FIRST – Industry, Government and Education Coming Together Through Robotics

Cindy Randall
Director Research
FIRST
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"The American education system… just is not stimulating enough young people to want to go into science, math, and engineering." (page 270)

"…we have done a very poor job of conveying to kids the value of science and technology as a career choice…"

"…we should be embarking on an all-hands-on-deck, no-holds-barred, no-budget-too-large, crash program for science and engineering education immediately." (page 275)
## 21st Century Workforce Specifications

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>Innovation</td>
</tr>
<tr>
<td>Sciences</td>
<td>Teamwork/Collaboration</td>
</tr>
<tr>
<td>Psychology</td>
<td>Problem-Solving</td>
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<tr>
<td>History</td>
<td>Oral/written communications</td>
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<tr>
<td>Global Geography/Culture/Languages</td>
<td>Leadership</td>
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<td></td>
<td>Lifelong Learning</td>
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21st Century Workforce Specifications

**Attitude**

<table>
<thead>
<tr>
<th>Old</th>
<th>New</th>
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<tbody>
<tr>
<td>Security</td>
<td>Risk-taking</td>
</tr>
<tr>
<td>Steady Advancement</td>
<td>Entrepreneurial</td>
</tr>
<tr>
<td>Single/Few Employers</td>
<td>Many Companies/Career</td>
</tr>
<tr>
<td>Stability</td>
<td>Flexibility</td>
</tr>
</tbody>
</table>
A Growing Income Gap

- High Skills: $85,000 (7% increase)
- Low Skills: $24,000 (10% decrease)

1986 to 2005

Council on Competitiveness
Prepared for Future?

12th Grade Science Scores

Job Requirements

1996 2000 2005
Educational Initiatives

“Supply Side”
- Standards
- Testing
- Curriculum
- Teacher Quality
- Merit Pay
- Teacher Training
- Vouchers
- Charter Schools
- STEM Academies
- Length of School Day / Year
- New School Designs

“Demand Creation”
“…to create a world where science and technology are celebrated…

…where young people dream of becoming science and technology heroes…”

Dean Kamen
Founder
FIRST Overview

- 501 (c) (3) not-for-profit organization
- Headquarters in Manchester, NH
- Board Chairman John Abele, Founder Chairman of Boston Scientific
- $25 million operating budget
- 2,000 corporate sponsors
- 60,000 volunteers
- Over 9 million in college scholarships
**FIRST Program Continuum**

- **“Sports Model”**
  - K-12 Grades
  - Grade Level:
    - K
    - 1
    - 2
    - 3
    - 4
    - 5
    - 6
    - 7
    - 8
    - 9
    - 10
    - 11
    - 12

- **“T-Ball”**
- **“Little League”**
- **“Junior Varsity”**
- **“Major League”**
  - FIRST Robotics Competition

- **Jr. FIRST LEGO League**
- **FIRST LEGO League**
- **FIRST Tech Challenge**
FIRST Robotics Competition: How It Works

- Combines the excitement of sport with science and technology
- Creates a unique varsity sport for the mind
- High-school-aged young people discover the value of education and careers in science, technology, and engineering
- New game each year
- Common kit of parts
- 6-week build period
Organization & Programs

**FIRST Robotics Competition Team Growth**

- Over 1500 teams
- 30,000 high-school-age students
- 41 regional competitions
Education in Science & Technology

- *FIRST* Students vs. Comparison Group
- Seek Education in Science & Technology
  - Twice as likely to major in science or engineering
  - More than three times as likely to major specifically in engineering

Source: Brandeis University, Center for Youth and Communities, Heller School for Social Policy and Management
Impact

Careers in Science & Technology

- **FIRST Students vs. Comparison Group**
- **Earn Career Opportunities:**
  - Almost ten times more likely to have internship
- **Expect to Pursue Science & Technology Careers:**
  - More than twice as likely to pursue S&T career
  - Nearly four times as likely to pursue career specifically in engineering

Source: Brandeis University, Center for Youth and Communities, Heller School for Social Policy and Management
**FIRST LEGO League: How It Works**

**Problem Solving and Creativity**
- Present kids with a real-world problem
- Unleash thinking, energy, and fun
- 2007 Challenge: “Power Puzzle”

**Teams of Kids and Mentors**
- Work as a team
- Learn with adults and mentors

**Do It All In 8 Weeks**
- A Timeline to learn efficiency and effectiveness
- Compete with peers in Tournament
Organization & Programs

- 10,000 teams
- 100,000 middle-school-age students
- 45 countries
- 300+ qualifying events
- 68 tournaments
- Junior FLL for 6 to 9 year-olds
II. Organization & Programs

*FIRST* Tech Challenge: How It Works

- Pilot program
- More accessible, affordable *FIRST* experience
- Creates bridge between FLL and FRC
- Off-the-shelf kit of parts
Organization & Programs

FIRST Tech Challenge

- 800 teams
- 5,000 high-school-age students
- 40 states represented
- 24 events
FTC, DHS and NIST Partnership
Super Bowl Winners at the White House
Sponsors and Mentors

Over 2,000 leading corporations, foundations, agencies, including:
Ready for a Flat World

**Knowledge**
- Math
- Sciences
- Psychology
- History
- Global Geography/Culture/Language

**Skills**
- Innovation
- Teamwork/Collaboration
- Problem-Solving
- Oral/Written Communication
- Leadership
- Lifelong Learning
“Education is not filling a pail; it is lighting a fire”.

William Butler Yeats