

The Woman Engineer in Brazil

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Abstract

In most societies, women have traditionally held lower positions than men. The situation is even worse in developing countries. Brazilian society early in this millennium is no exception. But modernization and industrialization are now fostering more active female participation in society. During the twentieth century, Brazilian women reached some important goals: the right to vote, to study and to work. Women became more independent in their personal as well as professional affairs. In Brazil, however, participation of women in technical professions increased only slowly. The objective of this research is to examine the life stories of female engineers, looking into factors that contributed to their decisions to pursue the engineering profession. Open interviews help us understand facts and people that were somehow important in motivating these professionals to pursue a career, which had traditionally been considered a male domain.

Introduction

During the nineteenth century, Marx and Engels declared that male over female was the first oppression by class in history. Man would represent the "bourgeois" and women, the proletariat. He emphasized the need to establish social equity before legal equality [1].

Throughout history, women have had to abide by social rules created by men. The rupture of these social rules always caused a deep emotional damage, loss of economic power and social stratification for those women who chose to question them. Different limits and kinds of repression integrate the social representation of women – present in popular imaginary and in individuals' subjectivity – even in women's subjectivity – in Brazilian society. Women held the position of second class citizens in the national political sphere. Until the end of the nineteenth century, Brazilian women were neither allowed access to university level courses nor supposed to take part in political or cultural activities. [2]

The beginning of the twentieth century brought some hope. Brazilian women as a group fought hard for their right to vote which they finally won in 1932. [3] In the 1960s and 1970s, industrialization and rapid economic development opened the way to improved and more effective female participation in productive processes. Women would enter the labor market and soon work their way up to jobs requiring more intellectual ability. Every day, a higher number

of women entered the university with an eye to meeting requirements for new positions. They also entered the teaching and research area within the Brazilian university framework. [4]

By the end of the sixties, Brazil entered the era of the so-called “Brazilian miracle”. The boom that took place required an enormous increase in the labor force, which could only come from women’s entrance into the labor market. At the university level, an increase in the number of courses also increased the number of seats available as well as the chance for more women to enter the university both as students and as professors, in every field. [5]

In the decades to come, women more aggressively took jobs in professions that had traditionally been seen as male professions. Soon these women would reach the highest managerial positions in companies. [6] A study of 1509 executives carried out by the Catho Group – Expert professionals in Human Resources – revealed that women’s participation in higher managerial positions rose from 3.5% in the 1980s to 9.2% in the 1990s. Another survey carried out from April 1994 to April 1995 of those who had registered with the group, showed that among 295,000 executives, 19.9% were women. Increasingly, this process helped women to take up technological careers. [7]

For the scope of this work, our questions relate to the decision making process involved in the choice of career. The objective of this work is to examining important factors that contributed to different women’s decisions to become engineers. We use a qualitative approach through non-directive open interviews [8] [9] and examine the histories of women engineers in Brazil - their academic trajectories, their daily professional lives and their struggle for self-realization as professionals and as women.

Brazilian Women’s Participation in Scientific Fields

The demand for women’s labor fostered their participation in the work force in every sector of Brazilian economy. The need to meet that demand with qualified labor fostered both the appearance of new private colleges and an increase in enrollment at federal universities. With higher education, women could now take positions that required a college degree. Their participation in highly technical jobs increased. This improvement would have a strong impact on the condition of Brazilian women as a whole. Industrialization and the modernization process caused women’s labor to shift from the primary to the secondary sector. And naturally, this process would also affect the tertiary sector, in education, health, social services, and public administration.

Women Engineers: Trajectory and Decision

We interviewed ten professional women who had chosen a technological career dedicated to the engineering field: six actively working in private companies, two actively working in government organizations and two engineers who had already reached retirement. In so doing we could perceive some interesting common points in their life stories. We have turned these points into research categories: the Family; Infancy and Adolescence; Personal Characteristics; and Decision-making.

