AC 2008-2867: CREATING A COMPREHENSIVE WOMEN IN ENGINEERING ORGANIZATION USING A MANAGED RESOURCE STRATEGY

Margaret Bailey, Rochester Institute of Technology

MARGARET BAILEY, registered professional engineer, is the Kate Gleason Chair and Associate Professor in Mechanical Engineering at RIT. She earned her BSE at Pennsylvania State University in 1988 and her Ph.D. at University of Colorado at Boulder in 1998. She conducts research with students using advanced thermodynamic analyses and neural network modeling applied to various, energy-intensive, complex mechanical systems. Dr. Bailey serves in numerous leadership roles within her college, including Executive Director of RIT's Women in Engineering Program (WE@RIT); ME Department Advocate for Engineering Honors Program; and Member of Multidisciplinary Capstone Design Leadership Team.

Elizabeth DeBartolo, Rochester Institute of Technology

ELIZABETH A. DEBARTOLO is an Associate Professor in the Mechanical Engineering Department at the Rochester Institute of Technology. She earned her BSE at Duke University in 1994 and her MSME and Ph.D. at Purdue University in 1996 and 2000, respectively. She works with students on predicting and enhancing fatigue life in aircraft materials and structures and on determining mechanical properties of biological materials. Dr. DeBartolo serves on her college's leadership teams for both multi-disciplinary capstone design and outreach program development.

Jacqueline Mozrall, Rochester Institute of Technology

JACQUELINE REYNOLDS MOZRALL is Department Head and Professor in Industrial and Systems Engineering at RIT. She performed ergonomic training, job/workplace design, and product development functions in manufacturing and office environments for over 10 years. She also published more than a dozen articles on ergonomics and human factors-related related topics. She has a keen interest in undergraduate education and is a program evaluator for the Accreditation Board for Engineering and Technology. She has been involved in the Women in Engineering Program and multidisciplinary senior design activities at RIT. She received a B.S. from RIT, a M.S. from North Carolina State University, and a Ph.D. from the University at Buffalo. All three of her degrees are in Industrial Engineering. She returned to RIT in 1994 as a faculty member in ISE and became Department Head in July, 2000.

Julie Olney, Rochester Institute of Technology

JULIE OLNEY is the Program Coordinator for Women in Engineering at RIT (WE@RIT). She earned her associate degree in applied science and technology with a concentration in social welfare at RIT in 2005. Ms. Olney is responsible for the development and implementation of WE@RIT community building, outreach and recruitment events, and the student staff employed by the program. Ms. Olney serves on The President's Commission on Women, The K-12 Outreach Coordinating Committee and The Institute's Council on Mentoring.

Creating a Comprehensive Women in Engineering Organization using a Managed Resource Strategy

Abstract

According to Margaret Mead, "A small group of thoughtful committed citizens can change the world." This paper describes such a "group" consisting of engineering college professors, administrators, and students who together create a dynamic organization aimed at increasing the representation of women within the engineering workforce. Although women serve as the target audience, the group of "committed citizens" consists of women and men with similar intrinsic motivators. In 2004, the team launched a new organization called WE@RIT (or Women in Engineering at RIT) and within a few months hosted their first pre-engineering outreach program aimed at an audience of twelve 6th and 7th grade girls. Over the past four years, the organization has grown significantly to include outreach activities for females from 4th through 11th grade, the TEAK (or Traveling Engineering Activity Kit) Program and companion website designed for 6th grade classroom use; a comprehensive recruitment strategy for 11th and 12th grade women; and an extensive community building program for current women engineering students. During the 2006/07 academic year, WE@RIT hosted over 1500 participants in their various program offerings with the support of 175 people, most of whom were volunteers.

