

**Full Annual Report**

**REACH 2001**

**Prepared by  
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The goals of Camp REACH are to generate and sustain adolescent girls’ interest in engineering and technology, their motivation toward education, and their self-confidence. An additional goal is to maximize spillover effects of the program by involving other organizations within the greater Worcester community, and in particular the girls’ parents and middle school math and science teachers. This report details the activities of Camp REACH for January to December, 2001. It includes descriptions of REACH 2001, and the alumni activities for participants from previous years.



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## Background Information

Worcester Polytechnic Institute (WPI) was founded in 1865 by merging the vision of prosperous tinware manufacturer John Boynton and the dream of Ichabod Washburn, one of Worcester's most successful entrepreneurs. The institution that resulted from that union was unlike any that had gone before. Students learned about the theory of science and engineering in the classroom and put that knowledge into practice in a real manufacturing plant. The balance between learning and application has been at the heart of WPI's approach to education ever since.

Today, WPI provides its 2,700 undergraduate and 1,000 full- and part-time graduate students with a thorough conceptual foundation in science, engineering, management, the humanities and arts, and the social sciences. And it continues to encourage its students to demonstrate their ability to apply what they learn in the classroom to real-world problems, and to gain an appreciation for how the solutions to those problems might impact the world around them.

WPI strongly encourages and supports outreach programs like Camp REACH. The project-oriented educational approach is proven, since modeled after WPI's approach to undergraduate learning. The program provides excellent promotion for WPI within the community and to prospective students. And, by encouraging women to consider engineering and science careers, the diversity of WPI's student body should eventually benefit.

Camp REACH, now in its fifth year, is a two-week residential program at WPI for thirty middle school girls that generates interest and excitement about engineering and technology and the ways they can be used to help individuals, organizations, and society. Camp REACH addresses a need for an intervention program that reaches girls at an early enough age such that they develop self-esteem and self-confidence in the areas of math and science and realize the importance of taking four years of both mathematics and science in high school.

The central and unique feature of the camp experience is a design project in which teams of students solve a problem for an organization in the greater Worcester community using teamwork and an engineering design process. Other program activities include hands-on workshops, field trips, and speakers to enhance career awareness. The camp staff is selected in such a way as to expose girls to a broad spectrum of female role models, from female high school students to engineering faculty and practicing engineers. Spillover effects are created as the high school students and middle school teachers learn alongside the girls about the engineering profession and why it is important for women to prepare for and enter this increasingly influential facet of our society. Several strategies are used to ensure the long-term effects of the camp experience, as well as to magnify the camp's sphere of influence, including follow-up activities that take place during the school year and outreach to parents.

A technologically literate workforce is a critical and growing need in the United States. While females comprise more than half of our population, only 7.3% of practicing engineers are women. Full participation of women and minorities in engineering is needed, not only for reasons of equity, but for economic security. New entrants to the workforce in the 21st century will be predominantly women and minorities. In order for companies to maintain leadership in a global economy, more women and minorities must be prepared to assume positions as engineers and managers. A recent report<sup>1</sup> predicts that by 2028, there will be 19 million more jobs than workers who are adequately prepared to fill them. The report goes on to recommend existing outreach programs should be expanded and strengthened.

A more diverse technological workforce could revitalize corporations, government, and universities by providing new perspectives on old problems and by bringing a broader range of interpersonal skills and

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<sup>1</sup> A. P. Kellogg, The Chronicle of Higher Education, Friday, January 11, 2002

collaborative approaches. Studies indicate that a critical time in the “pipeline” of women into technological careers is the middle school years, when it is common for girls to lose interest in math and science.<sup>2</sup> WPI is uniquely positioned to provide an intervention program that draws upon the motivating effect of life on a college campus, use of state-of-the-art technological facilities, and talented students and faculty to serve as mentors.

We believe that a key to realizing the full representation of women among engineers lies in communicating the nature of what engineers do, how they can help our society, and the skills that are required. Thus, the objectives of the camp program are for girls to experience the following aspects of engineering:

- Engineering requires collaborative work in teams
- The engineering design process can be used to find creative solutions to the problems of individuals, organizations, communities, and societies
- Engineering requires excellent written and oral communication between individuals and groups
- Engineers need knowledge in the areas of math and science

The program content is designed to meet these objectives. A design project is the major focus of the camp experience and is the primary means of introducing the nature of engineering as a collaborative problem solving process. This year’s projects are described in a following section. For each project, the team defined the problem and constraints, gathered information, defined design specifications, brainstormed alternative solutions and analyzed them against their specifications, and selected the best solution using a decision matrix. The girls will return to their project sites several months following the camp to see their ideas come to fruition.

The other major aspect of the program content is the Discovery Workshops, which emphasize hands-on learning and exploration rather than finding a “correct answer.” These are also described in this report, along with the other notable program activities.

## **Lasting Effects**

Now that REACH finished its fifth offering, we can better measure the lasting effects it has on the campers and the middle school teachers on staff. This section details some of these effects – a more comprehensive longitudinal study is currently underway.

### ***MassAcademy***

The Massachusetts Academy of Mathematics and Science (MassAcademy) is a wonderful opportunity as it is a publicly-funded school and is located at WPI. Our first group of campers (from ‘97) were old enough to apply for the Academy this year. MassAcademy suffers from the same gender imbalance found in institutes of higher education geared toward mathematics, science and engineering, and therefore any increase (no matter how small) in the number of young women who apply, are accepted, and matriculate at MassAcademy is very important to its director.

During the 2000-2001 academic year, twenty-five girls applied to MassAcademy, three of which were former REACH campers (12% of the applicants). All three REACH alumni were accepted, and two

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<sup>2</sup> See, for example, P. Orenstein, *School Girls, Young Women, Self-Esteem and the Confidence Gap* (New York: Doubleday, 1994), p. 23; S. Brush, “Women in Science and Engineering,” *American Scientist* 79, 404-419 (1991).

chose to matriculate. This matriculation rate is higher than the overall rate for girls accepted to the program.

***Returning as staff members***

For the first time this past year, former campers were eligible to return to the program as teaching assistants (TAs). This position is described later in this report. It was gratifying to receive a tremendous amount of interest in this position from the '97 campers. Ten out of the thirty former campers applied to the position.

Because of this level of interest, the number of TA positions was increased from six to eight. Three former campers were accepted this year, and it is anticipated that in the future all of these junior counselor positions will be filled by former campers.

## ***Anecdotal Evidence***

We continue to hear from former campers and their parents about the positive and unique experience had at Camp REACH. Below is a quotation from the mother of a '97 camper:

“I want to thank you again, years later, for being one of the great experiences of her academic life. It might tickle you to know (she would never bother to tell this) that despite an interest in “music, literature, and foreign languages” she still got her highest MCAS scores (8th grade) in science. She declared she didn’t know anything about at least one main essay question (something about truck gears or engines) but thought through an answer. This I credit entirely to your efforts that gave her confidence, analysis skills and a sense of fun-in-the-challenge.”

The following is part of a letter received from a teacher on staff during the '97 program:

“REACH seems to be having unforeseen effects in Princeton. Every spring when I tell my classes about the camp, we also talk about MassAcademy. This week was the second time I got a phone call from a parent telling me about a girl headed to Mass Academy as a result of that talk. (Way cool from my end!)”

