

Video Summary

Minerva's Machine: Women and Computing

(Video published ca 1995)

Preface

Women are not quite full citizens in today's high-tech universe. Once a strong presence among the computer pioneers, there are relatively few women in computing today. At a time when the field needs them most, girls from grade school to high school are losing interest. Why?

- We will meet several women in computing, explore their work and follow their paths to success.
- We will also examine the computer gender gap, and
- Finally, ask what has been done to bridge the gap.

I. Women in Computing

Ada Byron, Accomplished mathematician, thought of as the first programmer

- She became fascinated with Babbage's "Difference Engine".
- She championed Babbage's second machine, the "Hypothetical Analytical Engine".
- She wrote detailed notes describing how it would be worked.
- Ada's instruction for running it earned her a place in history as the first computer programmer. Today, a computer language is named in her honor.
- Byron & Babbage's version of a programmable machine would not be realized for over one hundred years

It would take fifty years before women would gain limited admission to scientific and mathematical circles. By and large, women were prepared for culture and the arts.

Betty Vetter, Statistician, Commission on Professionals in Science & Technologies

- *"During the late 19th century, women were doing quite well in education. By the 1920's, women earned 13% of the PhD's in Science & Engineering. As we came to the 30's, that number fell to 11%. During the onset of WWII, it fell to 8.9%. Returning GI's were getting their deferments, requirements were elevated, space was limited & there were fewer women in college, thus, it fell to 6% by the 60's."*

In 1946, the first digital computer known as the ENIAC was created. Primarily programmed by women until 1948; the women were professionals. They were primarily college graduates in mathematics.

Computer Science was a new field with no history of prejudice or discrimination. Women came in and grew, earning degrees on all three levels.

RADM Grace Murray Hopper, Legendary figure in Data Processing

- *"If, during the next twelve months, any one of you says "But we've always done it that way", I will instantly materialize beside you and I won't look at you for twenty-four hours"*
- As early as 1944, she coined the term "BUG" referring to errors in computer programs.
- She played a key role in the creation of an early computer language, COBOL.
- She toured Navy bases and college campuses, paving the way for the new technology.
- Retired in 1986 as Rear Admiral of the US Navy and she earned the 1991 National Medal of Technology.

Thelma Estrin, Professor Emeritus UCLA

- *"John Von Neumann was very interested in the brain...it was at their suggestion that I should think about using computers to study brain waves"*
- Began during the WWII era.
- Earned 1990 Medal of Technology.
- Pioneered the use of computers in biomedical engineering.
- Collaborated with husband Jerry Estrin and John Von Neumann at Princeton to build a new digital computer.
- She and her husband built Israel's first computer, the Weizac, while starting her family.
- She pioneered the use of computer graphics in the CAT Scan to simulate neurosurgery.
- As a National Science Foundation appointee in the early 1980s, she oversaw grants totaling over \$30 million annually.
- She appeared on television to discuss the future of computers.

Cynthia Harvey, Morgan State University / NASA

- *"I became interested in science through my father...my father had a philosophy that said that you can be anything you want to be"*
- After double-majoring in mathematics and physics, she got her first job at a Naval Research Center.
- Like Thelma Estrin, she built one on the first computers.
- In 1956, she joined the digital computing lab at Westinghouse Aerospace where she simulated NASA's first satellite launches.
- Unlike her male colleagues, she was not promoted or allowed to attend conferences.
- Upon her resignation, she was informed that conferences were reserved for career persons. She ultimately convinced management that she was a career person and was reinstated.
- Two years later, she joined the Mathematics Department of Morgan State University; she ran its Computer Center and then eventually founded the Computer Science Department.
- For two decades, she lobbied the State of Maryland for support for computer science.
- Today she has a joint appointment with Morgan State and NASA where she is the Technical Coordinator for MUSPID, The Minority University Space Inter-Disciplinary Network.
- Of her many accomplishments, she take great pride in mentoring students in the local computer club.