The organization and its programming flourish using a managed resource strategy in a climate where funding is limited. Student and faculty volunteers and/or student employees perform much of the effort involved in designing and administering various programs. A unique leadership structure allows a faculty member through work plan adjustment to serve as the program's executive director while a full-time coordinator handles daily program activities. In order to run the organization using resources effectively, the group created overall program goals with supporting program level objectives as well as program-level objectives. The structure allows the team to assess and evaluate various offerings or the entire program on a regular basis. There are few, if any, features of the organizational structure and resource management scheme that are school/region specific, and therefore elements of this organization and its management strategy are transferable. This paper describes a strategy that allows for deliberate organizational growth under limited resource conditions in the context of women in engineering.

Organizational History and Background

A group created the WE@RIT (Women in Engineering at the Rochester Institute of Technology) organization within the Kate Gleason College of Engineering (KGCOE) to address the needs of an engineering workforce that is lacking women leaders and to promote gender diversity within our engineering programs. As the number of retirements in science and engineering and the demand for trained professionals in those fields increases, while enrollment in college degree programs remains steady, our nation may be facing a shortage of scientists and engineers [1]. It is critical to expose young people to the broad range of opportunities within engineering. WE@RIT outreach programs include fun activities that highlight applications of math and science in less traditional areas of engineering thus appealing in particular to women and minorities who seek concrete applications of the abstract math and science concepts they have

learned in school [2, 3]. In response to this need, WE@RIT has developed an extensive portfolio of outreach programs that bring girls from 4th-12th grades to RIT to learn about engineering [4,5] as well as an active community building program to increase retention of current women engineering students [6]. Since its inception in 2004, WE@RIT has received financial support from the Gleason Foundation, Harris Corporation, IBM, Intel, Microsoft, Xerox Corporation, and the New York State Perkins Initiative. In recent years, WE@RIT has moved into a dynamic, growth-oriented phase, with a dramatic increase in the number of new programs designed to attract women in engineering and a subsequent increase in student participation. Over the past four years, the number of WE@RIT programs increased from two to nearly twenty per year. Last academic year, program offerings attracted participation from over 1500 people, namely K-12 students, educators, parents, and current engineering students. This resulted in a three-fold increase in participation based on the previous year's amount.

The WE@RIT goal is to establish and enhance a "pipeline" of pre-college and college programs that will ultimately increase the number of women engineers entering the workforce. The long-term strategic plan for WE@RIT has several facets including the continuation and growth of novel, comprehensive programs in outreach, retention, and recruitment while forming industrial, government, and academic partnerships. The executive director and coordinator guide development of all WE@RIT activities using the following two program-level objectives in order to achieve the goal:

- Objective 1: Create a supportive environment that enables women to meet their full potential while pursuing an engineering degree.
- Objective 2: Present outreach programs for middle and high school aged young women that allow them to learn about engineering in a comfortable and nurturing environment.

The primary focus of efforts over the next several years will continue to be on outreach, recruitment and retention. Through setting the stage to recruit and retain greater numbers of top women into RIT's engineering programs, and fostering success early in their college experiences, we in turn educate successful women engineers who consistently achieve high levels of excellence.

In 2005, the WE@RIT Center moved into highly visible space within the KGCOE building and began employing a dedicated staff whose duties focus solely on its operation, which enables faculty to become easily involved in various activities. The WE@RIT Coordinator manages the daily operation of the program, which involves aspects of event/program design, assessment, marketing, resource management, etc. This position is full-time. The WE@RIT Executive Director is a full-time, tenured faculty member who is one of the founders of WE@RIT. The Executive Director works closely with the program coordinator in leading this dynamic effort within the college. With a relatively modest operational budget, strong volunteer support enables program offerings. Volunteers consist of students, staff, faculty members, industry representatives, and interested individuals from throughout the university community and beyond. Therefore, many opportunities exist for people to support WE@RIT. An organizational structure has evolved which includes a core team of engineering faculty, staff, and administrators, referred to as the WE@RIT Management Team, who consistently support initiatives with individual and collective time and creative energy.

