IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 25, Issue 5, Ser. 1 (Sept. – October. 2023), PP 23-25
www.iosrjournals.org

Tracing The Evolution Of Women In Computing And Their Transformative Impact On The Modern World

Kataru Rohita Reddy

Date of Submission: 03-09-2023 Date of Acceptance: 13-09-2023

I. INTRODUCTION:

In a world of fierce competition and continuous technological evolvement, computers occupy the primary niche in all sectors. One such pioneer of programming is Ada Lovelace, who not only contributed to the creation of basic computer programs but also put forth the incredible potential of computers. Therefore, computers have been influencing our everyday lives over the last 60 years, but not many know that the idea of this machine emerged almost 200 years ago.

The underrepresentation of women in computers is a topic that dominates articles. It is frequently thought that women are less capable and not very inclined to work in the computer industry. But the truth is that computers began as a female-dominated field that had a disproportionately large female workforce, leading to the feminization of the sector. However, the gendering of computers also moved from being viewed as a low-status and low-paying profession to one that was more suited to men. Female programmers began to receive negative, stereotyped reviews. Women saw a lot of defamation in the profession, from sexist remarks to being painted as unsightly. Young females who are influenced by the media, periodicals, and marketing often question whether or not they belong in the field of computing. Equal opportunity and anti-discriminatory practices were not implemented in the industry until the 1970s and 1980s. However, programmers were always portrayed as being male.

History of Women in Computing:

History has proven that in today's world of computing, all the stereotype reports that exist about female inefficiency are merely myths. When we use Finland as an example, we discover that, here, the information technology sector didn't grow until the 1970s, when both men and women made up an equal share of the workforce and more women than men enrolled in professional education. Finland urbanized later than other nations in Western Europe but at a faster pace. In the 1950s and 1960s, Finland's agricultural sector developed to a level equal to that of the modern world. Finland completed what other Nordic nations required 50–80 years to complete. The fact that women made up 44.4 percent of Finland's IT workforce in 1960 set it apart from other nations' IT workforces. (M. Vehviläinen, 45).

One of the greatest pioneers in the field of computing was Augusta Ada Byron Lovelace, the first conceptual programmer who gave the field of computing the theoretical underpinnings for today's computers. Lovelace, who was the daughter of a mathematician, had always shown an aptitude for mathematics. When Ada Lovelace first met Charles Babbage when she was seventeen, she referred to the difference engine as a "thinking machine" because she saw its potential right away. She even produced a study comparing and contrasting the Difference Engine, the first automatic calculator, and the Analytical Engine, which included the first set of guiding principles for a general-purpose programmable computing system.

She also included a table describing the operations necessary for solving mathematical problems. This is how she became the first conceptual programmer for Babbage's analytical engine. She also developed the "loop" and "subroutine" concepts a century before electronic computing machines appeared. In addition, she provided a table outlining the operations required to solve mathematical issues. She did this to become Babbage's analytical engine's first conceptual programmer. She also created the notions of "loop" and "subroutine", a century before the invention of electronic computing devices. (Gürer 175).

Another pioneer of computer programming is Grace Murray Hopper, who helped the computing society move forward with her technological achievements. It was her project, Mark I", at Harvard University while she was working for the Navy that introduced her to programming. She was "the third programmer on the world's first large-scale digital computer," in her words. Hopper and her team discovered "bugs" or errors in their system while working on" Mark II", and as a result, they coined the term "debugging" for the computing lexicon. The first commercial electronic computers, Binac and UNIVAC I, were developed largely thanks to Hopper. She oversaw the division that created the original compiler, A-0, and its replacement, A-2. The FLOW-MATIC programming language, the only one used at the time for business data processing, was also created by

Hopper. Using FLOW-MATIC as their model, the industry-wide community referred to Hopper as the "grandmother of COBOL. Having an excellent technical vision, Hopper even foresaw artificial intelligence, aiming to build computers that could replace the human brain. Subroutines, translation of formulas, relative addressing, linking loaders, code optimization, and symbolic manipulation are all among the contributions of Hopper. (Gürer 176)

