BREAKING THE GENDERED-TECHNOLOGY PHENOMENON IN TAIWAN'S HIGHER EDUCATION

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ABSTRACT

Addressing the policy of gender mainstreaming in response to the gendered-technology phenomenon, this study aims to explore the contemporary change of the gender-technology relation. Drawing the female discourses on technology, gender, and success, this study collected qualitative data by individual interviews from 28 women in technology who were asked about their experiences of doing technology, doing gender and performing femininity or/and masculinity. This paper demonstrates women success in relation to their gender identity and gender-technology discourse of gendered technology. Based on the cross-generation females' accounts on their context of family, schools and society, this paper explores how female technologists constitute their gender role and how they articulate the formation of gendered technology phenomenon. It concludes a vase-breaking theory that elite female technologists can break gender boundary by individual characteristics, masculinity, family support, school empowerment from female role-model and single-gendered school, and social support from university. Although mostly the female co-constructed and deconstructed simultaneously the gendered technology, there is seen changing culture among three generations that younger generation get more advantages on gender mobility by breaking gender boundary. There is also a phenomenon of elite female develops technology well by appropriating all sorts of resources and eventually gender mobility is achieved with the help from men and women so that they have broken the strict boundary of gendered technology.

KEYWORDS

Female technologist, feminism, gender mobility, gendered technology, masculinity

1. INTRODUCTION

As individuals cannot be detached from his/her living environment, education should take four aspects of individual, family, school and society into consideration. So do science education. How do people learn about science and technology? Learning does not only take place in school but also in family and society. Taiwan is well-known as a kingdom of technology but there are very few female technologists. Since *2004 Gender Equality Education Reform* started, it had corresponded to the revolution of gender structure in the field of technology and science. This study focuses on the gender-technology relations. It questions the "technology as a masculine culture" and "technology as a male institution". This study aims to explore the contemporary discourse of gender boundary and gender mobility in technology, drawing the girl discourses on technology, gender, and success. Thanks to the policy of *Gender Equality Education*, more female technologists workin universities and more girls get into technology in universities. However, according to previous research, female technologists are rather corresponding to the patriarchic society than challenging gender inequality (Wang, 2010). Empirical study shows that female technologists have advantages in successfully demonstrating both femininity and masculinity. While they succeed in technology, they experience failure in female identity. Gender mobility is seen in those who survive in the social structure of strict gender boundary (Wang, 2012).Followed by the above study on the gender discourses of woman technologists in Taiwan's universities that reflect a masculine technology which intensifies masculinity yet mitigates femininity, this research focuses on the female gender discourses on learning technology and science, by exploring if they were aware of gender equality or are they just corresponding to the patriarchic society? This paper aims to analyze the gender-technology discourse of girls into technology and explore female success to the gender-technology relation and gender identity (femininity/masculinity).

2. BREAKING GENDER-TECHNOLOGY RELATIONS

The methodology and methods used in this study and the research findings for breading gender-technology relations are discussed as follow.

2.1 Methodology and Methods

A feminist approach was selected for this study in order to uncover the rich details and in-depth descriptions of the female experiences. Individual interviews were conducted on 28 elite women, including 12 female university teachers &16 female university students majoring in technology in Taiwan's top universities. They were based on five top universities in Taiwan and represented the mainstream of Taiwan's diverse ethnic backgrounds. Empirical data were collected by individual interviews and oral historical interviews from 28 selected females (teachers and students majoring in technology in Taiwan's top universities). They were asked about their life experiences of doing technology, doing gender and performing femininity or/and masculinity. Interviewing items were focused on their learning experiences on technology and its dilemma, motivation and social model, the successful self of the elite girls in the field of technology, how they perceive their success linking with their personal femininity or masculinity, how they make use/transform/discard their femininity during their career in technology, and how they interpret gender boundary and gender mobility by mapping the gendered culture in the technology field. In total, interview for each participant was done during 1.5~2.5 hours. In order to double check the quality of data, this study employs a follow-up investigation by Bem's (1974) Gender Role Scale. The scale is to investigate the type of gender role for the researched females--masculinity, femininity, undifferentiated, or androgynous.

