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School of Engineering



**Creating Tomorrow's  
Engineering Workforce**



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## Agenda

1. Introduction
2. Video
3. Why Hispanics?
4. Engineers of the future
5. What is STEPS?
6. Objectives
7. Evaluation
8. Proposal





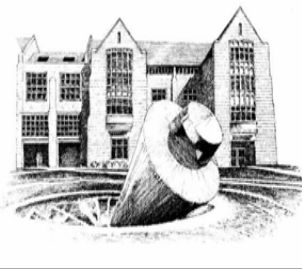
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## Why Hispanics?

- Hispanics represent 13.72% of US population (39.9 million)
- The Average annual rate of increase for the past 4 years is 3.93%
- Hispanics are the nation's largest minority
- They have become a driving force in the economy, politics and culture

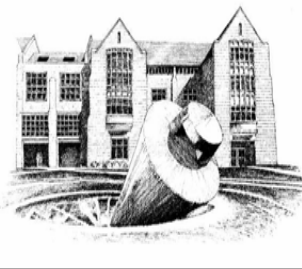


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## Engineers of the future

- Hispanics under 18 years of age represent 34% of total Hispanic population (13.6 million)
- Academic institutions have an opportunity to increase the diversity in their student and faculty populations
- Academic institutions have an opportunity to develop a whole new array of talent



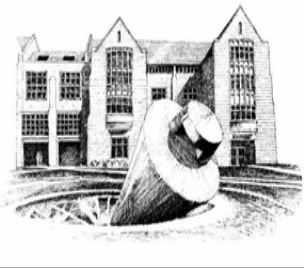
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## Engineers of the future

*“National statistics indicate that Hispanic students are not enrolling nor completing engineering curricula in proportion to their increasing numbers of the population. In order to close this glaring educational gap, more students from Hispanic backgrounds must be motivated, assisted financially and supported with programs to complete their higher education degrees.”<sup>1</sup>*