## ***Survey of former staff members***

Three middle school teachers serve as staff members each year, with the objective of having them learn about engineering so that they can pass along the information and excitement to their students during the regular academic year. There have been fifteen teachers on staff, and they have been surveyed to see how their experience has effected them. Below are the results of this survey – with responses coming from the three '97 and three '00 teachers (although all were asked to participate).

One question asked if they have used any aspect of the engineering design cycle in their teaching. 67% of the '97 teachers responded “All the time (more than 20 times\* a year)”, and 33% of the '00 teachers responded “Often (up to 10 times\* a year).” Of those that said that they teach the engineering design cycle, 40% said that they learned “Pretty much everything” during their training at Camp REACH, and 20% said that they learned “A lot”. When asked “How often do you have opportunities to talk to students or their parents about engineering as a profession?”, 67% of the teachers said that they do so either frequently or often. Of these, 67% said that a lot of what they teach about they picked up from REACH.

Other positive results from being a REACH staff member included that one former staff member started another outreach program, “DESIGNCAMP”. Another cited connections with engineers that she used for the benefit of her class. A recent staff member described REACH as “true professional development,” where she learned more applications of math and technology.

## **Description of Camper Population**

The girls who attended the camp will be entering the seventh grade in the fall after the camp. Seventy-one applications were received. The application paperwork included an essay that asked to girls to describe something that they worked hard on, either in school or in their personal life.

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\* ‘times’ should be interpreted as follows -- if you do an entire unit on the design cycle, please count the number of classes that you used for the unit.



Photo of the '01 campers with some of the '01 staff members

Participants were chosen based on an essay; prior achievement in math and science courses was *not* a criterion in the selection process. After judging that the essay met minimum standards for content, thirty girls were selected at random. Table 1 shows the geographic distribution of these thirty girls.

Hometown	School	#campers
Auburn		1
Douglas		1
Fitchburg		1
Holden		1
Leominster	Southeast	2
Milford		1
Millbury		1
Northborough		1
Paxton		2
Rutland		1
Shrewsbury	Shrewsbury Middle	4
Sturbridge		1
Upton		1
Watertown		1
Westborough		1
Whitinsville		1
Worcester	<b>School</b>	7
	Columbus Park	3
	Solomon Schechter	1
	Greendale	1
	Our Lady of the Angels	1
	Nelson Place	1

Table 1: Geographic Distribution of Campers

Table 2 shows the ethnic backgrounds for the thirty girls that were accepted as '01 campers. The numbers can be compared to the Worcester County averages of 90.8% Caucasian, 2.0% African-American, 5.1% Hispanic, and 1.9% Asian.

African-American	19	63%
Caucasian	2	7%
Hispanic	2	7%
Asian	3	10%
American Indian	0	0%

Table 2: Ethnic Background of Campers

Twenty-nine of the thirty girls who started the program were able to complete it this year.

## **Staff for '01 Program**

The staff for the program was composed as follows:

- 1 Director
- 3 Middle School Teachers
- 3 Residential Advisors
- 8 High School Student Counselors
- 7 Workshop Leaders

### ***Director***

Denise Nicoletti was the '01 Director, completing her fifth year in this role. She is also an Associate Professor of Electrical and Computer Engineering at WPI.

### ***Health Supervisor***

A health supervisor is necessary to meet state regulations for camps. This year, Amanda Kight served in this role, helping to administer medications as directed by parents, performing first aid, and being on campus 24 hours per day.

### ***Middle School Teachers***

The camp staff includes three middle school teachers from school districts in Worcester County. New teachers will be used each year, and those who participate in the camp gain a much better understanding of engineering that they will pass on to *all* of their students. They also come away with ideas for projects and teaching methods to use in their math and science curricula that will engage student interest. Teachers share these ideas and methods with their colleagues by presenting them at professional meetings upon return to their school districts.

This year's middle school teachers were: Mallory Macdonald (Science Teacher, Sawyer School), Catherine McDonagh (Math Teacher, Lancaster Middle School), and Daniel Seltzer (Math Teacher, Dr. Arthur F. Sullivan Middle School).

### ***Residential Advisors***

Residential advisors (RAs) live in the dormitories with the girls, are in charge of the evening activities, and coordinate a variety of personal issues for the campers. Our three RAs for this year's program were O'Malley Barton (WPI Junior; Civil Engineering), Jillian Crocker (U. of Richmond Sophomore; Women's Studies/Psychology Major; staff member in '99 and '00); and Lisette Manrique (WPI Junior; Biomedical Engineering Major).

### ***Teaching Assistants***

Six high school students are also part of the camp staff in the role of Teaching Assistant (TA). They are recruited from Worcester County high schools, and selected based upon their enthusiasm about science and math. Since they are closer in age to the campers than the rest of the staff, they serve as crucial role models, encouraging the girls to work hard during the camp and afterwards in school. Like the middle school teachers, they also learn about the engineering design process and college life.

The '00 high school student counselors were Aimee Hart, Sara Hicks, Colleen McConnell, Avital Mendelson, Jenelle Pope, and Ping Tai. Ms. Hicks and Mendelson were also TAs in '00. The schools that the TAs attended in the '00-01 academic year were the Massachusetts Academy of Mathematics and Science (Mendelson, McConnell), Merrimack College (Hicks) Doherty High School (Tai), Gardner High School (Hart), Wachusett Regional High School (Pope).

Because of the large number of well-qualified applicants, a new position was formed – “junior teaching assistants.” These staff members participated in all of the daytime activities, but unlike the teaching assistants, did not live in the residential hall. This year’s junior teaching assistants were Clara Engmann (Doherty High School) and Crystal Tolman (Uxbridge High School).

The staff members who were also campers in '97 were Crystal Tolman, Jenelle Pope, and Aimee Hart.

### ***Discovery Workshop Leaders***

Table 3 lists the discovery workshop leaders, all of them returning from previous year’s programs. The workshops are described in a following section.

Name	Workshop	Previous year(s)
Holly Ault, Ph.D.	Mobility for the Disabled	'97, 99, '00
Andrea Martin	“Who Durnit” Forensics	TA in '97, '98, workshop leader in '00
Dan Gibson, Ph.D.	Sandcastle Building	'97-00
Allen Hoffman, Ph.D.	Mobility for the Disabled	'97-00
Denise Nicoletti, Ph.D.	Car Maintenance	'97-00
Nicholas Arcolano	Electrical Engineering Workshop	---

Table 3: Workshop Leaders

## **Description of Projects**

A design project is the major focus of the camp experience and is the primary means of introducing the nature of engineering as a collaborative problem solving process. The girls worked in groups of ten on projects during the two weeks of the program, along with one middle school teacher and TAs. Following are the descriptions of the projects, and their successes.

### ***Children’s Garden***

Team Members:

Middle School Teacher: Daniel Seltzer; TAs: Colleen McConnell, Avital Mendelson, Crystal Tolman; Campers: Alyshia Abbascia, Nitya L. Durvasula, Marissa Fratturelli, Stephanie L Kerber, Lauren Monique Lagace, Agnes Nam, Yevgeniya Oransky, Katie Rich, Ariel Beatrice Sands, Colleen McKay Stanton

The customer for this team was the Children’s Garden Daycare Center, located at the Visiting Nurses Association (VNA) of Worcester, Massachusetts. There were teaching materials that were not being used because the storage for them was inconvenient, and material was being misplaced or lost.