Lucie Fjeldstad, Fjeldstad International

- *"It was probably the best experience of my IBM career...I think I probably managed 18 to 20 billions as a revenue number, at one time or another in the IBM company."*
- In her twenty years at IBM, she rose to become the second ranking woman and one of three corporate vice presidents.
- How did she become so powerful? She understood the value of teamwork.
- Her approach was to be more prepared than they are.
- In the late 1980s, her mission was with the Personal Computer Group. It was a pivotal time for personal computing and the dawn of interactive multimedia, the combination of text, graphics, video and sound.
- Today, Lucie is a Multimedia Consultant.

Janet Wixson, University of Tennessee, Executive Director of Academic Computing

- *"I call myself the in-between generation...when I grew up, it never occurred to me that I would have a career outside the home...the selection of careers or the selection of major were irreverent"*
- She eventually majored in mathematics; she was torn between her competitive spirit and the expected roles of the day.
- She remained a mother and homemaker until the early 1970s
- She went to work at the University of Alabama Computer Center. She taught herself programming, which opened a whole new world for her.
- She struggled between her evening classes, her job, raising two children, and taking care of her family
- The social climate at the time was not very supportive for women. Demoralized and very fatigued, she left graduate school.
- But, she did not give up her career. Not everyone was pleased by her many promotions.
- She proved herself with her ability to compete with her male peers and subordinates as well as prove it by a wide margin.
- She unsuccessfully sought a competitive raise and promotion; she left for a position Chattanooga.
- In the technical field, women were assumed incompetent until proven competent whereas our male colleagues were assumed competent until proven incompetent.

- Girls experiment with the “give and take” tinkering with their first programs, negotiating a “Soft Mastery” style.
- Unfortunately, they are rebuffed by so called “Hard Mastery” mindset.
- These girls are being lost for many years to the technical culture, to the computer culture.

The environment has been inhospitable, but merely raising the age-old issue of differences, regardless of whether they are inherent or are culturally determined, unleashes criticism from women.

Marie Wilson, President, The Ms. Foundation

- *“There are women who don't want to see that anything is going wrong...and I think it makes it hard...and sometimes they feel that attention is called to problems...that they will be identified with the problems...that they will be treated differently by male colleagues”*

Sherry Turkle, Professor, MIT

- *“My position about the criticism of finding difference is to say – Better to find difference and to show people, not only to tolerate it, but to welcome difference than to deny difference and have girls turned off and to drop out”.*

Cornelia Brunner, EDC Center for Children and Technology

- *“If we really did allow in our society for different ways of knowing, thinking & doing things, then it wouldn't really matter what causes the particular preferences or styles of thinking and doing, but it matters because we have a completely dual society in which everything has to be either female or male.... in one of those two, always has to be better than the other”.*

Ellen Spertus, PhD Candidate, MIT, Microsoft Research

- *“I knew it was un-feminine to go into math or computers”*
- She is one of the few female computer science PhD candidates to date... a child of the PC revolution, she matured within the computer culture.
- In updating the report (*Barriers to Equality in Academia--Women in Computer Science at MIT*), she observed improvements in MIT, but found persistent discrimination elsewhere.
- She found that it wasn't the women being stupid, but all the barriers against them.
- Then, as a result, women try to find alternatives.

III. Bridging the Gap

Brenda Laurel, Interval Research Corp., Author, *Computers as Theatres*

- *“You have to start with the basic idea of what it is...this thing is not a giant calculator...it's not a number cruncher, it is a representation device.”*
- In the mid 1970s, she was experimenting with interactive theatre, so telling stories with computer graphics was a natural progression.
- In 1993, she conducted the Placeholder Project with Rachel Strickland, an experiment in virtual reality (or computer-generated worlds). Its purpose was to explore new ways that people might play with computers.
- Her job was coordinated with technical and cultural issues and how to solve that problem...One of her focus groups were 12-year-old girls, which have not benefited very well from computer technology.
- It's galvanized her on the issues of making math, science and engineering socially and culturally acceptable.