2.2 Research Findings and Discussions

Based on the 28 qualitative interviews, this study categorized the contextual data into four aspects of their technology-learning experiences: individual, family, schooling and society.

2.2.1 Transforming Femininity into Masculinity

The participants' stories show that femininity is not welcome in technology. Most of the researched females in this study gradually transform their femininity into masculinity as long as they figure out the masculine culture in the university campus, especially in their Department of SECT. The technology females were not born masculine but becoming masculine. The individual femininity was shaped by the disciplinary culture of *Engineering*, gradually transforming into masculinity, as Huihsuan said:

> *I become more robust and strict as long as I study in this subject. I was so shy in childhood. However, my college classmates judge me a strong woman. They see a very firm and masculine temperature in me. Therefore, I think, doing technology is somehow redoing gender (Huihsuan, 20 years old, undergraduate student, Department of Electrical Engineering)*

However, the researcher was curious of this special articulation from the technology females. Are they masculine women? An investigation of masculinity/femininity provided quantitative evidence based on Bem's Gender Role Scale which was employed to figure out the types of gender role as Table 1.

Table 1. The investigation of BEM's Gender Role Scale on the researched females

Gender role type	Masculinity	Femininity	Undifferentiated	Androgynous	Sum
Teachers	5 (46%)	3 (27%)	3 (27%)	0 (0%)	11(100%)
Students	2 (14%)	5 (36%)	7 (50%)	0 (0%)	14(100%)
Sum	7(28%)	8(32%)	10(40%)	0 (0%)	25(100%)

Table 1shows that 25 scales were returned in which only 7 women in the type of masculinity. The result was very different from what they thought they were. Many of them thought of androgynous type and some thought of masculine type. None thought of feminine type, yet there are 8 women in the type of femininity in

the scale result. There could be two interpretations. One is that the self-perception of technology females is changed by the organizational climate of the environment where they are. The other interpretation is that Bem's scale is inappropriate for the females in Taiwan due to cultural difference.

Above all, females in technology performed masculinity more than femininity, preferring thinking and understanding to memorizing or recitation, and preferring reading natural scientific mystery books to romantic fictions. Younger generation desires female models more than older generation although mostly they identify with male role models and adorn masculinity. Younger generation can escape from the anxiety of being 'strong woman' easily than older generation, though the stigma of strong women is still in place.

2.2.2 Growing in a Non-Patriarchic Family with Female Models

According to their family data, most females grew up in a non-patriarchic family. They were supported from their parents by providing good education, unisex toys, cultural capital, and high educational expectation. The most important support is family models in technology and science. They identified with male role models like uncles or fathers working as engineers, medical doctors or professors. Fewidentified with female role models in family whom inspired the interest of exploration, as Yinching said:

> My parents are both technology professors but I'd say I was influenced significantly by my grandmom and my mom. Probably I should say the females in my family have more impact on me than males. They are all very independent with their own thoughts. Even if my unties are housewives, they encouraged me to take a breakthrough to develop my own career. I believe women are able to accomplish a great business (Yingching, Assistant Professor, 32, 20100127).

Regarding their family support, gender-free family climate is also a key to develop girls'potentiality in technology. Most girls were growing up in an open environment without gender differentiation. Some parents even treat their daughter as a son, as Huana said:

> *My father is a SECT professor. He works for technical production for marketing. My uncle works in medicine. He is very good at medicine improvement. I have two younger brothers, but my parents have quite high expectation in me, probably inspired by my uncle's achievement. They don't treat me differently from my brothers. I'd say they somehow dominate the way which I stand now (Huana,*
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> *24 years old, graduate student, Department of Communications Engineering ）*

Above we can see younger generation take advantage of the gender equality family. Elder daughters were trained to do housekeeping, yet the youngest daughter had the freedom. Younger generation was protected by their parents who even strongly suggest the future way to go, as Huiting said:

> *My parents were against Humanity which for them is not promising at all. They suggest me study for natural science or technology. The whole family prefer technology career…my uncles and my sisters,all doctor and electronically engineer,are against social science or humanity (Material Science, Huiting, undergraduate, 20111019).*

Females were impacted mostly by technology family full of male or female models. Younger generation benefits from gender-free family. Older generation benefits from patriarchic family subject to the youngest daughter within a group of children. Even if their family situation is quite good for developing technology, most women were unconfident with the possible dilemma between family and career in the future.