The team investigated different solutions, keeping in mind the customer’s small budget and the necessity of creating storage space that was both user friendly and safe for preschoolers and infants to be around.

The group has had one interim meeting, where they put together most of the design that they created for the teaching materials. They will be coming together once again soon for the final ribbon-cutting ceremony.



***Central Massachusetts Regional Employment Board (CMREB)***

Team Members:

Middle School Teacher: Mallory Macdonald; TAs: Clara Engmann , Jenelle Pope, Ping Tai; Campers: Jody Elizabeth Borhani, Liana Fay Christy, Chelsea Elizabeth Drew, Jennifer L. Giard, Julianne D. Jensen, Hannah Kilcoyne, Kristen Leigh Magnuson, Caroline Tanya Nembhard, Rebecca Marie Taylor, Amy Zhou

The problem given to the team was that CMREB was in need of a website. The site needed to be attractive to potential employers of a newly trained workforce. Volunteers were found for the site's final implementation, specifically Amy Marr and Troy B. Thompson, both WPI web designers.

The team spent a good deal of time looking into the CMREB organization and other websites nationwide. They completed the most crucial part of a web development project -- the collection of all of the information desired to be part of the website. They went one step further and designed the different webpages, including photographs, links, etc. All of this information plus the final report was made available to the sponsor and the final web designers (Marr and Thompson).



### ***AIDS Project Worcester***

Team Members:

Middle School Teacher: Catherine McDonagh; TAs: Aimee Hart, Sara Hicks; Campers: Rosemary Benitez, Abigail Page Cooney, Bianca Marie Cruz, Danielle Ferry, Alison Bridget Medlar, Carissa L. Niro, Jillian M. O'Donnell, Megan P. Quick, Chelsea Catherine Sheehan

The purpose of this project was to redesign the office space at AIDS Project Worcester to accommodate a new pharmacy, provide privacy where appropriate, and to stay within budget. The group had a number of important recommendations to make, and provided AIDS Project Worcester with material so that final decisions could be made using input from all involved.

### **Description of Discovery Workshops**

The "Car Maintenance" workshop began with a presentation by Provost John Carney, an expert in the study of automobile crashes. He presented models and a videotape to show how engineers approach car safety. This was followed by hands-on discussion of various systems in automobiles: electrical, fluids, and tire/brakes, led by Denise Nicoletti and the middle school teachers.

The "Who Dunit" Forensics workshop was designed by a group of WPI undergraduate students, and was led again this year by Andrea Martin. In it, a fictitious jewelry thief has taken an emerald necklace and carelessly left key evidence at the scene. The campers discover "who dun it" using modern forensic

science techniques. Throughout the workshop, clues were analyzed using gas chromatography, infrared spectroscopy, ink analysis, fingerprinting, and DNA modeling.

The “Sandcastle building” workshop showed campers how to build large, impressive castles by first understanding building dynamics and the material properties of sand. During this workshop, these topics were explained and experienced while the students make towers, crenelations, and other elaborate structures. The workshop leader, Dan Gibson, is an Assistant Professor of Biology and Biotechnology at WPI, and a sandcastle competition winner. Areas of engineering that were explored include materials and civil engineering. This workshop was a key part of the Cape Cod weekend trip.

In the “Mobility for the Disabled” workshop, campers learned about state and federal regulations that require engineers to design all public buildings to be handicap-accessible. The workshop was designed and led by Holly Ault and Allen Hoffman, both professors of Mechanical Engineering at WPI. Areas of engineering that were explored include mechanical, rehabilitation, and architectural engineering.

A new workshop was introduced this year on electrical engineering. The participants of this workshop had the opportunity to build different kinds of alarms using soldering kits. This workshop was designed by WPI undergraduates and led by Nicholas Arcolano, a recent WPI graduate.

## **Description of Other Program Activities**

Education of parents about the program, engineering, and the necessary high school academic preparation for technological careers is a key outcome of the program. This is achieved through special parent seminars at the beginning of the camp, where they were told (separate from their daughters) the rules of the program and what they can do to combat homesickness. At the end of the camp, one of the middle school teachers explained what the girls’ mathematics and science programs would be during the next two years, and what parents could do to support their daughters in their academic activities. Then, the Bob Salvatelli, Director of the Massachusetts Academy of Mathematics and Science, explained what the opportunities are there for young women. Stephanie Blaisdell, Director of WPI’s Diversity and Women’s Programs, talked about some of the challenges faced by adolescent girls and how families can be supportive.

Our program schedule (available in Appendix A) shows all of the camp’s activities. The “Ice Cream Sundae Building” activity is the girls’ first introduction to the engineering design process by learning what specifications are. The first full day starts with a “Computer Orientation,” important because the girls come with a wide range of computer skills. The design project activities are spread out over the entire two weeks, taking up part of each weekday. These activities include trips to the customer site to see first hand what their project is and interim presentations to determine if they are on track with their design. “Optional Computer Time” was available each weekday morning, and was very popular as girls could send and receive e-mail.

The weekend centered around a trip to Cape Cod, starting with a day at Woods Hole Oceanographic Institution, with its Aquarium and Endeavor House Exhibits and an overnight stay in a church hall in Falmouth. The next day’s activities included a Sandcastle Building Workshop at a nearby beach.



There was a half-day trip to Bose Corporation. This allowed the girls to see the engineering work environment, meet with engineers who talked about what they do, and tour the research and manufacturing facilities.

Near the end of the program, lab tours were held to show the girls the wide variety of science and engineering activities going on at WPI. This included a hands-on demonstrations of biomedical engineering equipment, the Robotics laboratories, and measurement equipment in the Fire Protection Engineering Laboratory.

Recreational activities were planned for each night. The program ended with Final Project Presentations by the campers for their customers, families and friends, a Closing Ceremony with a presentation of certificates and a closing dinner. Bill Durgin, WPI Associate Provost for Academic Affairs, gave an excellent keynote address pointing out in how many ways the girls' engineering efforts matched industry standards for what qualities they desire for engineers.

## **REACH in the News**

Camp REACH will be listed as a 'best practice' in an upcoming U.S. Department of Labor report on attracting women to nontraditional careers.

The following are articles that appeared in the past year. Copies are included at the end of the report. Denise Nicoletti was also a guest on "The Public Eye" on WICN in August, 2001 and presented at the Engineering in Mass Collaborative "Best Practices Workshop Series," May 4, 2001. Also, REACH was listed in "Partnerships with higher Education WPS – Colleges of Worcester Consortium" 2000-2001 report.

- "Local teen reaches for academics and fun," Sterling Meetinghouse News, September, 2001
- M2 PressWire, August 2, 2001
- "Campers creating Web site," Worcester Telegram and Gazette, August 1, 2001.

- Northboro-Southboro Villager, July 27, 2001.

## Dissemination

In addition to newspaper articles and other media coverage, publications and conference presentations are given about the Camp REACH experience. These opportunities provide vehicles for letting others know of our successes, strengthen our evaluation process, and the scholarly activities associated with producing them are important for a program residing at WPI. Below is a list of the publications and presentations directly related to REACH, followed by a second list of closely related articles.