<sup>1</sup> Society of Hispanic Professional Engineers –SHPE- foundation,

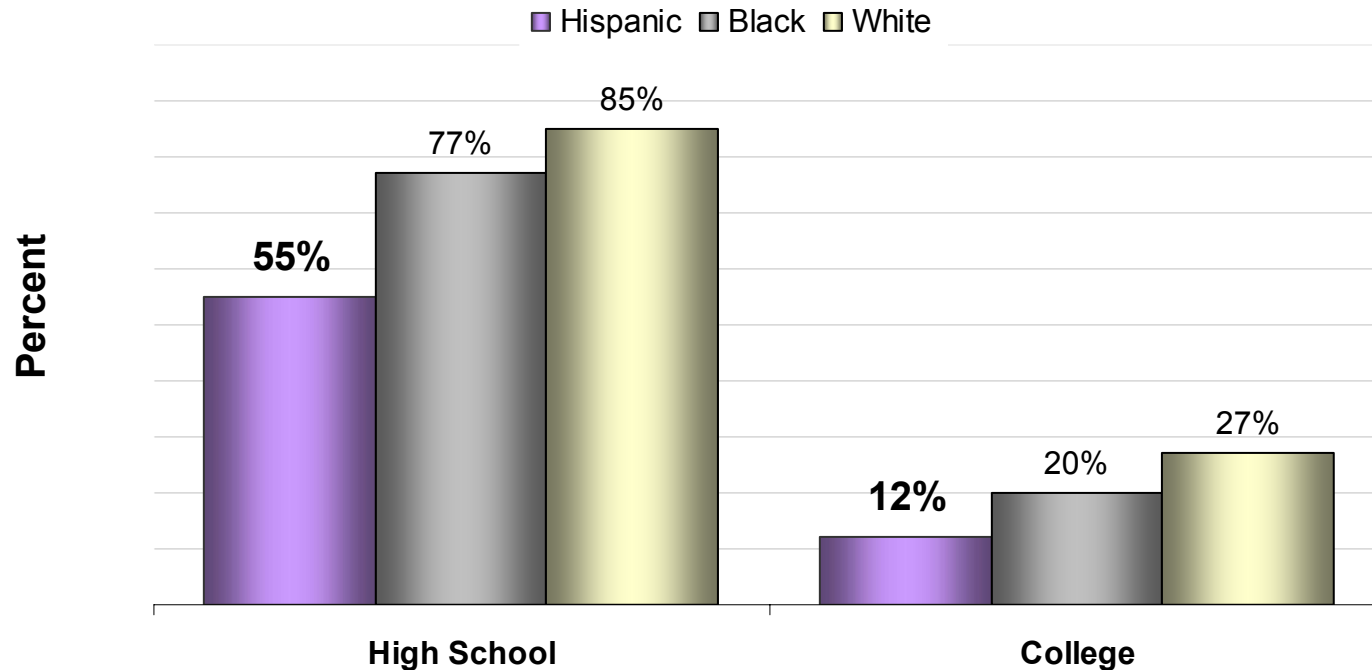


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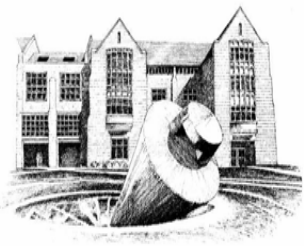


