

Board 191: Are female faculty role models to female students in higher education? A study of teachers' perceptions of their roles and responsibilities in computer science and engineering

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Are Female Faculty Role Models to Female Students in Higher Education?

A study of female faculty's identity in computer science and engineering

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Introduction and background

Historically, computer science and engineering have been considered as masculine fields. Despite long-standing initiatives to improve gender equity in science, technology, engineering, and mathematics (STEM) field, the underrepresentation of women has persisted [1]. Studies show that although there has been an increase in women earning PhDs in computer science and engineering, the percentage of female faculty members has not increased as much [2]. One possible reason could be that demands to publish and teach students have created challenges for female faculty of STEM to balance between work and family [3]. If such assumption is true, this reality indirectly but undoubtedly have pushed back boundaries of the traditional ideology regarding women's family and work roles and responsibilities [4] and create impact on female faculty's identity. Traditionally, women are expected to undertake a heavy burden of domestic work while playing the primary care provider for educating and nurturing children in many cultures [5]. Women are much less likely aspired than men to develop career in masculine discipline if they anticipate future difficulties in pursuing and advancing careers [6]. Based on evidence suggested in the existing literature, validations on whether women's lower representation in STEM is caused by their obligations and unavoidable conflicts of undertaking multiple demanding roles and responsibilities both at work and at home are valuable. More importantly, it is important to know how female faculty of STEM perceive and negotiate their identities when they try to navigate between work and home roles and responsibilities. This study aims to explore female faculty of higher education's identity in computer science and engineering in relation to their work and family roles. In particular, the study asks how female faculty develop and present identities in interactions with students. The study applies the position theory to investigate gender's contribution to female faculty's identity and identity presentation.

A review of the literature and theoretical framework

Female Faculty's Gender Identity

Many researchers have acknowledged that men are entitled to additional gender privilege and social power than women [1] [5] [7] [8] [9]. People give men more opportunities to work and overtly presume that men are more competent and can contribute more than women can [7]. Previous study shows that women typically lack the expert or legitimate power of men [7]. Women generally influence others by conveying agreeableness, sociability, and warmth with indirect strategies [7]. Women's sense of gender identity is grounded in historic sociopolitical biases, cultural values, and professional practices about women's roles in a given society [5] [10]. As women are more engaged in the workplace and taking on leadership positions, the term "Superwoman Syndrome" has been used to describe women's overload and stressful experience [11] [12]. The superwomen are trapped by social norms that expect them to balance her domestic and career responsibilities successfully. Contextual factors such as the history of gender stereotyping, mothers' experience and spiritual values shape female habitual mind [12]. Women have been taught to avoid power because it does not support stereotyped perceptions about women, which create the fear of using power. In addition, marginalization of women exists in general in society, education, academia, and particular in the masculine fields (e.g., STEM). People used to apply stereotypes of gender role as

assessment norm to justify occupational success [5]. For example, it was assumed that male personality or physical attributes were requisites for success in male-dominated professions. The persistence of stereotypes adversely affects women career development in male-dominated fields [8][13]. Women's work is usually associated with helping others' development, which is not recognized as real activity [5]. Despite women get successful achieve, they attribute their accomplishments to luck and have negative views of their academic context and less optimistic viewing of obtaining success [9]. Women have fewer influence attempts than men and feel lower confidence in their ability to supervise workers [14]. Therefore, the study analyzes how the different effect of power frame between male and female faculties in computer science and engineering to understand their right and duties as educator in this masculine field.

Identity Influence in Pedagogical Practice

Previous study shows that pedagogical practices play a significant role in girls' STEM engagement [15]. Several researchers have found that same-sex role models positively influence women's decisions to work in traditionally male-dominated fields [15] [16] [17]. Female faculties have been proposed to function as same-sex role models, which may inoculate female students against the harmful impact of stereotypes impugning their ability in computer science and engineering [15]. Female faculties' identity as an educator impact on next-generational gender equality development [15]. Scholars suggest that more studies should provide insights into hidden barriers to female faculty career development in computer science and engineering [15][18].

