

AC 2008-2188: ENGINEERGIRL: A WEBSITE TO INTRODUCE MIDDLE SCHOOL GIRLS TO ENGINEERING

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Dr. Bevlee A. Watford is Associate Dean for Academic Affairs and founding Director of the Center for the Enhancement of Engineering Diversity in the College of Engineering at Virginia Tech. A professor of Engineering Education her research interests are in developing and implementing programs to enhance the success of undergraduate engineering students. She is also involved in providing pre-college opportunities for middle and high school students to increase their interest and future participation in the engineering profession.

Catherine Didion, Association for Women in Science

Catherine Didion is a Senior Program Officer at the National Academy of Engineering (NAE). Her portfolio is the Diversity of the Engineering Workforce program with a charge to provide staff leadership to the NAE's efforts to enhance the diversity of the engineering workforce at all levels including the diversity of those being prepared to enter the future workforce. In addition to her duties at NAE, in March of 2007 Didion became the Director of the Committee on Women in Science, Engineering, and Medicine. Didion is an internationally recognized leader and expert on issues of equity and gender in science and engineering. She was the editor for Women in Science Column for the Journal of College Science Teaching from 1993-2002.

Patricia Paddock, NYC Department of Education

Patricia J. Paddock has developed online educational resources for a variety of formal and non-formal educational institutions including The United Nations, Girl Scouts of the USA, and the New York City Department of Education.

Suzanne Jenniches, Northrop Grumman

Suzanne Jenniches, a 33-year veteran of the Northrop Grumman Corporation, currently serves as Vice President and General Manager of the Government Systems Division. The division encompasses 17 operational sites, seven in the US and ten in Europe, the Middle East, and North Africa. These operational sites supply governments around the world with Postal Automation Systems, C4ISR and Tactical Communications Systems, Air Traffic Management, International Infrastructure and Air Defense, and Homeland Defense. Mrs. Jenniches is very active in the support of engineering and education. She is past president of the national Society of Women Engineers and was awarded the Achievement Award, in June, 2000. Since 1997, she chairs the National Academy of Engineering (NAE) "EngineerGirl!" website.

Annette Gildea, Gildea Media Group

Annette Gildea is the Founder and CEO of Ollie Interactive, an award-winning Internet design and marketing communications studio based in Northern Virginia. Her professional interests include development of intuitive user-interface design for new media and web 2.0 social networking applications. Ms. Gildea is serves on the Board of Directors for Habitat for Humanity of Northern Virginia, and has appeared as a guest on NPR's "Diane Rehm Show" to discuss the social influence of the Internet and new media on young women in America.

Katie Gramling, Diamax

Katharine Gramling is Director of Strategic Services at Diamax Information Systems. As a senior business analyst, she works with associations and not-for-profit institutions to develop web strategies and design websites that achieve project and organization objectives.

Greta Zornes, Tulane University

Greta Zornes recently completed her PhD in Environmental Health Sciences at Tulane University in New Orleans. She is active in Engineers Without Borders and is currently involved in a project in the community of Amayo, Nicaragua. Currently a fellow at the National Academy of Engineering, Greta is working with the Diversity in the Engineering Workforce (DEW) program supporting the Engineer Girl and Engineer Your Life projects. Greta is employed as an engineering consultant with CH2M HILL.

EngineerGirl! A Website to Introduce Middle School Girls to Engineering

Abstract

In 1997, the National Academy of Engineering launched the EngineerGirl! website (<http://www.engineergirl.org/>). The intent of this website is to actively target the gender gap in engineering through marketing efforts aimed at middle school girls. This paper and the associated poster present the EngineerGirl! website, its various facets and activities, and presents data which indicates how well it is utilized and received by girls in the 6th through 8th grades.

Introduction

Initially launched in 1997, the EngineerGirl! website is an interactive, engaging means of informing and encouraging diverse young women to explore careers in engineering. It was designed with the assistance of middle and high school young women from across the United States and Canada who worked together on the Girl's Advisory Board (GAB). The result of their initial efforts was a website that brought together role models of women engineers who provided real world examples of how they became engineers. The primary theme of the EngineerGirl! website is to focus on how girls can make a difference in society through becoming engineers.

In 2004, the GAB was again assembled through a series of on-line chats. The results of their analysis of the then current website indicated their desire for a more interactive, engaging website. They also participated in pilot testing of website template designs. The result is the EngineerGirl! website in its current format – an interactive, informative medium which encourages young girls to both learn about engineering and imagine themselves as an engineer. Emphasis is placed on providing content that inspires the young women and that challenges them to make a difference in the world through pursuing engineering careers. There are numerous sections of the website, some of which are detailed below.

Gallery of Women Engineers

This section of the website highlights successful women engineers in a variety of professions. It includes profiles of over 110 women engineers, some historical and some current. For example

- Emily Roebling (1843–1903), an engineer who oversaw day-to-day construction of the Brooklyn Bridge after her engineer husband fell ill
- Grace Murray Hopper (1906–1992), an engineer involved in the development of the first computers
- Shruti Pai, a biomedical engineer who works for the Center of Excellence for Limb Loss Prevention and Prosthetic Engineering
- Ayanna Howard, who worked on the next generation Mars rover while employed at NASA Jet Propulsion laboratory

More recently, historical information on women engineers has been gathered from libraries and websites. After sifting through multiple sources of biographical information, 16 comprehensive profiles designed to appeal to middle-school girls were created. These descriptions were added to the EngineerGirl! website, along with links directing visitors to sites that provide additional information.

In addition to the profiles above, nominations were solicited and nominees contacted for permission to include them in the Gallery. Biographical information was developed as well as relevant links to their biographies. Forty-one women were invited, and 16 profiles were added to the website.

