me how to become an indispensable part of everything I do. My drive to succeed and make a real difference coupled with the communication and presentation skills that EA helped me develop have jump-started my career. About a year ago when I first started my job, I jumped at the opportunity to create a presentation about Air Liquide’s internal social network—EA gave me the confidence to attempt such a task. Soon enough, word of my presentation made it to the Head Office in Paris, France. Because of this international exposure so early in my career, I quickly began to make a name for myself. Since last year I have been able to present before executives, meet with senior management from Paris, attend several exclusive meetings and receptions, manage the internal social network that I presented, and now work directly for the Chief Operating Officer (COO) of the company. Ambassador Alumnus

In addition, the Penn State Engineering Ambassadors program is an award-winning and nationally recognized STEM (Science, Technology, Engineering, Math) outreach program. In 2011, the Ambassadors were recognized by the White House via the Champion for Change program for our work in recruiting women into STEM fields. In 2012, we received the American Association of University Women’s Gateway to Equity Award. And in November 2012, we were presented with the American Society of Mechanical Engineers Johnson & Johnson Medal for our efforts in diversity and inclusiveness.

Program Goals Moving Forward

Our goal is to maintain the program at its current size and to continue to look forward to opportunities to expand the number of students that we interact with through increasing the numbers impacted at each event.

Another key goal is to move forward with establishing the Engineering Ambassadors Network. In August 2012, we founded the Engineering Ambassadors Network a network of collaborating Engineering Ambassador programs at universities across the country. Our program is the founding member of the network and we have shared our program model and strategies with 22 other universities to start Engineering Ambassador programs.
Rensselaer Polytechnic Institute

In fall 2011 Rensselaer’s first cohort of Engineering Ambassador students developed the following mission statement to help guide the focus of the newly-created hallmark educational outreach program:

*The Rensselaer Engineering Ambassadors are an assembly of highly motivated students focused on inspiring a younger audience to explore the role of engineers in society.*

Today there are 31 Engineering Ambassadors, with the following breakdown by gender, ethnicity, and major:

![Gender Breakdown](image)

- Male: 18
- Female: 13

![Ethnicity Breakdown](image)

- Caucasian: 74%
- Hispanic/Latino: 13%
- Native American: 7%
- Asian: 6%
Program Recruitment and Training in Communication and Leadership

The Rensselaer Engineering Ambassador recruiting process begins every year in December. Department heads from the School of Engineering as well as representatives from Rensselaer’s Archer Center for Student Leadership Development recommend high performing first-year and sophomore engineering students. Students are also invited to apply through other channels including student professional organizations. A special invitation is sent with a description of the strict criteria which includes having a 3.20 entry level grade point average. Students must have a passion for educational outreach. All students are required to complete the application, including a reference questionnaire, and submit a resume and transcript. There are three levels of review of the candidates: general application review, first interview, and a five-minute presentation on a predetermined subject. The recruitment sub-committee supports the process, but the final selection is made by the Engineering Ambassador program director.

Once accepted into the program, the “Junior” Engineering Ambassadors (or Ambassadors that are new to the program), shadow “Senior” Engineering Ambassadors (in other words, “trained Ambassadors”) on one or two events during the spring semester in order to learn firsthand about the responsibilities of being an Engineering Ambassador. During the following fall semester, Rensselaer’s Engineering Ambassadors then team up and research an engineering related topic as the first step to building a new presentation. In addition, each presentation team must identify a faculty advisor to support the development and eventually approve the technical content of each presentation. This approach has proven to be an essential component of developing a high quality technical presentation.

The Junior Ambassadors are then required to attend the three-day communications training facilitated through the Penn State, Rensselaer, UConn and WPI partnership. This represents the core of Rensselaer’s communications training each year and has provided a consistent and effective approach while the institution develops a more extensive approach in-house. Rensselaer’s Archer Center for Student Leadership Development provides key leadership skills.
training through a variety of interactive learning experiences. For example, the Archer Center faculty and Engineering Ambassador program director identify Subject Matter Experts (SMEs) from within the Engineering Ambassador team who then share their expertise with the total Engineering Ambassador community. SMEs have presented on subjects including effective presentation critiquing techniques, organizational skills, incorporating mathematical concepts into presentations, creative presentation theme building, and effectively connecting with the audience. This has proven to be a very successful way to foster the strengths and leadership capabilities from within the Engineering Ambassador community.