Because video games are often a child's first experience, there is a concern that girls, uncomfortable with these games are already behind in the computer classroom

Eugene Provenzo, President, University of Miami

- *“Girls would talk about being very interested in video games & trying them...but they would say things like ‘I like video games & I like computers, but I don't like the content of the games’”*

Joel Cooper, Professor, Princeton University

- *“Teacher’s were trying to make instruction more exciting, more efficient for children by using computers...they were using software packages that were incorporating many of the aspects of video games...we were noticing that girls are hesitant to use. The computer designer may be thinking that a boy was on the other end of the computer. That would be consistent with the way most of society thinks about computers & computer users.”*
- Studied the underlying reasons why the video game model has been transferred to educational software
- They asked teachers to design educational software for Middle School kids, 12 and 13 year-old adolescents. The three categories are: girls, boys, and most important, students.
- They seemed to form the assumption the software that was designed for students was designed for boys. She effectively designed video games that boys like and leave girls out in the cold.
- The software designed for girls was very consistent with what we know girls like in computer assisted instructions program. They are very straightforward, a learning tool program. There was no space, no war, no sport, no eye-hands coordination, but interesting programs created with direct feedback just as we thought, girls like learning tool programs.
- Gender is one of the very important variables that discriminates children’s preferences, children’s comfort, and children’s ability to learn with an educational software package.
- Another solution is to increase the awareness of gender issues in the computer classroom.
- The computer equity project has prepared teacher-trainers across the country.

Joan Sanders, Gender Equity Programmer CUNY

- *“We have taught the teacher-trainers to recognize all the sources of influence that encourage girls to stay away from computing after a certain point...main thing that you really need to do is to understand these influences do exist.”*
- Some game manufacturers are exploring ways to attract girls.
- It would be very difficult to determine what girls’ need because we can only obtain feedback based on what is already out there & very few girls games exist...It would be at relatively serious & expensive research on how to make games that would actually be of genuine interest to girls of different ages
- One of Cornelia Brunner’s solutions is to make software that will stimulate girls imaginations
- To invite girls into the technological design process, allowing them to tinker & move things around like the movers & shakers of Designing Technology without the bottleneck of not knowing enough Math & Science & to make it work
- Operation SMART (Science, Math & Relative Technology) – One of the projects intended to increase girls interest in Science
- Another broad approach to increase a girl’s self-confidence is Take Our Daughter To Work Day.
- There are also women’s organizations (like Hoppers), conferences & seminars that drive more women to be involved

Are these programs sufficient?

Marie Wilson

- *“If we are not careful, we’ll put girls further behind...If they’re not computer literate, If they’re not able to sit down and work with these machines then they won’t be left out of just jobs as far as I know, they’ll be left out of life”.*

Jo Sanders

- *“The way you make a living is the central fact of ones existence. People without computer skills have a huge handicap in the job market”.*

Joan Feigenbaum

- *“I wouldn’t quit just because I encountered prejudice.”*

Cynthia Harvey, Morgan State University / NASA

- *“Don’t let anyone deter you from your goal”*

Thelma Estrin,

- *“Look for mentors and role models, female and male, to help inspire you”*

Sandra Baylor Johnson

- *“As long as you are sure about what you can do, that’s all it takes; you can go as far as you want”.*

Lucie Fjeldstad

- *“I’m quite optimistic for the future of women in the computer culture”.*

Starr Roxanne Hiltz

- *“Rather than have to drop out for five to ten years to raise a family, I think that communication technology allows them to stay actively involved in the work force and still not have to totally abandon their children for 10, 12 hour days...”*

Cornelia Brunner,

- *“I think it’s very important to have this dialogue go on between people who really think about technology in this more socially grounded way, mostly women, but obviously not exclusively and the people who are inventing it...”*

Without a meaningful dialogue, everyone stands to lose.

As it is, we can only wonder how many ideas that could have been contributed by female talent will never enrich us all.

Looking to the future, we must ask: What will the repercussions be to our increasing computer-oriented society if women, half the population and professional workforce, are not as prepared in computing as men?

Hopefully, we will not have to find out