Figure 6. Bachelor’s Degrees Earned by Women in Selected Fields, 1966–2006

Three points

- Meaningful applications
- Build visual and spatial understanding
- Build engineering confidence
Meaningful applications of robotics, creative materials, student-directed approach

challenge-based vs. student centered
Craft materials, student inventions

Students create own problems to solve
Personally meaningful
Using technology to help others
Multiple gendered interpretations of technology
Build understanding of robotic systems with visual, spatial, and experiential representations
Person

Switch

Robot

Sing a happy song
Developing algorithms, space > time
What does the computer give to the robot? ... A program!
Gestural Representations of Program Concepts

- Current classroom study to examine use of gestures to communicate program concepts
- Inspired by similar research being conducted in math and science classrooms
- Based in new theories in cognitive science about role of physical and social experience in grounding how we think and conceptualize
Examples we have found:

- **Conditional Structures**
  - Up and down balancing motions (twin-pan balance schema)
- **Recursion**
  - Iconic representation of ‘movement’ of control in tail recursion
- **Algorithm and Robot System**
  - Two handed circling motions (schema of a system as a sphere)
Implications for Teaching:

- Pay attention to gestures, including student gestures
- Example of student tentatively trying out teacher's gesture:
Alternate with engineering challenges that build confidence in construction, competition
Explicit instruction of construction principles

STABILITY

Make sure your motors are attached securely from the top and bottom.
Summary

● Meaningful applications of robotics, creative materials, student-directed approach
● Build understanding of robotic systems with visual, spatial, and experiential representations
● Alternate with engineering challenges that build confidence in construction, competition