2.2.3 Studying in a Single-Sex School with Masculine Schooling

Single-sex schools and talented classes were advantageous for girls into technology. Twenty of the 28 researched were from single-sex high school. In a classroom full of female students, they received less gender stereotypes and were expected for good scientific performance as Chiahsuan said:

> *I was selected into the talented class in our girl school. The talented class is honored for studying natural science or technology. We study the materials much earlier than general classes. Obviously as soon as you were in, you cannot out as it is a one-way road to Science and Technology (Mechanical Engineering, Chiahsuan, Associate Professor, 37, 20100121).*

All the older-generation female chose Science and Technology as their career in high school because they had been in the track and there is no way out. It is obviously that single-sex school and talent class is the key streaming to technology for older generation. The situation is quite the same in the younger generation.

Moreover, thanks to the single-sex school and the talented class, these girls fortunately have female role models in SECT. Many of them were encouraged or inspired by their female teachers of physics in schools or university. However, in most cases, teachers' gender discrimination is the worst harm to them. The situation was worse in junior high school than in high school because single-sex school provide pertection against gender discrimination, as Luiwen said:

> ...to me boys are better than girls in Math and Science when I was junior high school where my class is mixed with boys and girls. I scored the top in the class, yet teachers teased at me why I could beat boys. It seemed to him I should be left behind boys. However, my high school is a girl school where everybody is distinguished. I found teachers never treat us with gender discrimination. I never heard that boys are superior to girls or girls should focus their conduct more than achievement (Mechanical Engineering, Luiwen, researched student, 24, 20100918).

Above all, the schooling was perceived mostly unfriendly to girls' exploration into science and technology. Gender discrimination from the male gaze threatens girls' potentiality in technology. The females spent much time on crashing the stigma of beauty, detaching the weakness-label, and moving beyond the teachers' Pygmalion effect. However, these constrains cannot beat girls' involvement in technology as long as they have female models and freedom in the single-sex school.

2.2.4 Society Embracing Feminism

What is the social impacton gender-technology relations? Mostyoung generation had positive experiences of being female. For example, recently more organizations in SECT desire gender equality. In this circumstance, women majoring in technology are much more welcome than men.

> Some companies claiming gender equality would recruit female technologists than male. Women in technology are welcome than ever. Now that most members in this company are male, why not recruit female? Women can take a balance of the masculine culture in SECT. It's an advantage for
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> me (Chiaching, 22 years old, graduate student, Department of Electronics Engineering）

The field of technology desires women in order to develop female technologies. Above all, female can break the gendered technology by establishing the advantageous forces and overcoming the disadvantageous forces. Women can accomplish big business such as doing technology or doing science distinguishably. The masculine ideology may be no longer penetrated the technological fields through the positive gender discourses.

3. CONCLUSION

Based on the qualitative data from 28 woman university technology females, they broke gender boundary supported by personal interest, family support, school empowerment from which they gained power in technology. Responding to the changing economy, there are more market needs for female technology instead of male technology. It seems that technological girls have promising future. It is worth to mention that the stigmatized woman for female technologist is a trap door (Guy, 1994) that could crackdown female mobility to technology. As we all know, the patriarchic gendered structure can reproduce its corresponding gender ideology that male is superior to women in the public field and in the wider society (Massy, 1994). It turns out that woman can only act as a vase with the function of decoration. Now that women can perform masculinity and do the business of SECT as well as men, this result explicates an alternative pattern of gender hierarchy that masculinity is superior to femininity. It is somehow corresponding to Vaerting's (1923) research that those who perform masculinity become the dominant sex, yet that performs femininity is subordinate. Technology females can become the dominant sex thanks to their control of technology. However, masculinity may not be so omnipotent in relation to technology. Current university isfriendlytoward females in technology without demanding for masculinity. Although females in technology

are quite minor numerously, they felt more advantages because they can demonstrate both masculinity and femininity. If so, hopefully women don't have to become man (masculine) in order to get access to the stage of success and we can hence challenge what Weinstein (1988) relates femininity to an empty space and silent object.

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