### Publications about REACH

- D. Nicoletti, "An analysis of the effectiveness of the admissions policy for an outreach program for girls in engineering," accepted to the Journal of Women and Minorities in Science and Engineering, December 2001.
- D. Nicoletti, "Monitoring long term effects of an outreach program for girls," accepted to 2002 Frontiers in Education Conference, November 2002.
- C. Demetry, D. Nicoletti, K. Mix, K. O'Connor, and A. Martin, "Who Dunit?: Learning Chemistry and Critical Thinking Through Hands-On Forensic Science," The New England Association of Chemistry Teachers (NEACT) Journal, Winter – Spring 2002 issue.
- D. Nicoletti, "Lessons Learned While Inspiring Young Girls to Pursue Engineering," American Society for Engineering Education Conference presentation, June 2000.
- A. Hoffman, H. Ault, C. Demetry, D. Nicoletti, "Teaching Disability Awareness and Universal Design to Middle School Students," Designing for the 21st Century 2000 Conference Proceedings, <http://adaptenv.org/21century/proceedings5.asp>
- D. Nicoletti, C. Demetry, "Community Service Design Projects as an Introduction to Engineering Problem Solving for Middle School Girls," National Science Foundation Grantees Conference, 1998.
- C. Demetry, D. Nicoletti, "REACH: An Engineering Summer Camp for Middle School Girls," Frontiers in Education Conference, 1997.

### Related Publications

- D. Nicoletti, K. Keenaghan "Stimulating the professional development of introductory-level engineering students," accepted to 2002 Frontiers in Education Conference, November 2002.
- D. Nicoletti and J. A. Orr, "An Implementable/Sustainable Outcomes Assessment Process for an Electrical Engineering Program," American Society for Engineering Education Conference presentation, June 2001.
- W. Michalson and D. Nicoletti, "Computers in Introductory and Upper-Level ECE Courses," American Society for Engineering Education 1995 Annual Conference Proceedings, Anaheim, CA, pp. 2795-2799, June, 25-28, 1995.
- J. A. Orr, W. Eggimann, D. Nicoletti, D. Cyganski, "An Electrical Engineering Curriculum Beginning in the First Year," Frontiers in Education, 1994.

D. Cyganski, D. Nicoletti, J. A. Orr, "A New Introductory Electrical Engineering Curriculum for the First-Year Student," IEEE Transactions on Education, v. 37, n. 2, pp. 171-177, 1994.

D. W. Nicoletti (presenter), "A New Basic Program in Electrical and Computer Engineering," The Freshmen Year Experience special focus conference on Science and Technological Education, 1992.

## **Follow-up Activities**

The Massachusetts Academy of Mathematics and Science (MassAcademy) is a wonderful opportunity as it is a publicly-funded school and is located at WPI. Since students apply in the fall of their sophomore year in high school, we decided to invite REACH alumni to MassAcademy for a special visit during the spring of their freshman year in high school. This happened for the second time on April 17, 2001, and it was a very worthwhile event – with seven (of the 29 girls invited) coming.

A Winter Reunion was held for all of the alumni on February 25, 2001. About thirty alumni attended the pool party, plus several staff members.

A summer reunion was held for alumni campers and staff on July 31, 2001, which was during the '01 program. The guests first had dinner and then participated in the recreational activity planned for that night – which was Optical Illusions. About twenty people attended.

Two projects from the '00 program were completed in 2001, which included the final celebrations for the website designed for Worcester Big Brothers/Big Sisters and the Goddard Memorial. The Big Brothers/Big Sisters team got to be present during the launching of the website which occurred during their annual meeting at the Worcester Art Museum. The Goddard Memorial Group learned that their help was instrumental in their successful fundraising activities related to the Goddard Memorial.

The campers are very excited about engineering and college. We created an environment in which they could explore options, meet friends with similar interests, and be empowered. We are going to try to maintain this excitement in the years to come. Initially, this is not a problem because follow-up activities will include their visiting the sites of their design projects, seeing their plans implement and celebrated. We have also created an email list and publish biannual newsletters to keep everyone in touch (copies attached in Appendix C). Reunion activities are held a minimum of twice a year.

## **State Regulations**

The Commonwealth of Massachusetts has enacted regulations regarding camps. A policy handbook is necessary, covering everything from a description of staff orientation, to what would be done in the case of an outbreak of disease, to stating who supplies milk to WPI. A copy of the more than 30-page Handbook of Procedures and Policies can be provided upon request.

Additional staffing is required to meet the regulations. One person is a Health Care Consultant, who must be a licensed physician, nurse practitioner or physician assistant with pediatric training. This year, we were able to share this position with WPI's summer athletic programs, and the person used was a physician (Dr. Kirk Johnson). The state also stipulated how many campers per staff member is allowed (we are well within this number), what kind of records must be kept, and the 24-hour-per-day staff coverage.

The state issued its one-year permit to Camp REACH on July 6, 2001.

## Program Evaluation

Thorough evaluation of Camp REACH is conducted by administering pre- and post- camp questionnaires to camp participants, along with teacher and parental assessment of the girls' development. The progress and achievement of camp participants are being followed longitudinally through their high school years and, where possible, will be compared with a control group that did not participate in the camp. The following metrics for evaluation reflect the intended outcomes of the program:

- Higher levels of enrollment, higher “track” placements (where applicable), and improved achievement in middle school and high school math and science courses
- Subsequent participation in other engineering, math, and science enrichment programs
- Improved understanding of what engineering is and what engineers do
- Enhanced career awareness
- Improved self-esteem and self-confidence
- Enhanced motivation and higher personal goals, through exposure to female role models

Numerical results for the evaluations are given in the following sections. Although it is difficult to measure the long-term effects of the program on the girls now, we have gathered the following information. At the end of the camp, 97% of the campers rated their overall experience as outstanding or good. When asked “how interested are you in engineering as a career?”, 90% of the campers responded yes to a high or moderate degree. Self-evaluations showed dramatic improvements in their confidence and comfort in working on cars, talking with someone they don't know on the phone, and making new friends.

A multifaceted measurement of self-esteem showed that 56% of the campers showed improved self-esteem, with 12% showing remarkable improvement. One of our program's goals is to educate the girls' families about engineering. Our rationale is that the girls will need sustained encouragement and support, which is easier if the parents understand the engineering professions. Of those that did not know what engineering was before camp, 71% reported that they now understand very or fairly well what engineers do in their careers. Also, for an overall score for the camp, 92% said ‘excellent,’ and the remaining 8% said ‘good.’



***Results of Application Survey***

A survey was included in the applications process. The results were not used for the acceptance decision (and the forms told the girls this), but they were used when assigning girls to their project teams, and will be used in comparative evaluations in the future.

The results are shown in Table 4 -- including the '99 results for comparison. Students were asked to indicate what computer skills they had and an assessment of their abilities in different areas, where 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Don't Know.