Communication and networking are vital activities within this organization in order to promote outreach initiatives and raise the organization's overall visibility. The WE@RIT website (http://we.rit.edu) and supporting electronic and print informational documents inform those interested in learning more about the organization. Constituents include prospective and existing women engineering students; girls and young women in K-12 who are exploring the field of engineering; parents interested in enrolling their daughters in pre-engineering outreach programs; K-12 educators; and current and potential industrial, government, and academic partners.

The long-term strategic plan for the WE@RIT organization includes activities in several facets, namely: outreach and recruitment, community building and support for current RIT students, strategic partnerships, research opportunities, university advocacy, and K-12 collaborations. The WE@RIT Management team employs a managed resource strategy to ensure program objectives and goal attainment.

Organizational Structure

The WE@RIT Management Team created the following organizational structure (Figure 1) and strategy in order to assist and guide WE@RIT. Within Figure 1, organizational components are listed within boxes and described below while lines represent communication paths.

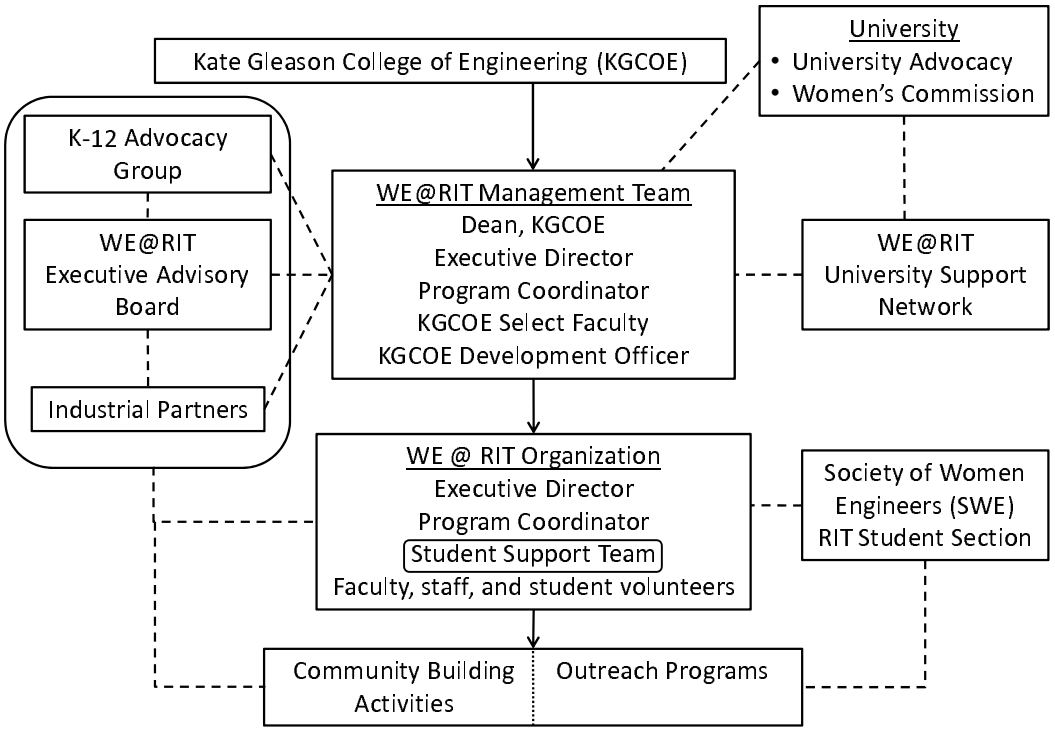

Figure 1: Organizational Structure

Executive Advisory Board:

The board is comprised of key people within their respective organizations who possess a passion for women in engineering initiatives. The group meets once per year to review and discuss the WE@RIT Annual Report while examining key elements of strategic framework including such elements as objectives, mission, and goals. The unique combination of people internal and external to RIT allows for sharing of resources that are essential to the success of the WE@RIT objectives. Executive Advisory Board members are involved in the execution and recurring evaluation of programs. Each member has a term of office of 4 years.