Educational Outreach Events

As mentioned in the Engineering Ambassador program criteria above, the Rensselaer Engineering Ambassadors strive to illustrate the importance of engineering to the health, happiness, and safety of our world as messaged in the National Academy of Engineering’s *Changing the Conversation*. The group’s main focus is to support approximately 12 regional middle or high school visits each academic year. The Ambassadors target at least one visit to the four regional urban school districts that have a strong presence of under-represented students. During the school visits, usually five to six Ambassador teams present simultaneously in STEM-related classrooms throughout the school day. The classroom visits generally follow with an opportunity for the Engineering Ambassadors to facilitate a panel discussion that includes answering questions on a wide range of engineering topics in addition to general questions about college life.

The Engineering Ambassadors also support campus-wide events such as the Exploring Engineering Day for 3rd to 6th grade students and parents; Design Your Future Day for 10th to 11th grade females; and Black Family Technology Awareness for local community members. The presentation schedule is very busy as there are more requests for outreach than the students’ calendars can allow. The Rensselaer program team hopes to grow the program by increasing the number of Ambassadors, thus allowing an expansion of the current educational outreach exposure.

Funding Opportunities

UTC is the primary sponsor of the Rensselaer Engineering Ambassador program and the company has supported the initiative from the beginning in order to help build the future pipeline of engineers. As mentioned previously, UTC provides internship and co-op opportunities for a selected group of Engineering Ambassadors. Rensselaer hopes to expand upon this successful model of industry/higher education partnership with companies from different industry sectors.

The Rensselaer program also works in close collaboration with faculty members and engineering research centers with vested interest in developing educational outreach programs. Examples include the following:

- The Engineering Ambassador program team works closely with faculty members applying for National Science Career Awards with educational outreach a key component
of the proposals. The faculty members then develop materials around their research area that Ambassadors can incorporate within their presentations and take on the road.

- Rensselaer is a key university partner for a NSF-funded Smart Lighting Engineering Research Center (ERC). The ERC sponsors up to four Engineering Ambassadors each semester to develop presentations and hands-on activities related to the digital lighting technology. The final presentations are incorporated within the Ambassador outreach to middle and high school students throughout the region. The partnership between the ERC and the Ambassador program enhances the presentation offerings to include interesting real world engineering applications of Smart Lighting ERC while providing greater educational outreach opportunities to many more pre-college students than if the ERC managed its outreach separately.

- Several School of Engineering faculty members have embraced the Engineering Ambassador philosophy by providing research experiences within their laboratories through the Undergraduate Research Program (URP). The students then develop presentations that tell the story of the research. The faculty members provide a great deal of guidance to the Ambassadors as they prepare presentations and hands-on activities about the technology within the URP laboratories.

An additional source of financial support comes from various state funded K-12 STEM grants whereby the objective is to encourage middle school students to explore STEM “academies” (programs) and Smart Scholars Early College programs. The Smart Scholars Early College High School Program is targeted to students who are traditionally underrepresented in postsecondary education. Students receive additional academic support from the school/college partnerships to ensure they are at grade level and ready to participate in rigorous high school and collegiate courses. Rensselaer’s Engineering Ambassador program has partnered with urban school districts and local community colleges to inform middle school students of the wide range of STEM-related career options available through this program.

Program Successes

During the 2011-2012 academic year, Rensselaer Ambassadors visited eight middle and high schools reaching approximately 2,300 students total that year. During the visits, usually five to six presentation teams held multiple sessions simultaneously throughout the school day. Through the support of the Smart Lighting Engineering Research Center, Rensselaer performed an informal review of the effectiveness of the presentations. Over 1,500 middle and high school students were surveyed with a pre- and post-evaluation that focused on the attitudes towards engineering. In summary:

- 60% agreed the presentation help them to better understand engineering
- 49% agreed that their interest in engineering had increased as a result of the presentation
• 58% agreed that their knowledge of engineering had increased as a result of the presentation

The 2011-2012 cohort of 20 Rensselaer Engineering Ambassadors were also surveyed and interviewed. The outcome included:

• 72% agreed that the presentation had helped them learn to transfer information outside their area
• 83% agreed that they were more motivated to learn the course content
• 83% agreed that the process had helped them develop self-direction and responsibility
• 94% agreed that the process helped them to develop confidence in presenting engineering content.