**Computer Skills:**

Quality that applicant was asked if it applied to them	'01 results		'00 results		'99 results	
	#	%	#	%	#	%
I have never/hardly ever used a computer.	0	0%	0	0%	3	10%
I can use the computer for word processing.	28	97%	27	90%	27	90%
I have hardly ever used on-line communication.	1	3%	5	17%	8	27%
I can get on-line and know how to access and send e-mail.	25	86%	23	77%	19	63%
I can get on-line and know how to browse the World Wide Web and do simple information searches.	29	100%	24	80%	22	73%
I am able to upload and download files.	19	66%	11	37%	10	33%
I know how to establish a web page or site that includes text and graphics.	10	34%	4	13%	8	27%

General Skills (average response, with 1 = excellent and 4=Poor):

Year	Working with Others	Observation Skills	Ability to Organize Information	Problem Solving	Listening	Following Directions
'99	1.50	1.64	1.89	1.39	1.50	1.43
'00	1.21	1.75	1.57	1.71	1.39	1.43
'01	1.72	1.83	1.55	1.69	1.52	1.41

Year	Recording Information	Making Decisions	Research Skills	Building Things	Making Oral Presentations	Writing Reports
'99	1.68	1.86	1.79	1.82	1.82	1.86
'00	1.46	1.82	1.66	1.84	1.55	1.64
'01	1.76	1.79	1.59	2.07	2.10	1.59

Table 4: Results of Applications Survey

This group of campers had substantially more interpersonal problems than the previous year's campers – perhaps reflecting their poorer self-reported score at working with others.

**Results Initial / Final Student Survey**

Students were evaluated on the first and last days of the camp to see what short-term effects the program had on their career goals, self-esteem, and their impressions of the camp. Initial and final surveys were received from every participant. Results that were left blank do not effect the final statistics.

Impressions of the camp

In general, the campers rated their satisfaction as

Year	Outstanding	Good	Fair	Poor	Very Poor
'99	10 42%	11 46%	3 13%	0 0%	0 0%
'00	24 80%	5 17%	1 3%	0 0%	0 0%
'01	18 62%	10 34%	1 3%	0 0%	0 0%

The combined score for outstanding or good is 97%. Below are some of their responses when asked what engineering is in their own words:

- Engineering is the way things work and designing things.
- Engineering is a way of constructing and learning, helping and having fun.
- Designing an item to fit customer's want and needs.
- Engineering is to help create something that would help make the world a better place.
- Engineering is what helps make things in our world work.

Their responses show that 48% (up from 40% last year) have given a high degree of thought to their future career. The table below shows how interested they are engineering as a career:

Year	High degree	Moderate Degree	Minimal Degree	Not at all
'99	38%	46%	13%	4%
'00	27%	57%	13%	3%
'01	17%	72%	10%	0%

Therefore, 90% are considering engineering to a high or moderate degree. The numbers are down slightly from the previous years in terms of a high degree of interest, but happily the numbers are

improved when considering the lower end of the responses. The careers listed as possible alternatives to engineering were lawyer (4), doctor (3), teacher (3), writer (3), actress (2), architect (2), chef, secretary, marine biologist, detective.

When asked if they *enjoyed* specific workshops, their responses were as follows, where the score is computed by the %mostly agree/(%mostly agree + %mostly disagree).

	Mostly Agree	Mostly Disagree	Don't Know	'01	'00	'99
"Who Dunit" Forensics	26	1	2	96%	97%	96%
Electrical engineering	22	2	5	92%	--	--
Mobility for the Disabled	23	0	6	100%	96%	83%
Sandcastle building	25	1	3	96%	100%	67%
Car Maintenance	21	3	5	88%	64%	58%

Their responses to the question if they *learned* a great deal in this workshop were

	Mostly Agree	Mostly Disagree	Don't Know	'01	'00	'99
"Who Dunit" Forensics	23	1	5	96%	93%	87%
Electrical engineering	26	1	2	96%	--	--
Mobility for the Disabled	22	2	5	92%	100%	78%
Sandcastle building	17	4	8	81%	96%	74%
Car Maintenance	25	0	4	100%	87%	70%

The program included tours of facilities at WPI and elsewhere. The following show the campers' assessment of these activities.

	Mostly Agree	Mostly Disagree	Don't Know	'01 Score	'00 Score	'99 Score
Marine Fisheries Aquarium, Woods Hole	23	4	2	85%	72%	88%
Bose Corporation	24	3	2	89%	89%	83%
Robotics, WPI	23	2	4	92%	97%	80%
Biomedical engineering demonstrations	23	1	5	96%	--	--
Fire protection engineering, WPI	20	2	7	91%	85%	50%

We also assessed how enjoyable various recreational activities were; below are their responses.

	Mostly Agree	Mostly Disagree	Don't Know	'01 Score	'00 Score
Book Reading	8	4	11	67%	
Bowling	1	1	12	50%	56%
Capture the Flag	22	4	1	85%	
Card-Making for sick children	17	3	9	85%	
Decorate Cookies	23	2	3	92%	84%
Decorate Dorm Doors	16	4	6	80%	
Escher & Tessellations Art	10	11	8	48%	
Friendship Bracelets	25	1	2	96%	
Journal writing	18	4	5	82%	
Kickball	23	4	1	85%	
Make Marble Paper	6	2	9	75%	
Make Mini-Gardens	22	7	0	76%	

Movie Night	29	0	0	100%	97%
Softball	1	3	10	25%	
Swimming	28	0	1	100%	93%
T-Shirt Design/Decoration	25	1	3	96%	
Talent Show	26	0	3	100%	

For the first time, we itemized the accounting so that we can determine how costly the different events were. *When there was a cost to the program*, it is listed below:

Movie Night	\$7.33
Decorate Cookies	\$56.25
Card-Making for sick children	\$63.99
Make Mini-Gardens	\$105.05
Escher & Tessellations Art	\$4.56
Friendship Bracelets	\$37.66

Combining the camper score with the cost (by multiplying the cost by [100 – the score]), we can sort the activities in terms of this overall metric (where lower score means a better activity):

Activity	Score
Movie Night	0.00
Friendship Bracelets	1.51
Escher & Tessellations Art	2.37
Decorate Cookies	4.50
Card-Making for sick children	9.60
Make Mini-Gardens	25.21

Campers were asked at the end what they liked the most about the camp experience. Some of their responses included:

- Meeting new people (13)
- I liked when we went to the Cape and to the beach (5)
- Our projects (3)
- Staying in dorms (3)
- Learning about different types of engineering (2)
- The thing that I liked the most was the experience of being an adult. We could make our own decisions and it was like we were at college. We could also experience what it is like to be an engineer.

Before I came I didn't know what engineering was, but now I do and want to pursue a career in



it.

Campers were also asked what did you like least about the camp experience. Some of them responded:

- Early wake up and bedtime (5)
- Some of the evening activities (4)
- The thing I liked least was homesickness (3)
- My roommate/some of the other campers (3)

They gave the following responses to describe what they learned from the design project:

- To organize information, oral presentations, interviews, team work skills, compromising.
- I learned how to work together and the different parts and tasks that engineers have. I also learned what it is like to be an engineer.
- How to compromise and deal with problems. See new ideas.
- I learned about teamwork and how to measure square feet. I also learned to listen.
- I learned that planning a project and writing a report is hard, especially with a deadline.
- I learned that you have to go through many steps before you can have the final design
- I learned that some things are harder than they look
- Things can be harder than they look

Their recommendations for next year's program included more swimming (4), and more/better recreational time (2)

### Rating of Skills

Campers were asked to rate themselves at the beginning and end of the camp on a variety of skills. The score given was 1 = Excellent, 2 = Good, 3 = Fair, and 4 = Poor. The tables below shows a score for each question, obtained by summing the responses for each skill. Table 5 are the results from the initial survey (on the first day of the camp), and Table 6 are the results from the survey performed on the last

day of the camp. A low number indicates a high level of comfort and confidence. There are 29 campers' responses -- therefore, a 'perfect' score would be  $29 \times 1 = 29$ , which would indicate that every camper said that they had a high degree of comfort with the skill. The 'worst' score would be  $29 \times 4 = 116$ .