Management Team:
A subset of the Executive Advisory Board forms the Management Team. Membership consists of the KGCOE College Dean, the Executive Director of WE@RIT, WE@RIT Coordinator, key faculty members and/or department heads within the College of Engineering, and the KGCOE Development Officer. These individuals, who are internal to RIT, are the core people that lead and manage the overall strategic direction of the program, including funding of the program.

K-12 Advocacy Group:
This group is comprised of strategic people within local school districts. They provide perspective on K-12 education and trends, while offering recommendations on the content and intended audiences for WE@RIT programs. Each member is appointed for a two-year period. The Management Team invites at least one member from this group to serve on the Executive Advisory Board to facilitate communication between these groups, and provide the board with K-12 education perspectives.

Industrial Partners:
The Management Team works to foster and nurture industrial partners to support WE@RIT programming through funding and participation (see program activity descriptions below). Several industrial partners also participate on the Executive Advisory Board.

WE@RIT Organization:
Membership consists of WE@RIT Director and Coordinator, the Assistant Dean in the College of Engineering, and 3-4 faculty members and/or department heads within the College of Engineering, and the Student Support Team. This group "runs the business" of WE@RIT on a day-to-day basis. Primary responsibility includes designing, planning, and facilitating programs. They meet weekly during each academic quarter.

- Student Support Team: Current RIT students who advise WE@RIT on program development, assist in program assessment, and are heavily involved in program facilitation and design. Key members of the team also interface with the K-12 Advocacy Group and join the Management Team at weekly meetings. These students are typically paid, and serve either on a part-time basis or in fulfillment of their cooperative education experience.

University Support Network:
Includes select faculty/staff/administrators from RIT's Kate Gleason College of Engineering (KGCOE), Golisano College of Computing and Information Science, College of Applied Science and Technology, National Technical Institute for the Deaf, Enrollment Management

(i.e., Admissions and Financial Aid), Sponsored Research, Student Affairs, etc. Individuals within this network periodically assist and advise WE@RIT in program design and development and are periodically invited to weekly WE@RIT meetings and all events. This group shares "best practices" and also cooperates on select community building and outreach activities, when possible, in order to leverage resources. For example, the Management Team works particularly close with Enrollment Management to develop unique and innovative recruitment strategies. The Management Team invites at least one person from the Support Network to serve on the Executive Advisory Board, in order to share perspectives and coordinate certain efforts across the University.

Society of Women Engineers (SWE) RIT Student Section:
This nationally recognized SWE Student Section is a very active group that hosts their own outreach and mentoring event each year. This group has strong membership from across several colleges, including, KGCOE, College of Applied Science and Technology, and the Golisano College of Computing and Information Sciences. The WE@RIT organization and SWE work closely together to leverage resources and coordinate activities. Many student SWE members from this group volunteer with the WE@RIT organization to support WE@RIT outreach events and participate in many of the community building activities.

Overview of WE@RIT Offerings

Two objectives guide the organization's activities, the first of which involves creating a supportive environment that enables women to achieve their full potential while pursuing an engineering degree. In support of this objective, WE@RIT has created a mentoring program and various community-building activities (Figure 2) for women engineering students [6]. Most mentoring programs encourage networking between experienced professionals and students. The WE@RIT Mentoring Program is unique in that it pairs upper level students with first year female engineering students for formal and informal activities. Students from all five departments including Computer Engineering, Electrical Engineering, Industrial and Systems Engineering, Mechanical Engineering, and Microelectronic Engineering, as well as students enrolled in Engineering Exploration for those who are undeclared participate in this ongoing program. Women entering the college are invited to campus four days early to participate in a special program, named *WE're in Motion*, designed to connect them with an upper level female engineering student. A more experienced student serves as host for a group of 6-8 first year women during this event as well as taking the role of mentor for these new students during their first year of study. By pairing off women in beginning stages of their education with women students in upper level classes, both groups will benefit from each other's academic and social development.

In the context of mutual mentoring, first and second year women engineering students receive affirmation and strategies to succeed in engineering. The objectives for the Mentoring Program include:

- Build confidence of women within engineering and specifically program participants
- Create personal support networks with peers and female role models for women within engineering
- Increase retention levels for first year women engineering students.