# Engineers of the future

2002 US Graduation Rates by Race and Ethnicity



Source: Hispan Telligence. U.S. Census Bureau

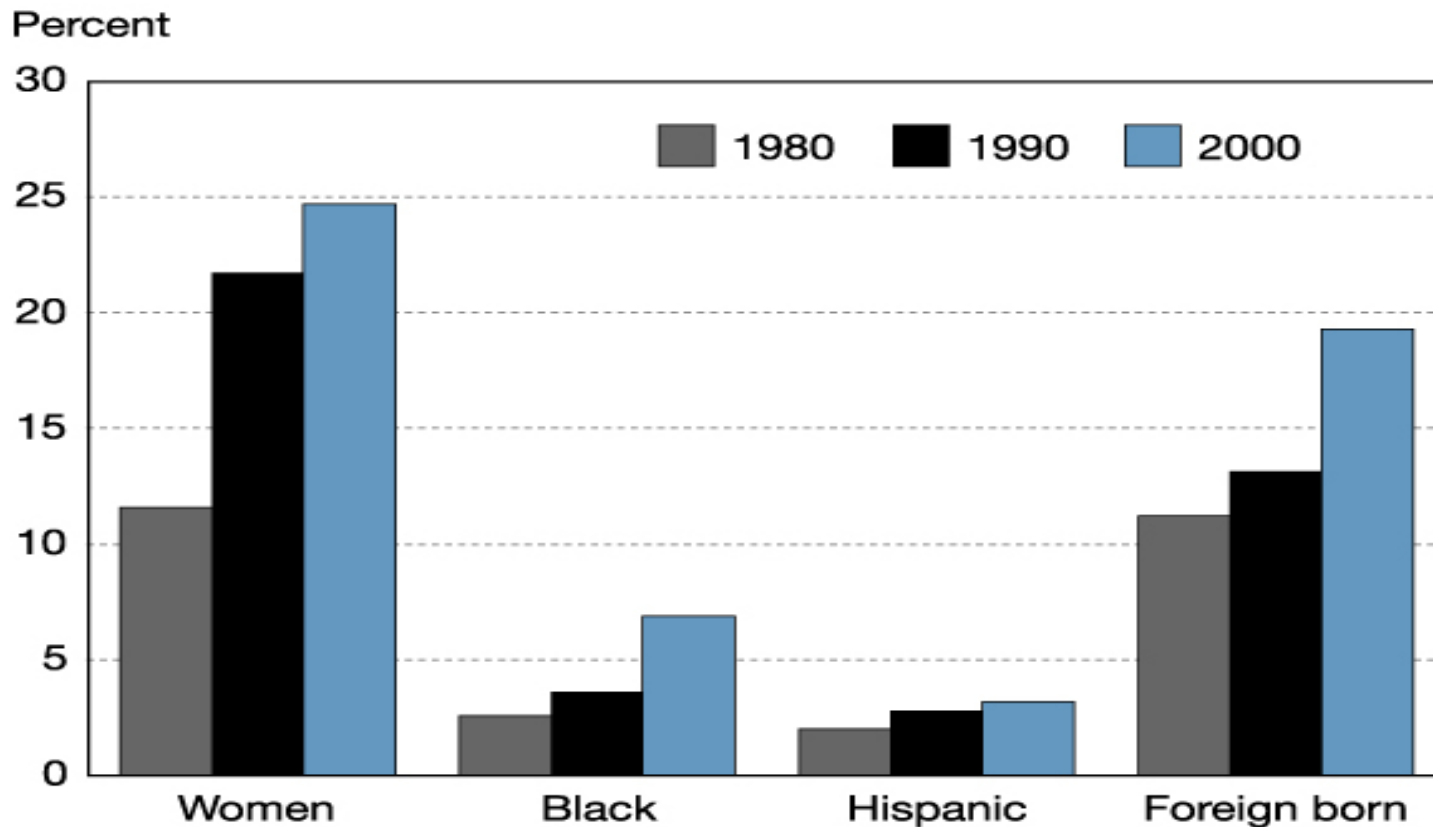


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# Women and minority graduates in nonacademic science and engineering occupations





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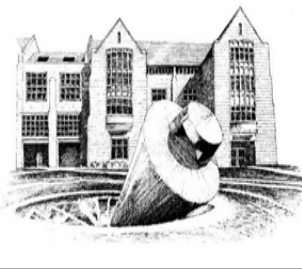


## Baccalaureate degree completion

“Calculated Odds” for 9th graders

	4-yr HS Graduation Rate	6-yr Baccalaureate Completion Rte	Predictive “Odds”
American Indian	43%	31%	4/100
Asian/Pacific Isl.	68%	52%	16/100
Hispanic	47%	47%	6/100
Black	37%	38%	5/100
White	83%	53%	18/100





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## Engineers of the future

- Hispanics, combined with other minorities, represent just 7% of science and engineering work force in 2003.
- More than 250,000 engineers will be needed in the next 10 years.
- It's a global economy: We need to strengthen US engineering and draw from the total population.



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# Origin of STEPS

- Need for more women engineers
- Need for more women engineering faculty
- University of Wisconsin – Stout
- Society of Manufacturing Engineers
- Minnesota Program



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## Enter STEPS

**S**cience

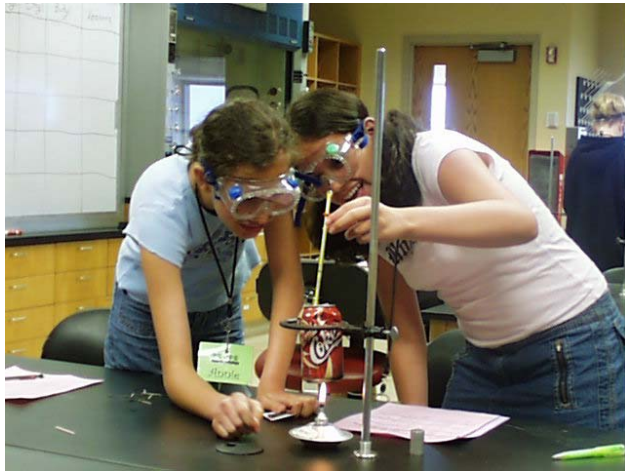
**T**echnology

**E**ngineering

**P**review

**S**ummer

Camp for Girls



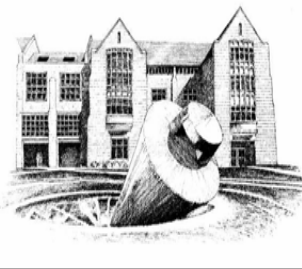


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## What is STEPS?

