



Robocamp: Encouraging Young Women to Embrace STEM

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The Problem

- * US needs well-trained scientists, engineers and technologists.
- * Texas has placed a strong emphasis on addressing this shortfall.
- * Women and minorities are severely underrepresented.
- * This underrepresentation directly correlates to small number of students entering STEM degrees and careers.

Magnitude of the Problem

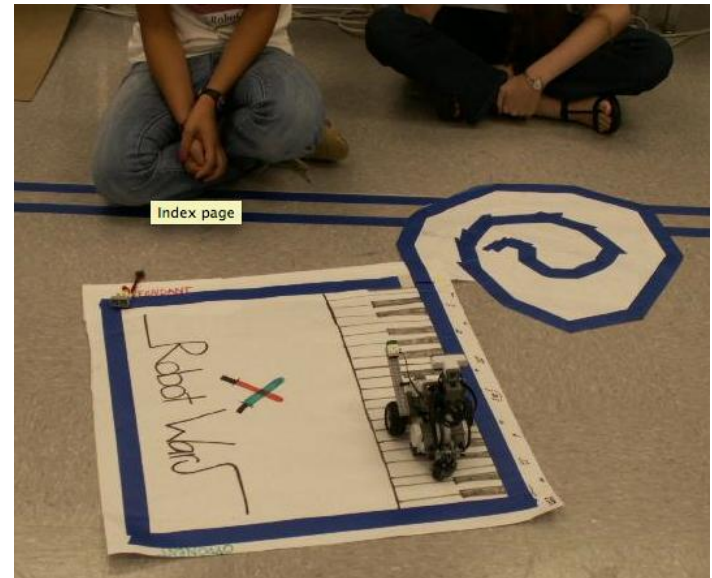
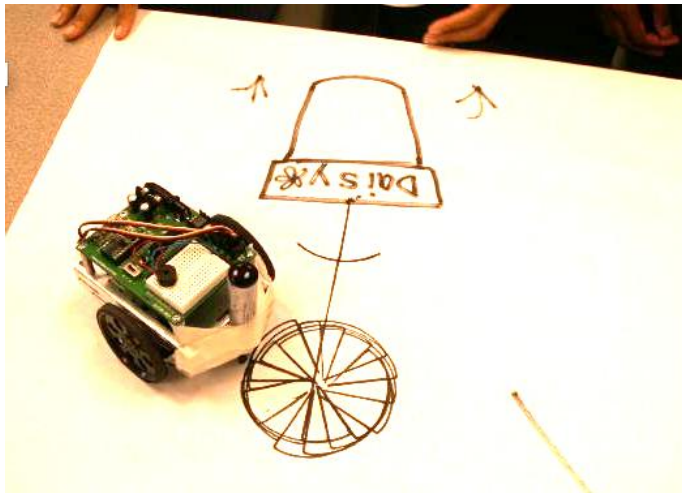
- * Women earn less than 11% of engineering degrees.
- * Women earn less than 24% of physical science degrees.
- * Need for innovative and sustained channels to prepare women and minorities for STEM education and careers is critical.

The Program

- * Special summer camps have been an effective strategy to promote engineering among high school women as evidenced by numerous success stories.
- * UNT CSE created Robocamp to address the need for sustainable channels to engage young women – to motivate and inspire their interest in technology.

The Program

- * Camp Programs are
 - Team based
 - Project oriented
 - Utilize mobile resources
 - Laptops
 - BOE-BOTs
 - Alice
 - SumoBots
 - PBS Design Squad activities





Team Activities

- * Activities include collaborative and collective efforts as well as independent operations.
- * Team environment encourages individual contributions to overall success regardless of personal strengths.

Sustaining Efforts

- * Started with a 2 year TWD grant for the Summer of 2005 with 2 camps.
- * Continued funding from
 - UNT College of Engineering (NSF ICER)
 - Motorola Foundation
 - (2 Innovation Generation Grants)
 - RGK Foundation
 - TWC Youth in Technology 2 year grant

Growth

- * 2005
 - 2 camps, 40 participants
- * 2006
 - 2 camps, 40 participants
- * 2007
 - 7 camps, 135 participants
- * 2008
 - 12 camps, including 2 camps for boys, and 1 co-ed camp, plus 2 counselor/teacher camps, approximately 250 participants
- * Over 450 total participants to date!