When it comes to the skills and interests of women in computing, "The Whirlwind" is yet another myth-buster. The first real-time high-speed digital computer was named Whirlwind and was created at MIT. Women made up about 20% of the programmers hired for Whirlwind (Gürer 177). Even English and music majors were among the top performers. For Whirlwind, Judy Clapp assisted in programming an air defense system. Later, Judy developed the first set of software tools for large teams of people to coordinate writing, integrating, testing, and maintaining a large system. She also finished the system for Whirlwind at the Lincoln Laboratory and MITRE Corporations, where she was the manager for software engineering technology and applications. (Gürer 178)

Women were respected for their passion, vigor, excitement, inventiveness, and spirit, in addition to their incredible contributions, intellect, and accomplishments. Along with working, Hopper also supported youth, taught, and was a highly sought-after speaker of her era. In the spring of 1994, an international conference named after Hopper was conducted in honor of women in computing. Ada, the high-level programming language used by the Department of Defence, is named in recognition of Ada Lovelace's accomplishments and pioneering spirit. (Gürer 175)

Breakthroughs in Computing:

Contrary to the widespread belief that women are less suited to the field of computing, it was originally thought that programming required persistence, patience, and attention to detail—qualities that are typically associated with women (Gürer 176). Early programmers for what were commonly called "calculators" or "computers", were nearly all women who worked on all aspects of the first computers, from funding the initiatives to developing and programming the devices. Men and women had equal access to opportunities and respect in the world of computing because it was gender-neutral.

As technical organizations expanded, they began to adopt a male-dominated, hierarchical business structure. Women were offered fewer opportunities since, as expected, they were only supposed to work as teachers and nurses, not in the top hierarchy of business and technical sectors. All the leaders and managers were men. One of the original ENIAC programmers, Kathleen McNulty, claims the girls were instructed that only men could earn professional ratings. Later, during World War II, when no more men were available, women were forced into leadership roles. Finally, many of the ladies obtained professional evaluations in November 1946. (Gürer 177)

II. CHANGING NORMS AND THE CURRENT SCENARIO:

Women in computing are a testament to the strength of individuality as well as gender diversity. It inspires us to continue to push norms, challenge preconceptions, and embrace the collective potential that comes from varied viewpoints in the spirit of those trailblazing women who paved the way for modern computing.

However, it is obvious that the proportion of women working in the field of modern computing has decreased. There have been and continue to be initiatives taken in favor of supporting and accepting women in computing, as well as shattering any misconceptions and hurdles for them. The world is beginning to realize the relevance of gender diversity in the field of computer science. The United Nations has designated February 11 as the International Day of Women and Girls in STEM. Nonprofit groups, like Girls Who Code, are also attempting to close the gender gap in tech and encourage more qualified women to enter this industry.

To address the cultural barriers, all of this encouragement and pushing forward is required. For years, it has been promoted that computing is a male-dominated sector and that women are not suited to work in this field. Therefore, we must bridge the gap between our current thinking and the old culture, which gave girls fewer opportunities in the field of computing. The founder of Girls Who Code, Reshma Saujani, has said that closing the gender pay gap in technology requires much more than just giving women access to more technical opportunities and paid employment. She has witnessed that, through coding and technology, women make significant contributions to their families and communities. The narratives of Anastasia, who invented gun control technology after experiencing multiple mass shootings in the US, and Haley, who established a database that enables families to rent or sell pricey musical instruments at reduced costs, are prominently presented by her. Reshma thinks that if we take the appropriate actions and put in enough work, we can close the gender gap in only one generation and use this shift to further the evolution of our society. (Saujani)

III. CHANGE THROUGH CULTURAL MODIFICATION/A CULTURAL APPROACH:

It is not uncommon for people to genderize STEM as a masculine field. Once, even a Google employee claimed that there might be a biological reason for the existence of fewer female engineers. Even successful women in computing like Maria Klawe, president of Harvey Mudd in 2006, had consistently been told that she, being a girl, was not good at her field of computer science. When Klawe became Harvey Mudd's president, only 10 percent of the computer science majors were women. She was hell-bent on increasing the number of women through a few cultural changes and also on proving society's mindset to be faulty.