- One FREE week introduction to engineering and technology
- Activities with high-tech equipment and processes
- Opportunity to learn what engineers do
- Manufacture and fly a radio-controlled airplane

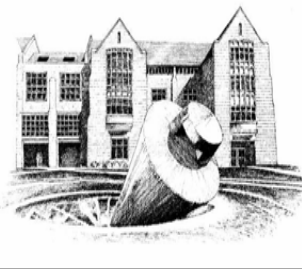


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## What is STEPS?

- Explore science and engineering topics such as physics, chemistry and team building
- Other activities such as swimming, pizza parties and karaoke
- Participants experience dorm life, cafeteria food and learn what it is like to be on a college campus.



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## Objectives

- To increase the number of girls selecting the appropriate math and science courses in middle and high school which prepare them for the study of engineering, technology, and science in college.
- To increase the proportion of women entering engineering, technology, and science in college.
- To enhance women's appreciation of engineering, technology, and science disciplines.



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## Demographics

Ethnicity	US	Minnesota
Total population	290,809,777	5,059,375
White	69.1%	88.2%
Black or African American	7.2%	3.5%
Native American	0.9%	1.1%
Asian	3.6%	2.9%
Persons reporting some other race	5.5%	1.3%
Hispanics	<b>13.7%</b>	<b>2.9%</b>

Source: U.S. Census Bureau



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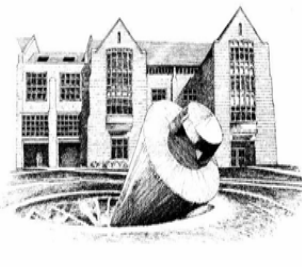
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## Demographics STEPS Enrollment

Ethnicity	2001	2002	2003	2004
White	71%	62%	65%	59%
African-American	9%	14%	13%	13%
Asian	11%	12%	9%	15%
<b>Hispanic</b>	<b>5%</b>	<b>5%</b>	<b>5%</b>	<b>5%</b>
Native American	1%	2%	3%	2%
Other	2%	1%	-	-
Not filled in	-	5%	6%	6%
<b>Total campers from underrepresented groups</b>	<b>29%</b>	<b>34%</b>	<b>29%</b>	<b>35%</b>





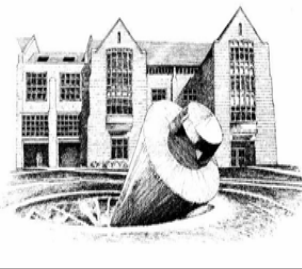
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## Pre/Post Camp Evaluation

Survey Year 2003	Pre-camp	Post-camp
It is okay for me to work in the field of Science	60%	70%
It is okay for me to work in the field of Math	62%	68%
It is okay for me to work in the field of Engineering	59%	72%

Source: Stout University



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## Pre/Post Camp Evaluation

Survey Year 2003	Pre-camp	Post-camp
Perception of self-esteem	7.3	7.6
Perception of self-efficacy	7.4	7.7
Perception of their interest in math and science	6.7	7.0

Questions rated on a nine-point likert scale varying from zero to very interested  
Source: Stout University



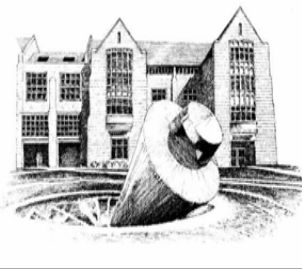
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## Testimonial

*“I had "little" interest in engineering before STEPS, but a lot of interest after the camp. I never realized there was so much stuff you could do in engineering. I thought engineering was way above my head, like you had to be a brain in math. It's a field that's opened up to me now because of this camp.”*