These preliminary results suggest that the Engineering Ambassador program is effective and beneficial; however, further studies need to be conducted in order to substantiate the results.

Program Goals Moving Forward

Even though Rensselaer’s Engineering Ambassador program aims to promote engineering to an underrepresented audience, the Ambassador role models currently do not depict the audience we are attempting to attract. Going forward, Rensselaer plans to address this, in addition to incorporating representation from all engineering majors. With these goals in mind, Rensselaer’s Ambassador recruitment efforts have become targeted to help encourage a diverse population of Engineering Ambassadors. Expanding industry connections will also help to strengthen the sustainability of the program within Rensselaer’s School of Engineering culture and community.

The university partnership between Penn State, WPI, UConn and RPI has played an important role in the development of Rensselaer’s program. A national network would also strengthen the mission of each Engineering Ambassador.

University of Connecticut

The University of Connecticut (UConn) formed its Engineering Ambassador Program in spring 2011, following the invitation from UTC and Penn State. The first cohort of 18 student Ambassadors developed the following mission statement:

_UConn Engineering Ambassadors engage a diverse student population, our university and the greater community in activities that inspire them to explore a variety of creative solutions to the problems facing humanity. We develop ourselves as passionate engineers of the future with the power to express engineering concepts through fundamentals of science and math._

The group attended the spring workshop offered by Penn State and began outreach activities as the “Presentation Team for Engineering Ambassadors.”

In fall 2011 the UConn Presentation Team members recognized the potential of the program and invited the entire cohort of students in the School of Engineering to join Engineering Ambassadors. More than 200 students attended the first general call out, leading to
approximately 120 students who actively participated in on-campus outreach events, professional development, and general body meetings for Engineering Ambassadors. The UConn Presentation Team for Engineering Ambassadors performs the outreach to local middle and high schools as well as serves as leaders in the general body of Engineering Ambassadors. This general body acts as a recruiting and training platform for the Presentation Team. Serving as a general body member allows a student to “try out” Engineering Ambassadors without the time commitment required by being part of the Presentation Team.

Currently for the 2012-2013 academic year, the UConn Presentation Team for Engineering Ambassadors consists of 32 members. The general body for Engineering Ambassadors continues to have around 200 members with about 50% of those actively participating in on-campus events, after school club support, and prospective student tours. This paper focuses on UConn’s Presentation Team specifically because these 32 students are the ones committed to and participating in the national Engineering Ambassador Network.

The charts below outline the information around gender, ethnicity, and major with regard to the 32 members of the Engineering Ambassador Presentation Team:

**UConn Engineering Ambassadors: Gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
</tr>
</tbody>
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**Uconn Engineering Ambassadors: Ethnicity**

- Caucasian (69%)
- Hispanic (9%)
- African American (19%)
- Asian (3%)
Program Recruitment and Training in Communication and Leadership

The University of Connecticut’s Engineering Ambassador Presentation Team recruitment begins early in the spring semester with an information session and request for applications. The applicants are screened by GPA, major, essay responses, experience, and prior involvement with the Engineering Ambassadors General Body. Potential candidates are invited to participate in an interview. The selection process is conducted by a panel of advisors for the Engineering Ambassador program, student leaders and select Presentation Team members.

New “Junior Ambassadors” are required to participate in the annual fall workshop where they are immersed in the assertion-evidence slide theory and apply this structure to create their first presentations for outreach to middle and high schools. In addition, new members are required to participate in an Engineering Special Topics course offered each semester. Returning members are invited to take the course. This course, taught by the advisor for the group, meets once per week and provides instruction and training in communications, leadership, and presentation skills. The course also includes sessions on networking, gender and diversity issues, and other special topics.