Listening	38	Research skills	51
Ability to organize information	39	Understanding the way things work	52
Working with computers	40	Building things	53
Following directions	40	Making decisions	53
Working with others	41	Making oral presentations	53
Writing	43	Problem solving	53
Observation skills	47	Taking things apart	54
Recording information	47	Using tools	55
Writing reports	47	Making measurements	57
Planning a schedule	48	Conducting an interview	59
Relating to people different than me	49	Talking with someone I don't know on the phone	66
Making new friends	49	Working on cars	85

Table 5: Initial Scores for Self-Assessment of Comfort With Skills

Working with computers	36	Planning a schedule	46
Making new friends	36	Writing	47
Listening	41	Taking things apart	48
Following directions	41	Understanding the way things work	48
Ability to organize information	42	Using tools	48
Writing reports	42	Recording information	49
		Talking with someone I don't know	
Working with others	43	on the phone	49
Observation skills	43	Making measurements	50
Relating to people different than me	45	Conducting an interview	52
Research skills	45	Building things	54
Making oral presentations	46	Making decisions	54
Problem solving	46	Working on cars	56

Table 6: Final Scores for Self-Assessment of Comfort With Skills

A score for each skill was obtained by summing the final score minus the initial score for each camper. Negative changes indicate an increased amount of comfort and confidence. The results are given in Table 7, including '99 and '00 values for comparison.

	'01	'00	'99		'01	'00	'99
Working on cars		-29	-27	Relating to people different than me	-15	-8	
	-32				-7		
Talking with someone I don't know on the phone	-19	-21	-6	Understand the way things work	-6	-8	-8
Making new friends	-15	-8	-11	Working with computers	-6	-4	-9
Conducting an interview	-10	-13	-3	Planning a schedule	-4	-3	-3
Making measurements	-9	-12	-5	Building things	-1	-14	-10
Making oral presentations	-9	-9	-13	Following directions	-1	-8	-6
Problem solving	-9	-13	-6	Making decisions	-1	-10	1
Using tools	-9	-9	-9	Recording information	0	-7	-10
Research skills	-8	-14	-5	Working with others	0	-7	-1
Taking things apart	-8	-17	-6	Ability to organize information	1	-10	-6
Writing reports	-8	-13	0	Listening	1	-8	-5
Observation skills	-7	-9	-3	Writing	1	-2	-1

Table 7: Changes in Self-Assessment of Comfort With Skills

To determine on a per camper basis what occurred (as opposed to a per skill basis), for each skill, scores were tabulated by first subtracting the initial from the final score for each of the 24 skills, and then an overall score was calculated for each camper by summing the change for all the skills. Negative changes indicate an increased amount of comfort and confidence. The statistical results are given in Figure 1.



Figure 1: Histogram Showing The Number Of Campers With Increased (Negative) And Decreased (Positive) Changes In Their Self-Assessment Of Comfort With Skills

### Self-esteem Rating

Self-esteem scores were obtained by summing the absolute difference between the “how I feel about myself” and “how I would like to be” responses. Low numbers indicate a high level of self-esteem. Differences in self-esteem were estimated by subtracting the initial score from the final one. Negative scores indicate an improvement in self-esteem. The statistical results are given in Figure 2.

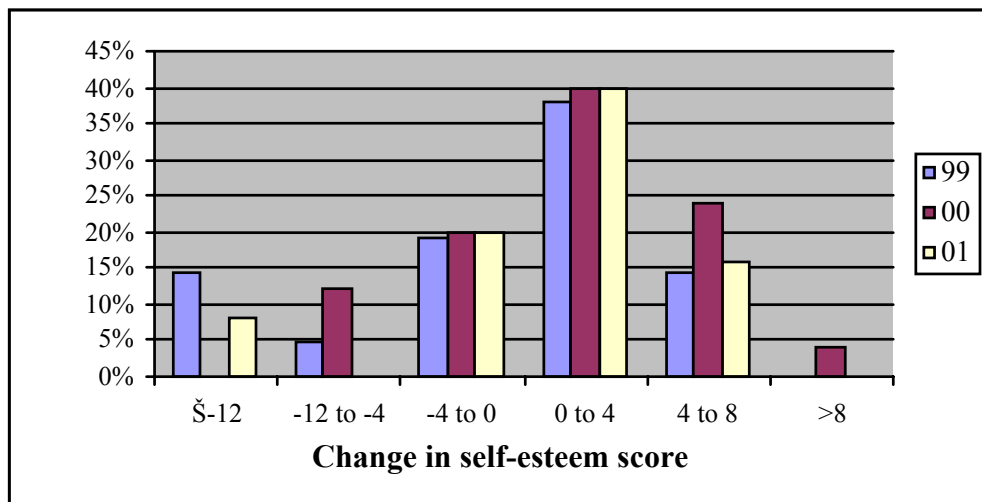


Figure 2: Changes In Self-Esteem Distribution, where negative numbers show enhancement to self-esteem

## Staff Observations

The middle school teachers and TAs were asked to make evaluations of the ten campers on their respective project teams. All calculations were made excluding blanks, 5's (not applicable) and 6's (don't know). Campers' scores were determined by normalizing by dividing by each staff member's mean score. A lower score means that someone developed more during the camp. Figure 3 shows in graphic form the distribution of scores for '99, '00 and '01. This shows that the population was assessed to be much more narrowly distributed this year – with the added problem of relatively more (not showing on the figure) developing much less.

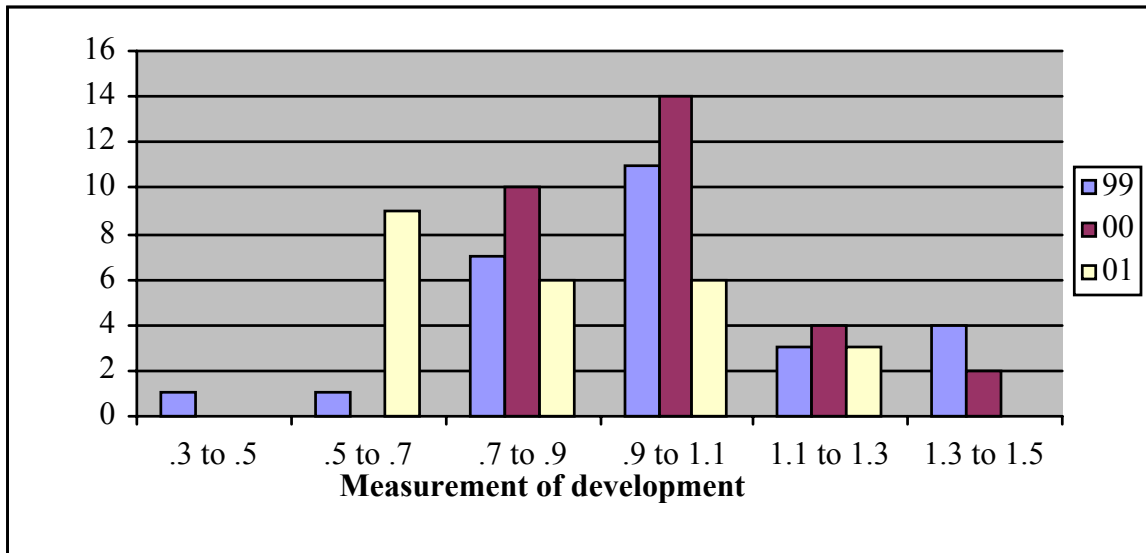


Figure 3: Campers' development distribution, as assessed by the camp staff

Overalls for each question, found by calculating average for that question, are given in Table 8, with '99 and '00 results shown for comparison. It is interesting to note that, unlike the previous two years, the results show that the skill that improved the most was "Student's self-esteem" – it was "Attitude towards engineering" in previous offerings.