Excerpt from a camper's webpage

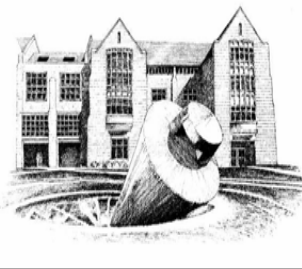


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# Longitudinal Study

- Ten year longitudinal study
- First Stout STEPS campers are now college freshmen
- Choice of science or engineering college major
  - High School Sophomore response
  - High School Senior response

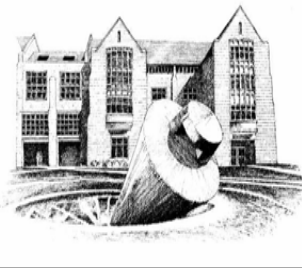


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# Results

- Hands-on experience generates
  - Engagement
  - Confidence
  - Pride
- STEPS campers learn what engineers do
- Builds friendships with girls of similar interests
- Gives girls a campus experience



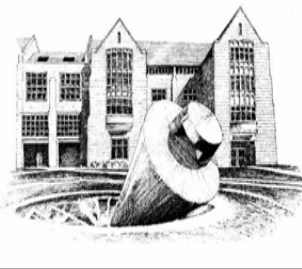
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# Stakeholder Engagement

- Volunteers
- Community
- Parents
- Faculty
- School of Education
- University Administration



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# Benefactors

- Medtronic Foundation
- 3M Foundation
- Guidant Corp.
- Lockheed Foundation
- Honeywell
- Rosemount Inc.
- Xcel Foundation
- Boston Scientific
- ADC Foundation
- Peregrine Capital Management
- Eaton Aerospace
- Goodrich Corp.



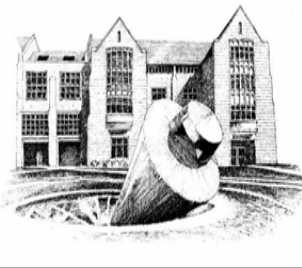
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# Web Site

- [www.stthomas.edu/engineering](http://www.stthomas.edu/engineering)
  - Undergraduate
  - STEPS
- Video, annual reports, more





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## Other Programs

- St. Paul Connections
- Project Lead the Way
- Science Olympiad
- Science Scholarship Competition



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## Next

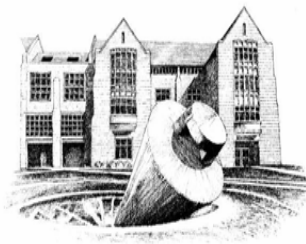
- Advanced STEPS
- Bring Junior STEPS alumni to campus
- Organize Hispanic graduates
- Encourage other Universities to do similar programs



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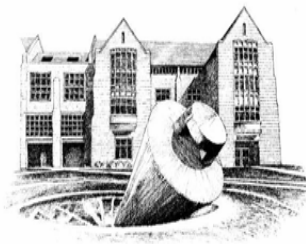
# Questions?



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**Gracias !!!**



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## Evaluation

### STEPS Enrollment

Ethnicity	2001		2002		2003		2004	
White	115	71%	96	62%	106	65%	96	59%
African-American	15	9%	22	14%	21	13%	21	13%
Asian	17	11%	18	12%	14	9%	25	15%
<b>Hispanic</b>	<b>8</b>	<b>5%</b>	<b>8</b>	<b>5%</b>	<b>8</b>	<b>5%</b>	<b>8</b>	<b>5%</b>
Native American	2	1%	3	2%	5	3%	4	2%
Other	4	2%	1	1%	-		-	
Not filled in	-		7	5%	10	6%	10	6%
<b>Total campers from underrepresented groups</b>	<b>46</b>	<b>29%</b>	<b>52</b>	<b>34%</b>	<b>48</b>	<b>29%</b>	<b>58</b>	<b>35%</b>
<b>Total Campers</b>	<b>161</b>	<b>100%</b>	<b>155</b>	<b>100%</b>	<b>164</b>	<b>100%</b>	<b>164</b>	<b>100%</b>