She began by tweaking the curriculum. The name of a course called "Intro to Java: A Programming Language" was changed to "Creative Problem-Solving in Science and Engineering Using Computational Approaches". (Sydell, 2017)

Klawe was aware that female students tend to get intimidated by male students, who show off their programming skills, acquired during high school, and dominate class discussions. So, a second intro course was introduced for students with no experience. In an attempt to change the stereotype of computer geeks spending their time alone in their basements, the course involved more collaboration and teamwork. (Sydell, 2017)

Through just these small modifications, Harvey Mudd's female students now make up 40–50 percent of its total computer science majors, and the Intro Computer class has become one of the most popular. (Sydell, 2017)

These trends are not only particular to Harvey Mudd but are also visible at other colleges. According to a four-year study in 1994 by Jane Margolis, UCLA's education researcher, Carnegie Mellon has also increased women's participation in computer science through reforms. Making up only 7 percent of the computer science majors at the time, Margolis realized that the reason for the lower participation of women in computer science was not because of their inability but was a question of their existence itself. For instance, in computer science clubs at the university, male students, while themselves having hobbies other than computing, would put down women who refused to dedicate all their time to computing. This instilled an unwelcoming feeling in female students. (Sydell, 2017)

Upon recognizing all these barriers, Carnegie Mellon made its computer science applications harder. Applicants wanting to become computer science majors would now not only have to be good at science and math but also need to display qualities of leadership. A new women's computer science club was established on campus as well. As a result, women now make up over 40 percent of computer science majors at Carnegie Mellon. (Sydell, 2017)

CMU has exceeded the national average in the past few years, especially in 2018, when almost 50 percent of all computer science majors were women. This milestone has been achieved not only through a gender-difference approach but also through a cultural one, also. It is a clear example for all workforces to improve and reform their culture and environment to improve the gender gap.

IV. IMPORTANCE OF ADDRESSING CULTURAL FACTORS:

It was believed that gender differences in computing or any other field were to be treated with a gender-difference approach. But that would mean changing the computing industry according to women's interests and attitudes. This approach fails to understand that such differences change according to culture and environment, which further increases the chances of creating a gender divide. The gender-difference mindset further emphasizes the fact that men and women are different in terms of their interests, abilities, and capabilities. This can reinforce stereotypes that men are innately better at coding than women, which has negative consequences.

A cultural approach, on the other hand, targets culture itself instead of gender differences that arise out of culture itself. It focuses on factors like the K–12 curriculum, stereotype threat, opportunities for engagement in CS, opportunities for leadership, confidence levels, gender ratios, implicit bias myths, and stereotypes. For instance, recognizing that most students are not taught computer science by a female teacher in their entire school years, a faculty-student lunch series was created by Women@SCS to give female students a chance to have informal interactions with their role models. Cultural transformation is essential in order to address the issue of gender inequalities in the world of computing.

Bibliography

[1]. Vehviläinen, "Gender And Computing In Retrospect: The Case Of Finland, In Ieee Annals Of The History Of Computing, Vol. 21, No. 02, Pp. 44–511, 1999.

[2]. Denise Gürer, 2002, Pioneering Women In Computer Science, Sigcse Bull. 34, 2 (June 2002), 175–180 Https://Doi.Org/10.1145/543812.543853

[3]. Martinez, Michael, And Lori Cameron, "The Epic Journey Of Women In Computing: Advances, Setbacks, And An Uncertain Future, Ieee Computer Society, May 13, 2023, Www.Computer.Org/Publications/Tech-News/Research/History-Of-Women-Programmers-In-Computing-Gender.

[4]. Saujani, Reshma. "Closing The Gender Gap In Science And Technology. United Nations, Www.Un.Org/En/Un-Chronicle/Closing-Gender-Gap-Science-And-Technology-0. Accessed August 1, 2023.

[5]. Sydell, L. (2017, August 10). Colleges Have Increased Women's Computer Science Majors. What Can Google Learn? Npr. Https://Www.Npr.Org/Sections/Alltechconsidered/2017/08/10/542638758/Colleges-Have-Increased-Women-Computer-Science-Majors-What-Can-Google-Learn
[6]. Https://Www.Brinknews.Com/How-One-University-Is-Attracting-Women-To-Computer-Science/ Could Not Cite (In-Text Citations For The Last Paragraph)