### ***Results of Parent Survey***

Parents were sent a survey after the camp to evaluate their and their daughter's experiences with the program. Thirteen responses were received, and the results are given below. When asked what *positive* things (general or specific) their daughter brought up, the responses included

- Jody enjoyed her peers. She loved the various site visits. She was excited by the robotics lab and noted that the Mass. Academy students were lucky to work there. She enjoyed the sand castle building. During her presentation she clearly attempted to speak clearly and exuberantly like Dr. Nicoletti did to the campers.

	'01	'00	99
Student's self-esteem	1.50	1.51	2.16
Working with others	1.68	1.76	2.26
Student's learning	1.77	1.54	2.04
Classroom behaviors (attendance, participation)	1.81	1.68	2.33
Writing Reports	1.81	1.67	2.26
Problem-solving	1.82	1.5	2.27
Listening	1.83	1.72	2.49
Observation skills	1.85	1.5	2.03
Ability to organize information	1.86	1.53	2.23
Student's peer interaction	1.87	1.59	2.32
Making decisions	1.87	1.73	2.24
Building things	1.88	1.38	2.78
Making oral presentations	1.89	1.61	2.29
Following directions	1.95	1.7	2.19
Attitude toward engineering	1.97	1.38	1.94
Student's motivation	2.03	1.54	2.11
Research skills	2.06	1.56	1.96
Recording information	2.07	1.62	2.22

Table 8: Averages for changes in campers' skills, as assessed by the camp staff

- Abby really enjoyed staying in the dorms, college food, getting to work with a non profit entity and she LOVED the sandcastles. She was enthusiastic about everything she did.
- Loved campus life. Enjoyed various workshops i.e. learned to change tire, oil, etc. Stuff was wonderful. Felt very safe and well guided. Chelsea loved camp Reach.
- She loved it! She enjoyed making friends with new people. The activities were fun, especially the tessellation art. The robotic workshop was her favorite. She had a great time at the Cape and building sandcastles.

When asked what *negative* things (general or specific) their daughter brought up, the responses included:

- Chelsea hasn't expressed many, if any, negatives. She's commented on some personality conflicts with other campers (1-2) but other than that she's kept any low points to herself.
- early bedtime, lots and lots of walking, roommates liked to "sleep" at bedtime when I like to chat a little
- She thought the food choices were limited. She had experienced some name calling and was troubled by that.
- Wasn't crazy about one of her roommates, but not a significant problem.
- None. Once she adjusted (homesickness) she was fine.

When asked to rate on a scale from 1 (very much) to 4 (not at all), the opening day activities received 77% said 'useful', compared to 95% in '00. The closing day parents' session got a similarly low score of 77%.

The suggestions that parents gave for improving the camp included:

- A little more structured interaction between campers (especially roommates) on opening day would probably be really helpful. I'm thinking of get to know you games. It might be good to include parents too or have separate games for parents.

- more explanation of what an engineer actually does and of the many jobs they might have: process engineer, project engineer, sales engineer, and the different interaction with people and things with the different types of jobs.

46% (compared to 53% in '00) understood what engineers do in their careers *before the camp*. Of those that did not, 71% (compared to 78% in '00 and '99) said that they now understand fairly or very well what engineers do in their careers. The effects of the camp on their daughters included:

- Jody has an understanding of what types of things are done in engineering. She also appreciates that women who are creative can have a place in engineering. The field is not limited to math whizzes. She grew as a person by working with other girls to develop a project. She was inspired by the fine role models of the many young women who led the program.
- better awareness of math + science but too early to see how it will affect her schoolwork this year. Don't know if it's just a developmental coincidence but she's also been much nicer to her family since camp! She's also evinced interest in Mass Academy.
- Camp has reinforced Chelsea's confidence, independence, esteem, and sense of adventure. She is a well rounded girl but even more so after camp.
- it was good for her to work in a diverse group of girls - there were ideas that she had to consider outside of her own. She had to learn to deal with other opinionated people.
- Ariel recently had to complete a science project with a group of classmates that involved designing a product to perform a specific task. I was very impressed, watching her (they met at our home after school) with her use of skills she was taught at camp to manage the design process, delegate tasks, and compile the presentation. She was completely confident and very focused. I also think that the two weeks away from home were very maturing in terms of proof that she can manage her needs and feeling while out of her normal element.

92% (95% in '00) gave 'excellent' as an overall score for the camp; the remaining 8% said 'good'.

### **Results of Staff Survey**

The staff was also surveyed to determine their impressions of various aspects of the program and to improve the quality of the staff training. The middle school teachers had an additional piece, meant to meet some of the requirements for the professional development points (PDPs) that were granted as part of their work.

Staff responses about the usefulness of different orientation activities are given in Table 9.

	Not Useful	Somewhat Useful	Very Useful
Discussion of design projects, led by Director	0%	38%	63%
Practice for Mobility for the Disabled Workshop	29%	29%	43%
Health policies, led by Director	0%	57%	43%
Practice for electrical engineering workshop, led by Director	0%	57%	43%
Sandcastle building workshop, led by workshop leader	14%	57%	29%
Forensics workshop, led by workshop leader	13%	25%	63%
Workshop on "Revisiting Adolescence", led by Tracy Lavengood	11%	56%	33%

Table 9: Percentages for staff evaluations of staff training

When asked to elaborate, they said:

- The “Revisiting Adolescence” workshop was not necessary and not a required event for MS teachers. I do feel this is beneficial to RA’s/TA’s
- Sandcastle workshop was not useful because everything was explained during the video before the Cape when the campers saw it.
- The forensics workshop explanation was too rushed. The DNA workshop I did was explained to me in 5 minutes right before I did the workshop. I think next time each station of the forensics workshop needs to be demonstrated well before the workshop.
- I thought that the orientation for the mobility workshop was too elaborate. I didn’t get very much information from it that wasn’t repeated during the actual workshop. I think that it would be better if it was just summarized for next year.

It is important to strike a balance between giving staff members enough information so that they can carry out their duties, and not being too bossy. For various program elements, staff members made indications about what they *wished* the amount of guidance would be, and what it was; the results can be found in Tables 11 and 12.