Throughout the academic year, Engineering Ambassadors participate in special seminars across campus as determined by group advisors and student leaders. The students plan and invite speakers for professional development including topics of “Sexual Harassment in the Workplace and Classroom”, “Advanced Presentation Skills”, “Technical Writing and Presentation Skills” and special leadership workshops offered by UConn’s office of student leadership.

### UConn Engineering Ambassadors: Majors

- **Biomedical**: 3
- **Civil**: 2
- **Chemical**: 8
- **Computer Science**: 1
- **Electrical and Computer Engineering**: 2
- **Engineering Physics**: 1
- **Environmental**: 1
- **Manufacturing for Engineering Management**: 2
- **Mechanical**: 8
- **Material Science**: 3
- **Undecided Engineering**: 1
Additionally, during each spring semester, Engineering Ambassadors are invited to participate in a second Special Topics class called Engineering with Impact. This course offers student leaders the opportunity to further develop their leadership skills while working to organize and develop their own organizations’ goals for the current and following year. This course allows and encourages the Ambassadors at UConn to serve as leaders, not only of Engineering Ambassadors but of other organizations as well.

Educational Outreach Events

UConn Engineering Ambassadors partner with as many as 30 local schools over the course of the academic year to offer outreach presentations and activities while delivering engineering messages consistent with Changing the Conversation. During these school visits, the Ambassadors present in pairs on topics chosen by the hosting teachers. Typically two to four pairs of Ambassadors present on a given day for the entire school day. This allows the Ambassadors to give classroom presentations to most students at the targeted grade level. Oftentimes Ambassadors are invited to present on “What is Engineering” and “My College Experience” in an auditorium setting to allow a second touch point for all students in the school.

Additionally, the group selects two to four schools each semester to partner with on long-term projects, which are modeled after UConn’s Capstone Senior Design projects. Typically, the Engineering Ambassadors present a project kick off, maintain communications with teams at local schools, and return for project wrap up in which the students present to the Ambassadors and the Ambassadors serve as project judges. During the fall 2012 semester, Engineering Ambassadors presented to over 3,000 students in classroom presentations and the goal is to present to an additional 3,000 or more during the spring 2013 semester.

In addition to visiting schools, Engineering Ambassadors host school groups on campus and offer tours of UConn’s research labs, the cogeneration plant, and the wastewater treatment plant. The Ambassadors include demonstrations and hands-on activities in the daily agendas. For the spring of 2012, the Ambassadors hosted over 600 students on campus during such field trips and the number is anticipated to increase to 1,200 for the 2012-2013 academic year.

Engineering Ambassadors work with the Lodewick Visitors Center host prospective student tours on campus each week. Ambassadors work in pairs to give a short presentation about Engineering at UConn and then provide a more informal question and answer session for prospective students and their families. An optional walking tour of the Engineering Campus is offered following the presentations.

In conjunction with the Engineering Diversity and Outreach office, UConn Engineering Ambassadors also support other programs on campus such as Northeast Regional Science Bowl (high school teams), Multiply Your Options (hosted by the Society of Women Engineers for 8th grade girls), and NASA Space Science Day (hosted by UConn’s Society of Hispanic Engineers for 5th and 8th grade students). The Ambassadors make presentations and host events for students on campus during National Engineers Week. Additionally, the Ambassadors provide support for the career fair and other large events hosted by the School of Engineering.
The Engineering Ambassadors Presentation Team along with support from the General Body offer help to Connecticut Science Fair, several after school clubs, and outreach to local preschools and elementary schools. They have hosted events for community organizations such as Big Brothers Big Sisters and attended the Connecticut Manufacturing Expo as well as the Connecticut Science Teachers Expo. The Ambassadors anticipate reaching over 2,000 students and teachers through these ventures during the 2012-2013 academic year.

The Engineering Ambassadors also support campus-wide events such as the Exploring Engineering Day for 3\textsuperscript{rd} to 6\textsuperscript{th} grade students and parents; Design Your Future Day for 10\textsuperscript{th} to 11\textsuperscript{th} grade females; and Black Family Technology Awareness for local community members.