- Improve the level of preparation of women going into engineering careers by showing them ways to handle the unique challenges that they may face.

To build and continue the mentoring relationships formed in the *We're in Motion* program, the Management Team designed a series of fusion experiences and the resulting program is named *Kate's Community* (in honor of Kate Gleason, for whom our college is named). *Kate's Community* involves frequent small group gatherings of women engineering students as well as faculty and staff. This program objective is to encourage women to become active participants within the college's mentoring program and/or women engineering community. The gatherings occur frequently and therefore provide students a regular opportunity to meet each other and build relationships. Participants are encouraged to provide feedback to WE@RIT on the effectiveness of existing programs and future recommendations.

In 2006/2007, a new SHAdow Program in Engineering (*SHAPE*) Initiative was piloted for first and second year women engineering students with a trip to an international manufacturer's computer testing facility. This program's objective is to improve student's understanding of what an occupation within engineering is really like, especially for a woman. Planned activities include opportunities to meet professional engineers during sponsor created workshops, luncheons, and facilities tours. Other opportunities to meet and interact with professionals from industry occur at Kate's Community gatherings hosted by WE@RIT throughout the academic year. These interactions ideally lead to the creation of additional shadowing programs for our women students with engineers in their workplace.

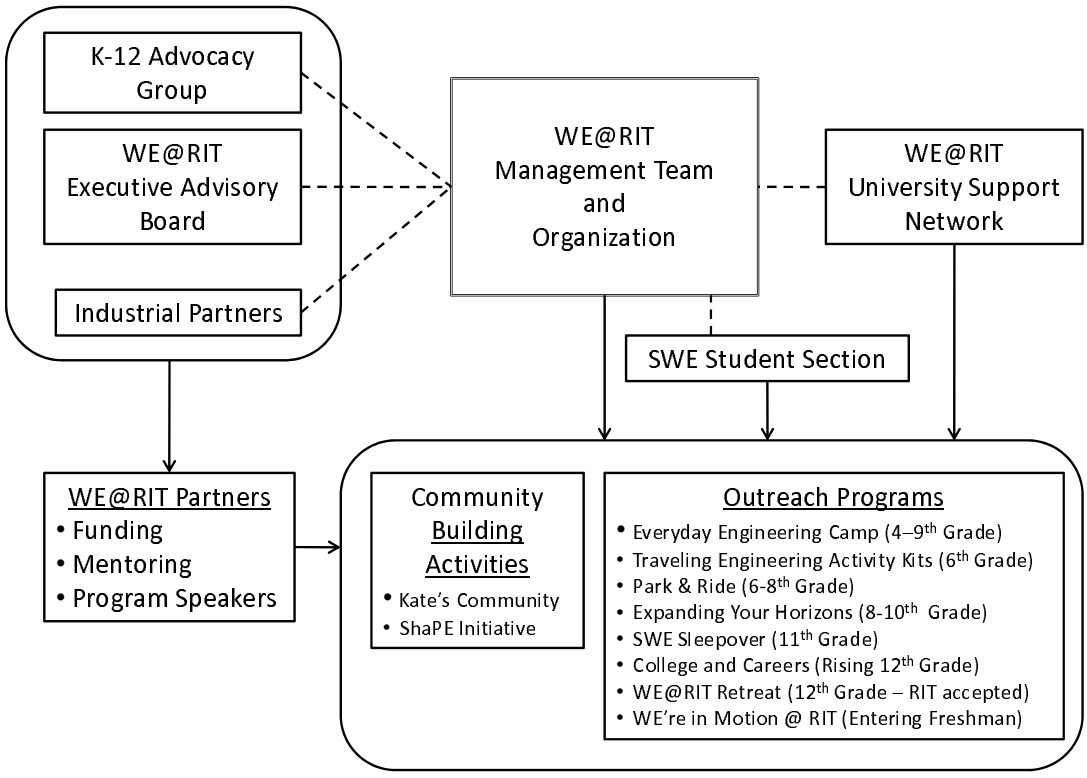

Figure 2: Organizational Activities

In addition to the above-mentioned programs, WE@RIT provides leadership opportunities for women engineering students. Each academic quarter several undergraduate students serve as program assistants for the organization. They gain experience in teamwork, program design, research, program evaluation, and the planning, organization, and facilitation of meetings and activities. They also play a key and critical role in building community and recruiting volunteers to help with outreach events. Student program assistants are most effective when they project a friendly, inclusive and warm demeanor. Their enthusiasm for the program is pivotal to successful attendance, as they are the face of the program to the general student body. Program assistants are paid positions, available in the form of full-time co-op employment and part-time work-study assignments. In addition to these opportunities, there are many volunteer positions available.

The second objective used to guide the WE@RIT organization towards goal achievement involves the creation and administration of outreach programs. A comprehensive portfolio of outreach programs have evolved over the past several years which are designed for females ranging in grade level from 4th through 12th (discussed in detail in [4,5]). The programs include *Everyday Engineering Summer Camp* for 4th through 9th grade girls; *Park and Ride: Amusement Park Design* for 6th,7th and 8th grade girls; *GO Tech,* a university-wide career exploration workshop for 8th, 9th and 10th grade women; the *SWE Shadow and Sleepover Event* which is hosted by the SWE Student Section for 11th grade women; *WE@RIT Retreat* which is a two day program offered to all women accepted for admittance into the college; and a session of the College and Careers program (sponsored by Admissions Office) titled "*Women in Engineering: Making a Difference*".