	Absolutely no guidance needed	---	In the middle	--	Tell me every detail
Design projects	9%	0%	64%	0%	0%
Mobility for the Disabled Workshop	18%	0%	55%	0%	0%
Dealing with homesickness, etc.	0%	0%	82%	9%	0%
Electrical engineering workshop	9%	0%	45%	0%	0%
Sandcastle building workshop	18%	0%	73%	0%	0%
Forensics workshop	9%	0%	36%	0%	0%

Table 11: Percentages for how much guidance desired by staff

	Absolutely no guidance	---	In the middle	--	Told me every detail
Design projects	9%	0%	64%	0%	0%
Mobility for the Disabled Workshop	18%	0%	64%	0%	0%
Dealing with homesickness, etc.	0%	0%	91%	9%	0%
Home heating workshop	27%	0%	45%	0%	0%
Sandcastle building workshop	9%	0%	73%	0%	0%
Forensics workshop	36%	0%	36%	0%	0%

Table 12: Percentages for how much guidance received by staff

The staff was also assessed on the projects, workshops, and recreational activities. They indicated that the projects went excellent (44%), good (44%), or fair (11%). Interestingly, the ‘fair’ comment was

from a staff member associated with the most successful project! The rest of results can be found below.

**Overall, I enjoyed this workshop.**

	Mostly Agree	Mostly Disagree	Don't Know	Score
“Who Dunit” Forensics	82%	0%	18%	100%
Electrical engineering	73%	0%	27%	100%
Mobility for the Disabled	55%	9%	36%	86%
Sandcastle building	73%	0%	27%	100%
Car Maintenance	64%	9%	27%	88%

**I learned a great deal in this workshop**

	Mostly Agree	Mostly Disagree	Don't Know	Score
“Who Dunit” Forensics	73%	9%	18%	89%
Electrical engineering	64%	9%	27%	88%
Mobility for the Disabled (Rehabilitaiton Engineering)	64%	0%	36%	100%
Sandcastle building	64%	18%	18%	78%
Car Maintenance	73%	9%	18%	89%

**I had a great deal of interest in each of these fieldtrips or tours.**

	Mostly Agree	Mostly Disagree	Don't Know	Score
Marine Fisheries Aquarium, Woods Hole	91%	0%	9%	100%
Bose Corporation	82%	0%	18%	100%
Robotics, WPI	64%	0%	18%	100%
Biomedical engineering demonstrations, WPI	64%	9%	9%	88%
Fire protection engineering, WPI	55%	9%	18%	86%

**I enjoyed the following evening/recreational activities**

	Mostly Agree	Mostly Disagree	Don't Know	Score
Book Reading	18%	9%	45%	67%
Bowling	0%	0%	73%	--
Capture the Flag	18%	18%	36%	50%
Card-Making for sick children	27%	0%	36%	100%
Decorate Cookies	18%	9%	36%	67%
Decorate Dorm Doors	36%	0%	36%	100%
Escher & Tessellations Art	27%	9%	27%	75%
Friendship Bracelets	45%	0%	27%	100%
Journal writing	18%	9%	45%	67%
Kickball	36%	0%	27%	100%
Make Marble Paper	9%	0%	64%	100%
Make Mini-Gardens	27%	9%	36%	75%

Movie Night	36%	0%	45%	100%
Softball	18%	0%	55%	100%
Swimming	27%	9%	36%	75%
T-Shirt Design/Decoration	27%	0%	45%	100%
Talent Show	64%	0%	18%	100%
Ultimate Frisbee	9%	0%	55%	100%

## Budget

The following show the expenses and income for REACH '01, with actual and budgeted amounts.

### Expenses:

Description	Budgeted	Total Spent	Leftover	%spent
Board (campers)	\$ 6,500.00	\$ 6,266.49	\$ 233.51	96%
Board (staff)	\$ 2,367.07	\$ 2,547.04	\$ (179.98)	108%
Room (campers)	\$ 4,788.00	\$ 5,640.00	\$ (852.00)	118%
Program director	\$ 6,000.00	\$ 6,000.00	\$ -	100%
Administrative assistance	\$ 5,000.00	\$ 3,125.00	\$ 1,875.00	63%
Stipends for 3 middle school teachers	\$ 6,000.00	\$ 6,000.00	\$ -	100%
Resident Assistants	\$ 1,500.00	\$ 1,550.00	\$ (50.00)	103%
Health Coordinator	\$ 300.00	\$ 300.00	\$ -	100%
Workshop leaders	\$ 1,970.00	\$ 1,404.00	\$ 566.00	71%
Fringe benefits	\$ 1,620.00	\$ 1,530.00	\$ 90.00	94%
Parent seminars	\$ 280.00	\$ 401.20	\$ (121.20)	143%
Closing ceremonies	\$ 1,000.00	\$ 408.00	\$ 592.00	41%
Staff training workshops	\$ 596.40	\$ 522.55	\$ 73.85	88%
Field trips	\$ 554.00	\$ 325.36	\$ 228.64	59%
Van rental for two weeks	\$ 2,835.00	\$ 2,016.00	\$ 819.00	71%
Brochure	\$ 2,343.00	\$ 2,418.00	\$ (75.00)	103%
Project supplies	\$ 1,265.00	\$ 1,625.21	\$ (360.21)	128%
Workshop supplies	\$ 212.00	\$ 741.12	\$ (529.12)	350%
Postage	\$ 1,232.60	\$ 1,542.93	\$ (310.34)	125%
Recreation	\$ 333.00	\$ 400.13	\$ (67.13)	120%
Misc supplies	\$ 679.00	\$ 557.88	\$ 121.12	82%
<b>TOTALS</b>	<b>\$ 47,375.06</b>	<b>\$ 45,320.91</b>	<b>\$ 2,054.15</b>	

The problem with overspending the Parent Seminar line will be addressed by scaling back the refreshments provided. The overexpenditure for the workshop supplies was caused by the inclusion of a new workshop on electrical engineering. The decision to include this new experience was based on the equipment from the previous workshop starting to fail, the department no longer supporting the computer peripherals necessary, and the relatively low scores given by the campers for this workshop. However, consideration of the relatively high cost for this new workshop should be made before it is repeated in 2002.

NOTE: There are still some payments outstanding for the '01 program, including supplies and administrative costs of implementing follow-up activities that will take place during the '01-02 school year.

### Income:

Intel	\$10,000
General Motors	\$6,500
TJX Foundation	\$5,000
Fidelity Investments	\$5,000
Engineering Information	\$3,500

Foundation	
Technical Expositions and Conferences (TEC)	\$3,000
Mercury Computer	\$2,000
Raytheon	\$1,500
AQUAL Clinical Research Services	\$1,000
Tuition	\$9,750
TOTAL	\$47,250.00

### **Action Items for '02**

All of the action items suggested in the '01 report were successfully acted on. The following are ideas that will be considered for improvements to the 2002 REACH program.

- Make announcements concerning handicapped accessibility for guests during opening and closing ceremonies
- Continue to streamline staff orientation, taking advantage of returning campers and staff members
- Include some material on ethnic diversity in staff training for behavioral problems
- Consider adding to the application material to better determine which girls will be more interested in the kinds of activities provided at Camp REACH. The first stage of this consideration should be gathering feedback and thoughts from previous middle school teachers.
- Better coordinate dining time with the sports camps – whose lateness often delayed our entry into the dining room
- Use camper and budget information to plan recreational activities

## **Appendix A**

### **Copy of REACH '01 Schedule**

## **Appendix B**

**Copy of articles related to REACH**

## **Appendix C**

### **REACH Newsletters**