Funding Opportunities

UTC is the primary funding source for UConn Engineering Ambassadors at this time. The company has supported the initiative from the beginning in order to help build the future pipeline of engineers. As mentioned previously, UTC provides internship and co-op opportunities for a selected group of Engineering Ambassadors. UConn plans to expand upon this successful model of industry/higher education partnership with members from different industry sectors and has begun to develop relationships with individuals and companies with this goal.

UConn Engineering Ambassadors have begun to work with School of Engineering faculty in writing for National Science Foundation CAREER Awards and funding supplements that will allow the Ambassadors to engage in undergraduate research and continue to present the work of the group to local middle and high schools through the Ambassador program. Engineering Ambassadors have begun to search and apply for other grants as well. Over the past year, students have submitted proposals to local and national funding agencies. The group strives to look for additional opportunities to build relationships with local industry, faculty, and national foundations in order to secure funding for the future.

Program Successes

During the 2011-2012 academic year, UConn Ambassadors visited over 18 unique schools and presented to more than 3,200 students. For the 2012-2013 academic year, UConn Ambassadors will almost double that reach by visiting nearly 30 schools and reaching over 6,000 students. The Ambassadors have developed and implemented a student leadership structure for the organization allowing them to apply leadership skills to the development of the group. Each Ambassador has the opportunity to serve as a ‘project manager’ over the course of a semester by coordinating visits, developing team tools, offering peer professional development workshops, planning large events, and more.

The partnership with UTC has resulted in placement of 12 and 13 internships in the summers of 2012 and 2013 respectively. One intern is continuing with a semester co-op. Additionally two Ambassadors have received and accepted offers for full-time employment. All Ambassadors who have participated in an interview process have reported that their experiences as an Ambassador had helped with their confidence in the process and that they were able to provide
examples from their involvement with Engineering Ambassadors when answering questions and
discussing the unique skills that they will bring to the workforce.

Several Ambassadors have had the opportunity to use the assertion evidence style design in their
coursework with much success. This confidence and experience in presentations has allowed the
Ambassadors to achieve higher marks than peers on such assignments. Many faculty have
embraced the program and its goals because of the Ambassadors’ performance in the classroom.

The Engineering Ambassadors developed prospective family presentations and tours for UConn
School of Engineering. These presentations and tours did not exist before. The group has
successfully toured more than 100 families and in just one enrollment cycle since the inception
of the program the group can attribute four freshman enrollments to the outreach and work that
the Ambassadors do. Likewise, Ambassadors site the program as inspiration for sticking with
tough coursework and often undesirable study schedules to complete a degree in Engineering.

These anecdotal results suggest that the Engineering Ambassador program at UConn is
beneficial to both the Ambassadors and the students they reach. Additional formal study is
needed to assess and further explore the benefits of the program.

Program Goals Moving Forward

The UConn Engineering Ambassador Program plans to establish additional corporate
partnerships in order to increase funding for the program, and also offer additional internship
opportunities to the group’s members. The current partnership with UTC does not provide equal
opportunities to Chemical Engineering students and Mechanical Engineering students. The
Presentation Team for Engineering Ambassadors consists of equal numbers of these two majors.
There is a need for additional partnerships with employers with more varied interests.

The program at UConn is growing substantially. The demand for participation in the program by
engineering students exceeds the current resources for the program. The schools being reached
by UConn Engineering Ambassadors have been very receptive and pleased with the outcome of
the visits. As the program has returned to schools for a second and third time, the school has
requested additional pairs of presenters to expand to the reach at that individual school. This
demand will soon exceed the capacity of the current team. As the program moves forward,
UConn Engineering plans to allow expansion of the program as additional funding and staffing is
acquired.

The partnership with Penn State, WPI, and RPI along with UTC has proved invaluable and
indispensable. UConn Engineering plans to continue to play an active role in this collaboration
and sharing of resources. UConn is proud to be a member of the new national Engineering
Ambassador Network and is excited to play a role in mentoring new Ambassador organizations.