An additional outreach program housed within WE@RIT, but not designed exclusively for recruiting women into engineering is The TEAK Project (**T**raveling **E**ngineering **A**ctivity **K**its) (discussed in detail in [7,8]). The TEAK Project is aimed at bringing engineering into 6th grade classrooms, using RIT student-created hands-on hardware and web-based engineering activities. Typically, a classroom teacher rents a TEAK and a female-male team of RIT students travels to the class to teach the lessons. Each TEAK includes complete lesson plans, post-activity assessment (a simple quiz on the topics covered), and a take-home activity. Although classroom instruction is typically to an audience of females and males, TEAK is housed within WE@RIT for several reasons: TEAK supports the WE@RIT objective related to presenting outreach programs and therefore synergy exists to effectively administer the program; a women engineering student provides classroom instruction with a male peer and serves as a role model for girls within the classroom; and recruiting female engineering students is far easier in a women-in-engineering organization than in the general student population.

The TEAK Project is slightly different from the other outreach programs in that all RIT students participating are typically either paid or earning course credit for their efforts, a difference that is commensurate with the increased technical level of their work. Student designers are required to do documented engineering design and analysis in creating the kit hardware and software, and student teachers review and revise lesson plans along with teaching technical content in a classroom. Additionally, the program is set up to be revenue generating, so it will ideally be nearly self-sustaining once most of the hardware and software development is complete. The

TEAK Project is still in its infancy; college engineering students developed current hardware under a small student project related grant. The next phase of TEAK growth has recently been funded under an NSF CCLI grant aimed at expanding kit offerings and assessing the benefits to RIT students because of their experience designing instructional materials and teaching engineering topics to others.

Managed Resource Strategy

Key members of WE@RIT use a managed resource strategy to sustain and grow the organization and its offerings by aligning resources with the organization's goal through strategic planning (Figure 3). Resources include people, space, funding, equipment, location, brand, organizational culture, reputation, network, and capabilities. As previously stated, the WE@RIT goal is to establish and enhance a "pipeline" of pre-college and college programs that will ultimately increase the number of women engineers entering the workforce. The Executive Director frequently reviews current strategy employed to manage each resource in order to meet the overall goal. The executive director discusses this information with the Management Team on a quarterly basis and presents an overview to the Executive Advisory Board annually.

