

## Best practice Beispiele zur Förderung von Frauen in der Informatik

188.234  
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## Zwei Universitäten im Vergleich

- TU Wien  
WIT Projekt an 4 Fakultäten  
siehe extra Folien; Vortrag von Sabine Cirktek
- Carnegie Mellon Universität  
prüfungsrelevanter Stoff: siehe Kapitel 5 und 6  
aus dem Buch: J. Margolis and A. Fisher,  
Unlocking the Clubhouse: Women in Computing,  
MIT Press, 2002. (Scan als pdf im Tuwel) und  
Lenore Blums Text.

## Carnegie Mellon University (CMU):

- Alan Fisher (studierte Chemie an der Princeton University sowie an der University of Cambridge und promovierte in Informatik) hat zusammen mit Dr. Jane Margolis (Sozialwissenschaftlerin und Expertin für Genderfragen bei Bildung) an der School of Computer Science ein Studienförderungsprogramm ins Leben gerufen, das innerhalb von fünf Jahren einen Anstieg der Studienanfängerinnen in Informatik von 7% (1995) auf 42% (2000) bewirkte.
- CMU hat mehr als 10.000 Studierende, mehr als 4000 Lehrende, eine der besten Universitäten der USA
- Interviewten mehr als 100 StudentInnen (rund 230 Interviews), long-term Studie von 1995-1999

## Können versus Selbstvertrauen

"I mean they're obviously here because they're very bright and they think a certain way, but when it comes to programming ... some of them haven't had the formal training and that leads me to believe that they just [exude] confidence, I guess. It is not so much of what they know."

Study of North Carolina engineering students found that the women in the first-year cohort began the semester less confident, on average, than the men about their ability to succeed in engineering. Even though they performed about the same, they lost more confidence in ability than did their male counterparts. (Fuller et al., 1997)

Stereotype that women are less able than men in math negatively affects women's test performance (Steele, 1997)

Quelle: Margolis and Fisher 2002

## Computer Gen oder Erlernbar

Opposing views on intelligence:

- you are born with the talents that you have, and nothing you do can change them  
"There are people who are born to do this, and I am not one of them."
- if you work hard and practice, you will improve  
"I know it's hard, it's really hard, because I remember my freshman year. I want to give it up because it's hard. But then I thought, 'That's a loser's talk.' So then I should try it and work hard. I think I can do it."

Quelle: Margolis and Fisher 2002

## Selbstvertrauen und Interesse

"I enjoy computer science, but it's not my life ... Part of it is a confidence thing ... because I sometimes feel like I'm not nearly as good as so many other people. I'm not a whiz. I'm not someone who gets things instantaneously. It just feels like everyone around me does. So when you feel like you are not as good at things, you lose a little bit of interest."

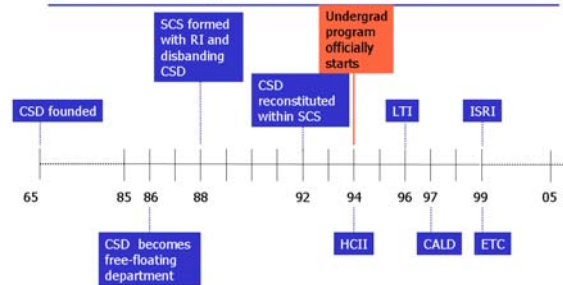
Quelle: Margolis and Fisher 2002

## Weitermachen oder Abbrechen

"Perhaps the most important single generalization arising from our analysis is that we did not find switchers and non-switchers to be two different kind of people. That is to say, we did not find them to differ by individual attributes of performance, attitude, or behavior to any degree sufficient to explain why one group left, and the other group stayed."

Quelle: Margolis and Fisher 2002

## Timeline: 40 years of CS at CMU



## Then and Now: 80's – 00's

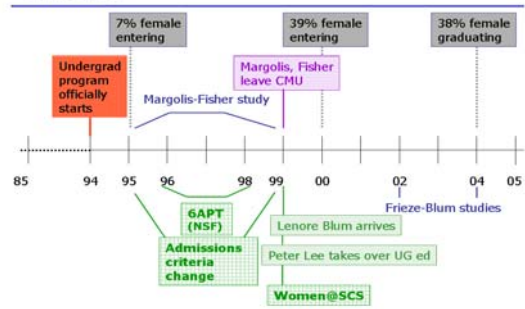
### Numbers

Female undergrads	7%	→	33-39%
Female grads	10-12%	→	10-23%
Female CSD/SCS faculty	5%	→	15.4%

### Culture

Faculty attention	grad students	→	undergrad and grad students
Faculty attention to gender issues	absent	→	engaged
Undergrad student community	absent	→	Women@SCS