Worcester Polytechnic Institute

There are 18 Engineering Ambassadors participating during the 2012-13 academic year, with the
following breakdown by gender, ethnicity, and major:
WPI Engineering Ambassadors: Gender

Male: 5
Female: 13

WPI Engineering Ambassadors: Ethnicity

- Caucasian: 67%
- Hispanic/Latino: 11%
- African American: 5%
- Asian: 17%

WPI Engineering Ambassadors: Majors

- Aerospace: 5
- Chemical: 3
- Electrical and Computer: 2
- Mechanical: 8
At WPI program recruitment begins in early spring. Preference is given to those applicants who are from underrepresented groups in engineering; however all candidates are encouraged to apply. Selection is based on good academic standing, experience and background, faculty endorsement, and an interview. In addition, potential candidates must make a five-minute presentation on a topic of their choice. The review panel consists of staff from offices on campus representing Women and Diversity, Admissions, and Corporate Engagement.

The WPI Engineering Ambassadors engage in a number of trainings to enhance their communications skills and their leadership abilities. As mentioned above, the first training takes place during the annual fall weekend workshop with the three partner universities. During this workshop, the Ambassadors learn how to effectively deliver messages from *Changing the Conversation*. They also become immersed in the assertion-evidence slide theory and employ this presentation structure as they work in pairs to create their first presentations geared towards middle or high school students.

The next intensive communications training takes place over a five-day period in October when the university has a fall recess. During this workshop, the WPI students participate in sessions from 9:00 a.m. - 5:00 p.m.; Junior Ambassadors attend the full five days and Senior Ambassadors participate in advanced training during the latter half of the week. For the most recent training in October 2012, Christine Haas, a leader and advocate for the Engineering Ambassador Program since its inception, developed and taught many of the workshop sessions. The Junior Ambassadors explored topics, such as presentation development, story structure, design techniques, delivery, and improvisation. The Senior Ambassadors delved more deeply into methods for incorporating stories and mapping techniques into presentations. The Senior Ambassadors also helped to mentor the Junior Ambassadors by providing presentation suggestions. The workshop also included time devoted to managing successful hands-on classroom activities with youth. In general, the communications training provides an important time for the Ambassadors to get to know one another and bond as a group, which helps them to feel comfortable in providing crucial presentation feedback to one another.

Throughout the year, the WPI Engineering Ambassadors also participate in leadership modules taught by business school faculty. These modules usually take place during a four-hour period on the day after each term ends. For example, in October 2012, the associate dean from the School of Business taught a session based on the book *Influence without Authority*. In December 2012, the Ambassadors completed a career assessment tool and created a development plan to help think about their career options and ways to leverage their talents and resources.

In addition to the formal trainings, the WPI Engineering Ambassadors attend weekly meetings. These provide a forum for the Ambassadors to practice their presentation skills and exchange informal information.

Types of Outreach
The Engineering Ambassadors seek to connect with various populations in order to inspire others to see the amazing opportunities in the engineering field. At WPI the Ambassadors perform outreach primarily through on-campus middle school tours and through local school visits. The program manager works with the WPI Admissions Office to coordinate the middle school tours, which include a presentation and hands-on activity by the Ambassadors and a brief presentation and tour by an Admissions representative. The Ambassadors also visit local middle schools or community based-organizations, such as the Boys and Girls Club of Worcester. Lastly, the Ambassadors make presentations on campus during events such as Alumni Weekend or National Engineers Week.

Funding/Sustainability Model

UTC helps to support the program by providing funding for student stipends, participant supplies, and program outreach events. WPI covers additional program expenses, such as a portion of the program manager’s salary, consultant training fees, and travel expenses.

Future plans include inviting two to three additional corporations in non-competing industries to sponsor a cohort of Engineering Ambassadors in addition to the group sponsored by UTC.

Program Successes

In establishing an Engineering Ambassador Program, WPI has achieved a number of successes with regard to K-12 outreach, program management, and program organizational design.

K-12 Outreach: During the academic year of 2011-12, ten WPI Engineering Ambassadors gave presentations and led hands-on activities reaching over 575 youth through 17 outreach events. The WPI program has continued to thrive, and currently there are 18 Engineering Ambassadors with the goal to reach over 1,000 youth in 2012-13. Because WPI is located in Worcester, MA, the second largest city in New England, the Ambassadors have the opportunity to reach a diverse population of youth within a short distance from campus. This year WPI is working more closely with schools that have programs, such as GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs) and ETS (Educational Talent Search). The Ambassadors feel a deep connection to the local community by being able to promote engineering to the Worcester youth.