Figure 3: Resource Managed Strategy

Although the identified resources are all important to this organization's effectiveness at achieving its goal, the authors focus on two of the most critical, people and funding. The momentum and enthusiasm created by the *Mentoring Program* and *Kate's Community* events allows WE@RIT to run events on limited funds by utilizing many engineering undergraduate volunteers. These volunteer report in post event surveys and focus groups that their time was well spent and they would volunteer again, even after sacrificing an entire weekend for example to work on an event. The coordinator carefully designs the overall volunteer experience with student time restraints in mind. Some of this "job satisfaction" is due to the emphasis placed on their role as team leader/mentor, which organically creates a close bond with participants. Other reported motivations to volunteer include a strong belief in the goal of WE@RIT and a sense of belonging within the community that exists within the organization.

Members of the Executive Advisory Board also volunteer their time on an annual basis due to an intrinsic motivation aligned with the organization's goal. In addition, the Management Team strives to design "quality" into all of the activities associated with WE@RIT and therefore, most familiar with the organization, perceive it and its offerings as high quality. This reputation helps the group in several ways, for example in attracting high-level executives to join the advisory board.

Faculty support is also associated with intrinsic motivations aligned with goal. Because time is such a critical resource of faculty within the college, the organization has created "quick immersion" type experiences for the faculty. These allow them to participate in a community building, outreach, and/or recruitment program in a manner that utilizes their time most efficiently while ideally maximizing the enjoyment they have participating. The coordinator position is full-time and salary payment originates from college-level support as well as external sources, namely corporate gifts and state funding when available. For the past five years, the executive director position has been tied to an endowed chair position, which resides at the college-level. The faculty member holding this position has a reduced teaching load and summer support in order to grow and manage this organization. Although an aligned intrinsic motivation by the membership has greatly helped in adequately "staffing" this organization under a shoestring budget, communication climate is vital in sustaining its membership. This is viewed as a useful and necessary expenditure of time and energy, without the membership, there would not be goal achievement.

Program and Organizational Effectiveness

Individual programs typically undergo two layers of assessment: feedback from participants (and their parents, where applicable), and feedback from volunteer personnel. Assessment is both formative and summative. The *Park & Ride* program assessment illustrates the process here, and further information on assessment of other outreach programs is available in a prior publication [5].

WE@RIT has identified a series of objectives for each of its programs and revisits these objectives periodically. Each objective has an associated assessment method and results are stored in an existing on-campus online survey tool. The Park & Ride Objective-Assessment data is shown in Table 1. In addition to this, several post-event survey questions ask for feedback on the event application process, instructions received before and during the event, helpfulness and availability of RIT student mentors, and a "what did you like/what would you change" question.

This particular program has been highly successful. Results from a recent offering indicate that the vast majority of participants would not change anything about the program. The percent of students indicating that their response to a new question would be "Bring it on, I love a challenge" increased from 50% to 60%, and three students who initially responded "I'll never get this" improved to at least "It's a little scary, but I think I can figure it out." One recent challenge for this program is that many girls come in already knowing what engineers do, so pre- and post-event survey responses do not indicate improvement, reflecting instead on the participants' prior knowledge. Team mentor observations on teamwork and communication skills indicated with

one exception that participants responded well to a teamwork discussion and worked well in teams throughout the event.

Park & Ride volunteer feedback is critical to assessment for two reasons: first, satisfied volunteers are more likely to volunteer again in the future, and they give additional insight into the participants' satisfaction with the programs. Volunteers are asked to rate their experience in terms of pre-event communication, ease of registration, communication with WE@RIT staff, interactions with the participants, and interactions with other volunteers. They give objective responses to questions about what they like most and least about the program and why they would or would not volunteer again. Volunteers routinely reply nearly unanimously that they will volunteer again, citing reasons like having fun, serving a purpose, and developing leadership skills. In an area for "Other comments", volunteers can add insights like "the girls loved walking to other parts of campus" or "girls wished they had another activity to break up the NXT programs".