## Timeline



## Then and Now: Numbers

Year	Applied		Admitted		Enrolled	
	Total	Women (% of all applicants)	Total (% of applied)	Women (% of female applicants)	Total (% of total enrolled)	Women (% of total enrolled)
1995	1484	160 (11%)	382 (26%)	54 (34%)	96	7 (7%)
1996	2182	231 (11%)	479 (22%)	87 (37%)	142	23 (16%)
1997	2222	248 (11%)	481 (21%)	87 (35%)	136	18 (13%)
1998	2364	274 (12%)	462 (19%)	96 (35%)	140	27 (19%)
1999	2680	342 (13%)	454 (17%)	122 (36%)	130	50 (38%)
2000	2876	404 (14%)	386 (13%)	158 (39%)	132	51 (39%)
2001	3237	435 (15%)	402 (12%)	157 (36%)	130	47 (36%)

1995 7% ♀ → 2000 39% ♀♀♀♀♀♀

How did this happen?

## What We Did: Getting Them In the Door

### 1. Admissions Criteria Changes

- Prior programming experience not needed. [Allan Fisher]
- "Look for leaders." [Raj Reddy]
- Consequence: Increased diversity in *both men and women* in their interests and background.

### 2. Summer Institute for CS AP Teachers (6APT [NSF])

- Opportunistically teach gender-equity skills to 240 high school teachers while they are taught C++ for AP CS.
- Allan Fisher, Jane Margolis, Jo Sanders, Mark Stehlik
- Consequence: 18% of women entering 1999 and 2000 were from the 6APT high schools, as compared to 0% in 1995.

### What We Did: Getting Out the Door

- 3. Multiple entry points into 200-level bootcamp
  - Four paths to 15-211, based on programming experience: none, some, a lot
- 4. Women@SCS: a professional community for students
  - Professional activities
    - Mentoring, tutoring, curriculum advice, curriculum oversight, career counseling, technical seminar series, professional networking, alumni/ae networking
  - Giving back to the community
    - Resurrection of Pittsburgh chapter of Computer Professionals for Social Responsibility (CPSR)
    - Outreach, brochures, roadshows
    - Women@SCS website, SCS website
  - Social activities
    - Dinners, SCS Day (workshops and talent show)

### What We Did Not Do

- We did **NOT** change admissions standards.
  - The strength of the applicant pool increased through the late 90's through 00's.
  - There has been no decrease in median grades or test scores of those admitted.
- We did **NOT** change the curriculum.
  - We did not "contextualize" the curriculum in any big way.
    - 1-unit 1 semester Immigration Course is good for *both men and women*.
  - We did not make it "female-friendly."
    - Bootcamp is for *both men and women*.

What does that mean anyway?

### Gender Studies: Margolis-Fisher

- 1995, 1996, 1997 cohorts (7%, 16%, 13%)
- 230 interviews
- CS culture: hacker, geeky, nerdy
  - computer science ≈ computer programming

#### Findings:

- There are gender differences, e.g.,
  - Men tend to view the computer as an object of study in itself. They "dream in code."
  - Women tend to view the computer as a tool. Their interest is in "computing with a purpose."
- Community of undergrad women is an unsuccessful intervention strategy.

### Gender Studies: Blum-Frieze

- 2002 study: 1998 entering class (19%) interviewed (senior year)
  - "Class in transition": 33 interviewed: 17 women, 16 men
- 2004 study: 2000 entering class (39%)
  - 44 of senior class interviewed; 136 of other classes surveyed
- CS Culture: more balanced in gender, students with diverse interests
  - computer science ≈ a way of thinking and solving problems

#### Findings:

- Margolis-Fisher gender differences disappeared!
  - Men and women alike like to hack and/or like applications.
    - Most are a little of both.
  - Men and women alike "dream in code" and "compute with a purpose."
- Women@SCS shows community building has a dramatically positive effect—it is culture-changing!

### Why These Differences in Findings?

- Because the numbers changed (near critical mass)
- Because the culture changed
  - Our environment is full of "leaders" and people with diverse interests
  - Students are energetic, enthusiastic, and pro-active

### What *You Can* Do

- Outreach
  - Your local grade schools and high schools: teachers and students
  - Summer and weekend programs
- Diversity In, Diversity Throughout
  - Understand your clientele: Where do they come from and where are they going?
    - Make your program attractive to a diverse set of students, men and women.
  - Present Computer Science for what it is; don't dumb it down.
- Replicate Women@SCS, roadshows
  - <http://women.cs.cmu.edu/>

Easy!

## Reminders

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- Don't make women seem different.
- Not all women want to associate with "women's" organizations.
- Respect women for their talent, ability, and achievements.
- Encourage and support girls' and women's interest in science and engineering—in the classroom, in college, in grad school, for their future career.
- Be sensitive
  - To potentially offensive remarks or behavior