Evaluation

* Includes

- Formative measures to provide feedback to project developers
 - Performed at both end of camp program
 - Establish baselines
 - How do students rate the quality of and their satisfaction with various activities?
 - How do instructors, assistants and participants view the usefulness of their activities or participation?

Evaluations

- Summative assessment to address project effectiveness, quality and usefulness
 - What was the overall quality and effectiveness of the activities based on student and parent ratings and reviews?
 - What impact did the camp activities have on the performance of the participants as they return to their secondary school, from both the student and parent perspectives?
 - What impact did the camp activities have on the higher education and career plans of the participants?
 - What were the demographic characteristics of students enrolled in each type of activity and how do they compare with demographic characteristics of students in the department as a whole?

Follow-up

- * Follow-up surveys are conducted each February-March to evaluate:
 - Performance in math and science
 - Attitudes about possible STEM education and careers
 - Interest in further camp activities
 - Tracking graduates as they move into college

New Results

- * Past presentations have highlighted results for math and science improvement and academic and career plans.
- * Recent special survey of high school graduates who participated in Robocamp showed (with 17 of 30 responding):
 - 16 of 17 attending a 4 year university
 - 14 of 17 pursuing STEM-related degrees in Engineering, Physics, Biology, Oceanography, Computer Science, Mathematics and Geology.
 - Most of the above are at Texas institutions (including 2 at UNT), but 1 at Columbia and another at Yale.
 - Remainder in Cosmetology, Health Management and Forensic Science

Student Anecdotes

- * “It opened my mind to considering this as a career”
- * “Yes, I understand more, and I am even taking a course in robotics, now. I’m actually passing.”
- * “Yes it affected what I wanted to major in. I wanted to first major in business, now I want to major in computers”
- * “Yes I have been much more interested in science since Robocamp”
- * “I had already known I was interested in math and science, however, my experience at Robocamp further enforced my decision. It also made me think that engineering would be an ideal field to study”
- * “Most definitely. My high school requires us to take one credit of computer science and this camp helped me choose which course to take. I am also more aware of what people are talking about when they discuss robotics. Robocamp further strengthened my interest in math and science”

Parent Anecdotes

- * “As I mentioned previously, I think the program gave her additional confidence, particularly because it was an all-girls class. Besides being female, she is also quite naturally introverted, so activities like this do help a great deal. I think it has given her confidence and a sense of direction. She is much more likely to discuss her experience at Robocamp and relate it to other things she is doing, whether in school or in extracurricular activities. I recommend the program to everyone I can think of with a daughter who might be interested in science”
- * “Yes, her grades improved greatly in math and science”
- * “She now tries to think thru the problems rather than just solve them”
- * “She, as of right now, is planning on going to college. No college has been chosen but she is interested in engineering (because of last year’s camp!!)”

Parent Anecdotes

- * “Math was never an easy subject for her, but since last year’s camp, she has been determined to learn all the math she can. She has completed her Pre-Algebra textbook on her own in the past six months. She is EAGER to start Algebra.”
- * “In the past, Sam always felt like math and science were for ‘smart kids’ and that it had to be boring. Camp changed some of these stereotypes for her. Now that she does not see these subjects as an opportunity to fail, she is better able to focus her efforts and succeed.”
- * “Yes. This year she has A/B’s in math and science. We believe that she finally figured out that she CAN do it so as a result she listens and tries harder.”

Recommendations

- * Summer Programs appear to have a significant impact on:
 - Improved attitudes and performance in math and science in middle and high school
 - Decisions to pursue STEM related degrees and careers, particularly among underrepresented groups
 - An abundance of resources exist to aid in the formation of such programs
 - Funding support is also available, and programs for women and minorities are especially popular
- * Try one at your institution!

Questions?



- Visit our departmental website or the camp site
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THANK YOU!!