Program Management: During the program’s start-up phase, a core group of four women representing the Offices of the Dean of Engineering, Women and Diversity, and Corporate Engagement successfully launched the program on campus in addition to managing their full-time work responsibilities. In recognition of the initial success, WPI then hired a full-time program manager to lead the Engineering Ambassador Program as well as a few other initiatives. This new role signals WPI’s commitment to sustaining the Ambassador program.

Program Design: WPI’s unique academic calendar system influences the design of the Engineering Ambassador Program. Rather than a traditional semester system, WPI employs four seven-week terms. Therefore, students tend to have a compact class schedule and start preparing for mid-term exams within three weeks of the term. In order to avoid missing classes, WPI
students usually travel to schools that are located within a short distance of the college campus. The on-campus middle school tours also provide a great outreach option because the WPI Ambassadors can interact with and present to a group of youth within a two hour time period.

Future Goals for Program

WPI is proud of its success in launching the Engineering Ambassadors Program during the first year of 2011-2012 and building upon this foundation in 2012-13. The goals for the future include the following:

- Motivate the next generation of engineers to impact the health, happiness, and safety of our world. One example of this is to double the program’s outreach numbers from last year and reach over 1,000 youth.
- Continue to collaborate with the three partners, Penn State, University of Connecticut, and RPI, and contribute to building the Engineering Ambassador National Network. An example of this is to contribute to the national network document sharing system by posting presentations and training materials.
- Raise the visibility of the WPI Engineering Ambassador Program on campus by partnering with various offices on initiatives. For example, WPI recently expanded its Multicultural Affairs Office and the Engineering Ambassadors will engage in events supported by this growing office.
- As noted in the Funding/Sustainability Model, WPI plans to solicit more corporate sponsors to increase the number of Ambassadors and broaden the range of majors represented, thus, showcasing a wider number of engineering options to younger generations.

Conclusion

The Engineering Ambassador programs at the four founding universities have several core similarities. They are professional development programs with an outreach mission. In addition, the programs are academically based, meaning the training and time commitment for the program goes beyond that of a club or extracurricular activity. Entrance and participation for these programs is considered a valued job, and as such, Ambassadors are compensated at $1,000 per academic year for their time. However, the programs also have main differences to fit the infrastructure and resources available at each institution. The ability to adapt the Engineering Ambassador program to a variety of institutions, while maintaining a core set of similarities, is one of the program’s strengths.

Each of the four universities encountered challenges while launching an Engineering Ambassador program. Institutions that would like to initiate similar programs might want to consider the following items:

Leadership Support: It is important to ensure that the Dean of Engineering (or upper level administration) supports the program. Even if the program is supported financially from an external source, the university needs to dedicate manpower and internal resources in order to successfully move the program forward.
Program Management: The institution needs to have faculty or staff with expertise or interest in teaching the communications, leadership training, and activity management, as well as an appropriate program manager to direct the program. The program manager could be the same person who runs the training, but the program needs a champion who handles recruitment, helps coordinate outreach, supervises the hands-on activity preparation, advises the students after their initial training, and acts as a point of contact as the program gains recognition internally and externally.

Outreach Scheduling: When launching a program, a university should assess the availability of outreach opportunities in the area and transportation to those areas. Students’ schedules can be a challenge, from finding times for weekly meetings, to training times, to coordinating outreach visits. Establishing clear expectations for students up front as to the time commitment can help ease some of this challenge.

While launching an Engineering Ambassador program can be a daunting task, the collaboration among the four founding universities has proved invaluable. The leadership of Penn State and the support of WPI, RPI and UConn have helped pave the way for the 18 additional programs who took the first step of launching their own programs by joining the Engineering Ambassador Network Workshop in August 2012.
Reference


6 http://www.engr.psu.edu/ambassadors/index.html


8 www.engineeringambassadors.org