Fun Facts

Fun Facts are designed to increase girls understanding of exactly what engineers do. It serves to nurture and stimulate a young girl's natural desire to explore the world. Over forty-five fun facts have been developed and placed on the site and include text which explain specific phenomenon with accompanying pictures. As one example, the Draper Prize, given by the National Academy of Engineering (NAE) is awarded for outstanding achievement, particularly innovation in engineering and technology contributing to the advancement of the welfare and freedom of humanity. As another example, the ferris wheel is considered to be an engineering wonder and was first designed and created by George Ferris in 1893.

Hot Projects

In this section we expose the girls to teams of engineers working on everyday projects. The Chocolate Engineering section was such a huge success that a section on jewelry making was recently added. Additional entries to this section are currently in process.

Becoming an Engineer

This section is arguable one of the most popular areas of the website. It provides information on the specific steps necessary to become an engineer, including the classes that a student should take in high school to prepare for entry to engineering studies. It also discusses the benefits of becoming an engineer including the opportunity to work with teams of people to solve problems, the chance to work with new technologies, the ability to work just about anywhere and the power to make a difference in the lives of individuals.

Careers

This section provides information on career planning, descriptions of various engineering careers as well as information on salaries and employment. The Girls Guide to Career Planning presents information on several different ways to explore engineering careers, including job shadowing and community service. It also provides links to the Engineering: Your Future website developed by ASEE, the Department of Labor's Occupational Outlook Handbook and to Guide Me NACME. This website features (among other items) a quiz to help girls discover what kind

of smart they are plus background information on different careers, and video clips of engineers in various fields.

Ask An Engineer

This section of the website allows visitors to submit questions to EngineerGirl! Responses are provided by the practicing engineers in the Gallery of Engineers. Visitors can submit a question, and view previously submitted questions and the answers provided. Of particular interest is that many of the questions are being submitted by individuals of various ages, including pre-college students, their parents, college graduates and others. Some examples are provided below, the first posted by the mother of a 7 year old girl.

Hi,

You have a really wonderful site. I am the parent of a seven-year-old, second-grade girl who appears to have an aptitude for math, science, and engineering. Her favorite toys are building toys (tinker toys, KNEX, legos, Bionicles), she is fascinated by how things work, she is good at math, and she has scored extremely high on the quantitative and nonverbal (spatial relations) portions of her cognitive aptitude tests. Clearly, she is wired for these activities and enjoys them, too!

I would really appreciate any and all advice you have about how to develop and encourage this strength.

Thanks,

A middle school girl asked the following question:

This is a young girl who would like to be a engineer when she grow up. Can u give me some tips and a web site? I have some experience I fixed my grandparents tv.

And finally this was posted by a young women with a liberal arts degree:

I recently learned about a program at Boston University called LEAP for Late Entry Accelerated Program, but they don't offer a civil engineering option. I am 24, graduated with a liberal arts degree two years ago, and I want to go back to school to pursue engineering. I'd like to get a BS as quickly as possible; any ideas?

Each of these questions received a personalized response from one of the engineers profiled on the website.

Essay Contest

One of the most interesting areas of the EngineerGirl! website describes the annual essay contest. Each year, girls (and boys) are encouraged to submit an essay to address a particular issue of importance. For 2008, the essay question – Engineering Energy for the Future - asks the question “How can engineers work together to make the world work for the changing needs of people everywhere without damaging the environment? What should they be focusing on, and

how will energy shape the future for engineering?” Students are asked to think about how much energy influences their life every day.

In 2007, the essay asked students to think about engineering’s grand challenges. They were asked to think about what life would be like on earth in the next 100 years and what they believed would be the most critical human needs. These essays have been enormously successful with over 100 submissions in 2007. The essays are evaluated by the EngineerGirl! Website Advisory Committee and winners are selected in each of the following age/grade groups:

Ages 8-11 - 3rd grade to 5th grade
Ages 12-14 - 6th grade to 8th grade
Ages 15-18 - 9th grade to 12th grade

Website Evaluation

The NAE regularly assesses the effectiveness of the EngineerGirl! website through various web-tracking tools. The number of hits to the website is easily determined: for example there were a total of 127,243 visits in the 4th quarter of 2007, representing a daily average of 1,383 visits. In addition the site visits are monitored to keep track of who is linking to EngineerGirl! and to determine how to update or add new content based on the needs of the audience.

The website is maintained through the efforts of the EngineerGirl! Website Advisory Committee, a group of women appointed by the NAE. Chaired by F. Suzanne Jenniches, Vice President and General Manager of the Government Systems Division for the Northrop Grumman Corporation, the Advisory Committee currently has 6 additional members. They are:

Annette Gildea
Gildea Media Group

Bevlee A. Watford
Associate Dean for Academic Affairs
College of Engineering
Virginia Tech

Patricia J. Paddock
Membership and Program Consultant
Girl Scouts of the USA

Carrie Phillips
Governmental Relations Manager
Southern Nuclear Operating Company

Katie Gramling
Diamax Information Systems Corporation

Karen Zill
Consultant

These individuals are committed to providing oversight and expertise to ensure the sustainability of the website. They meet on a quarterly basis to discuss the website, brainstorm about its contents and make suggestions for improvement.

Conclusion

The NAE views the EngineerGirl! website as one of its best efforts to increasing the diversity of the engineering profession. The website is both informative and engaging and its interactive activities are serving to increase the numbers of young women who visit the site.

Bibliography

EngineerGirl! Outcomes, Evaluation, and Future Plans, A Report Prepared by the National Academy of Engineering, 2004.