The Family

All the research participants spoke of their families with tenderness and satisfaction. We observed that all had had well-structured families. Most had studied in public schools because their parents lacked financial resources to pay for their education in private schools. Some had only entered private schools at the high school level so that they would be able to pass the so-called Brazilian *vestibular*, a very hard and competitive national examination for entrance into free, public universities.

We could also see a very strong influence of one parent figure. The influence could have worked upon the decision to become an engineer or upon the determination to take up a career. Four of the ten research participants had engineer fathers.

“My father worked at a state electrical engineering company... I may have gotten the wish to be an engineer from him, despite the fact that I liked Advertising... Actually, I was in a dilemma, but as I had always been good in mathematics, why not fulfill my father’s dream?”

“My father was always very concerned with our studies...this was always his first priority...”

“I was brought up in a small town in the mountains... in my father’s town... I was brought up with my father, mother and younger brother... my father worked in a telephone company... he was a technician and I have taken after him...”

“I enjoyed seeing my father’s work... he worked at a microwave transmission tower... he started engineering school, but could not finish it... in fact, he dreamed that I would take up engineering, but he never forced me to... actually, he passed away when I was 13 years old and was still in school... but I believe that this whole story had some impact on me...”

Infancy and Adolescence

Most of those interviewed spoke of their infancy and adolescence with fond memories. Their reaction to this line of questioning showed that they were at peace with their childhood experiences:

“Something that has highlighted much my infancy and that has to do with my profession... is that I was always very close to my father who is an engineer... he used to take me with him to the houses he was building or remodeling... and I loved it...”

“My parents always encouraged us to study... they made sure to follow all our school activities... anything related to our school was a priority...”

“At the beginning, my father had nothing.... my grandparents on my mother’s side helped a lot... with a lot of struggle, my parents finally bought a small house... my father had started from zero... yet, they managed to provide us with the schooling they had not had...”

“God gave them health so they could struggle... and they kept repeating that we had to study so that we could avoid a life of suffering. Thank God. Living in the country side is always harder than life in the city... they always told us we needed to have a career so that we could have some comfort...”

Personal Characteristics

Most of these research subjects had put great efforts into becoming good professionals. The interviews revealed that these engineers were not weak women. Each was of strong personality and determination. The subjects spoke of their daily routines, explaining procedures used for finding solutions for internal problems with their employees as well as their bosses. During the interviews, we could perceive equilibrium, confidence and determination as they talked about continuously observing and defending concepts of ethics and justice.

Most of them showed an attraction to mathematics from their school days. While some of them showed interest in every kind of puzzle and challenge, others pointed to having been attracted to exploring, putting together and dismantling electrical home appliances from their early childhood. All of these characteristics indicate spatial intelligence and a tendency to abstract thinking. Gardner calls them mathematical intelligence and spatial intelligence, within his Theory of the Multiple Intelligences [10] [11].

“I always liked mathematics... I enjoyed doing figures... that was fun for me... I have always enjoyed learning... never studied too much, though... but I like to be up to date...”

“I always had a very quick mind and I have a privileged visual memory... when I drive I can tell whether I’m going north or south, if I am going in the right direction... so all this led me to mathematics...”

“I was the only girl in the family... I had several male cousins, but no female cousin, yet I liked to play with dolls, I liked my bike. I went to school at the age of three and a half... I was an only child and my mother thought that I had to go through kinder garden level 1, kinder garden level 2, and so on...”

“...I always liked puzzles or intelligence games or quizzes... when I was small, it was hard to find some of these toys we can find today to help develop the brain... but there was Lego... and I just loved it...”

“And I just enjoyed riding my bike, playing outside, running up and down in the streets....”

The Decision

Summing up, all of the subjects expressed satisfaction with their choice of profession regardless of their motives for taking up a career in engineering. While some pointed to having enjoyed mathematics or puzzles since their infancy and others noted early exposure to engineering equipment, tools and gadgets by one of their parents involved in the profession of engineering, a few acknowledged having fulfilled a parent’s desire. Some expressed satisfaction at having reached leadership positions in their companies. Others stressed the fact that, as engineers, they could work every day with the object of their passion, Still others explained their satisfaction with the financial gratification they get - well being for their families and some personal financial autonomy for themselves. About whether they would support a daughter’s wish to become an engineer, most responded positively.