Table 1. Park & Ride Program Objectives, Assessment, and Sample Outcome

Objective	**Assessment**
Create awareness of career options in Engineering	Pre- and post-event survey item: "What do you think engineers do?"
Build participants' confidence that they can solve STEM problems on their own	Overcome obstacles to complete design. Pre- and post-event survey item: "What is your first thought when faced with a new math, science, engineering, or computer problem?"
Help participants develop basic programming and logic competency	Complete a functional robot car design and build project.
Begin long term recruitment of future RIT students	Requires admissions related longitudinal studies
Inform parents and participants that there are HS math and science requirements for entering an engineering program	Informal discussion with parents, formal discussion with student participants Pre- and post-event survey item: "List some subjects you think engineers might need to know about"
Determine how much information middle school parents already have about how, why, and when to get their daughters enrolled in particular math and science courses.	Parent post-event survey question about educational programs in their school districts that promote/develop student interest in STEM areas of study.
Help participants develop teamwork	Ask team mentors to assess participants'

and communication skills	development in this area.
Allow the participants the opportunities to express creativity in their designs, allowing them to discover that engineering can be a creative career path	Final demonstrations of the event will be a creative demonstration of the participants' own designs. Assess participants on use of creativity during design challenge on post-event survey.

Finally, immediately after each event, the WE@RIT Executive Director and Coordinator, and interested faculty analyze participant feedback (associated with pre and/or post surveys), volunteer feedback, and when applicable parent feedback, and document areas for future program improvements and required changes to the objectives or assessment methods.

On an annual basis, an organizational level assessment occurs where goal achievement is "measured" using various means. The identified objectives help to frame this assessment through emphasis on community building within the college and outreach. Several objective data points are analyzed including participant and volunteer counts; financial summaries; retention figures; climate survey results; program participant survey results; etc. This data informs the managed resource strategy and new and/or revised strategy typically results. For example, during the current year, the Management Team identified issues related to recruitment as a focus area and subsequently designed new programs, and procedures to improve outcomes associated with this issue.

Acknowledgement

The authors would like to acknowledge the Gleason Foundation for its support of the WE@RIT organization since its inception.

References

1. National Science Board. 2006. *Science and Engineering Indicators 2006*. Two volumes. Arlington, VA: National Science Foundation (volume 1, NSB 06-01; volume 2, NSB 06-01A).
2. Pat McNees, "Why Janie Can't Engineer: Raising Girls to Succeed." *The Washington Post*. January 6, 2004: C09. *Available online at* http://www.patmcnees.com/work13.htm
3. L. H. Jamieson, "President's Message: Cherchez la Femme," *IEEE Signal Processing Magazine*, 16(4), July 1999, *Available online at* http://www.ece.purdue.edu/~lhj/SPS/WomenInEng.htm
4. DeBartolo, E., Bailey, M. [2005] A continuous series of outreach programs to recruit young women to engineering. *Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition,* Portland, Oregon, June.

5. DeBartolo, Elizabeth and Bailey, Margaret, "Making Engineering Appealing: Programs for Grades 6-12 Girls", *International Journal of Engineering Education,* vol. 23, pp. 850-860, 2007
6. Bailey, M., DeBartolo, E. [2005] Creating a community for women engineers at RIT. *Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition,* Portland, Oregon, June.
7. DeBartolo, Elizabeth; Bailey, Margaret; Zaczek, Melissa; Schriefer, Timothy; Kelley, Patrick; Ramaswamy, Mallika; and Ryczko, Nicholas; [2007] Traveling engineering activity kits (TEAK) – energy and the environment: Designed by college students for middle school students. *Proceedings of the 2007 ASEE Annual Conference and Exposition,* Honolulu, Hawaii, June.
8. Bailey, Margaret and DeBartolo, Elizabeth, "HEAT TRANSFER Traveling Engineering Activity Kit: Designed by Engineering Students for Middle School Students", *2007 ASME International Mechanical Engineering Congress & Exposition*, Seattle, WA, November 2007.