“My parents always talked about how beautiful the engineering career was... and I myself just loved math.”

“I always liked math and physics... I was strong on those... so, when I was ten or eleven years old, I dreamed of being a stewardess while my brother dreamed of being an aviator... but soon, I had changed my mind and wanted to be a civil engineer... then, as I talked to my friends, we decided to choose electrical engineering, since they would probably suffer much discrimination as civil engineers, in a construction site, for example...”

“I don’t know whether women are discriminated against today... Thank God, I feel that I have made it because I like what I do... and this makes me happy...”

“I adore what I do... Financially, it is also nice. An engineer’s salary is not so low... therefore I don’t depend financially on my husband.... I buy my things and, on top of all, I help with the home budget... I think that is nice...”

“Look! If I had a daughter, I would like her to be an engineer... I believe so. Because I do not regret being an engineer. I wouldn’t change my profession even for one second. I really like it. The only complication would be having a child here. Can you imagine if I get pregnant? How would I go up on a loose ladder to check the iron fittings? Do you get it? That is complex... how would I do it? bring the baby to the construction site, bring the baby to the office... that wouldn’t work very well... I think it is very complex to be an engineer mother...”

“As for my daughter, I would not stop her from becoming an engineer if she so wished... it has to be one’s decision... it is something very personal... if she saw my work the same way I saw my father’s work, I became interested in it... I always wanted to see more... If she wanted to see and to know the profession, I would help her, I would stand by her, but I would never try to influence her...”

“And really women were very discriminated against... especially we pioneer engineer women, and it was a difficult time... but we have gotten over that... nowadays things are all mixed... today, each day more men do housework, and take care of the children... in my generation, men would never do the dishes, neither would they take care of the children... so today young men’s minds think very differently than young men from my generation... and this helps a lot...”

“We don’t have children yet. But if I had a daughter, I would help her taking up a career in engineering... Look... I would surely want her to follow my way... Well... I believe this is a wonderful profession, but hers would be the last word. Of course I would show her all the choices for engineering careers, because people have no idea of how wide the engineering profession can be... people have no idea of how we can perform... how we can work... we don’t learn this at the university... at school, one does not know all the subjects, all the choices one can make... I will show her all the options, but hers will be the final decision...”

Conclusion

In Brazil, every day more women entering the university enroll in technological careers and, in the market place, women are also taking new and challenging positions. Judging from these research participants, it appears a few factors are important in a woman’s decision to become an engineer: intelligence and a liking of mathematics; exposure to the profession (equipment, processes, gadgets, work place, etc.); the constant encouragement of a loving parent or relative in behalf of the child’s growth and development; the presence of a loved one as model in the engineering career; and the holding of attributes such as perseverance and determination.

This qualitative research has shown that the professionals we interviewed were not daunted by the challenges they faced. Additionally, they are very satisfied with their activities as women engineers. When asked about their profession, they enthusiastically confirmed that they had made the right choice. And not only did their words point to their satisfaction with their career choice, but also the brightness in their eyes, their smiles, and their facial expression attested to their professional pride. Only the retired engineers mentioned having had small problems with gender discrimination. Nonetheless, they immediately identified themselves as pioneers and were quick to note the changes that have taken place which now certainly favor women engineers.

The increase in the number of female engineers is highly beneficial to society as a whole. Studies have shown that the combination of a women's acute intelligence, perspicacity and sagacity, with determination to reach goals, her aptitude for small and meticulous tasks, easiness in dealing with people, and even a certain dose of intuition -- all constitute a set of attributes ideally suited for this beautiful career. And it appears that, every day, society better understands and recognizes the importance of female participation in engineering.

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Biography

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