Identity Negotiation: A Position Theory Lens

Identity recognition and acceptance support understanding of one's role, responsibility, and expected behavior [19]. As individuals play multiple roles throughout life (e.g., teacher, wife, and mother) [20], the dynamics of multiple roles lead to role scarcity and accumulation [21]. When individuals negotiate between multiple roles, they need to identify and prioritize roles to determine which are admissible activities. In collective cultural setting, females have a tendency to perceive academic career success in accordance with social and cultural expectations [4]. Role conflicts trigger individuals to reposition themselves in dilemmas according to the perceived importance of their roles in a moment [22]. The progress of finding balance, experiencing imbalance, and then re-seeking satisfying balance affects identity formation and growth [23].

The process of positioning is regarded as an appropriate tool for understanding identity [24]. Individuals' identities are formed through their positioning in discourse. Positioning theory argues that a person's role is labile, contestable, and ephemeral [25]. Being positioned (including positioning oneself) carries the duties and expectations about how one should behave or insert meaning into their actions. In turn, one's conduct grants one the right to be taken seriously in a group [22]. Analyzing the positioning usually involves claiming certain rights and duties, explaining the meaningful storyline, and interpreting the illocutionary force of interpersonal actions [26]. The storyline and illocutionary force give meanings to how people think and act their role in supporting the interpersonal actions fixing for this moment

and this situation [25]. According to Foucault’s power-knowledge-practice relations, how individuals were positioned in social discourses had implications for power relations. Positioning theory highlights the understanding of power relations in storylines, the distribution of rights and duties and the meaning of their actions [22][25]. The core of positioning is how individuals gain or negotiate access to rights and duties to say and do things [27]. The presumption about rights and duties depends on who is displaying it and in what context. Through constructing and distributing their right and duties in social interaction, individuals draw on discursive practices to locate their roles in social structures. Therefore, the original positioning theory triangle is captured in figure 1. The theory recognizes that individuals can constantly reposition themselves to create new meanings of who one is, which will result in one’s new ways of thinking and doing. Each distribution is a position in common with roles.

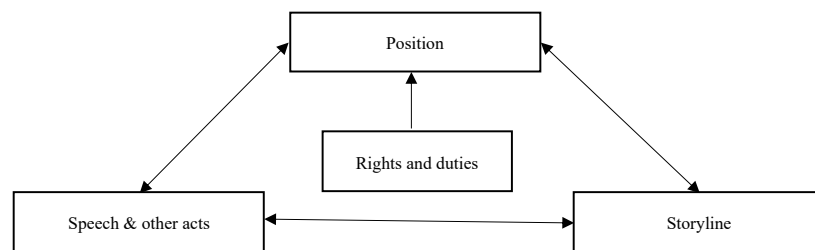


Figure 1. The positioning triangle (van Langenhove and Harre,1999)

Positioning is also about how individuals describe their social categorizations. According to Foucault’s discourse formation, dominant social norms as “authorities of delimitation” are inextricable from positions in discourses. These authorities of delimitation establish different social categorizations, which are activated and called “gaze” by Foucault. The individuals in the categorization accept rules and regulations constructed by dominant social norms, and their responses to gaze act as a mediator to explain their perspective of rights and duties. Based on that, Blocks’ expanded positioning theory retained the original triangle from Langenhove and Harré (1999) and added shaping structures as necessary background to all activity. Blocks added shaping structures which involve political, economic, social, cultural and geographical structures to explain how individuals’ rights and duties in institutions contribute to their eventual positions. Inspired by Blocks’ expanded positioning theory, we propose a new version of the positioning theory triangle, which is reproduced in Figure 2. In this figure, the reader can see the additions of the power frame not present in the original positioning theory triangle.

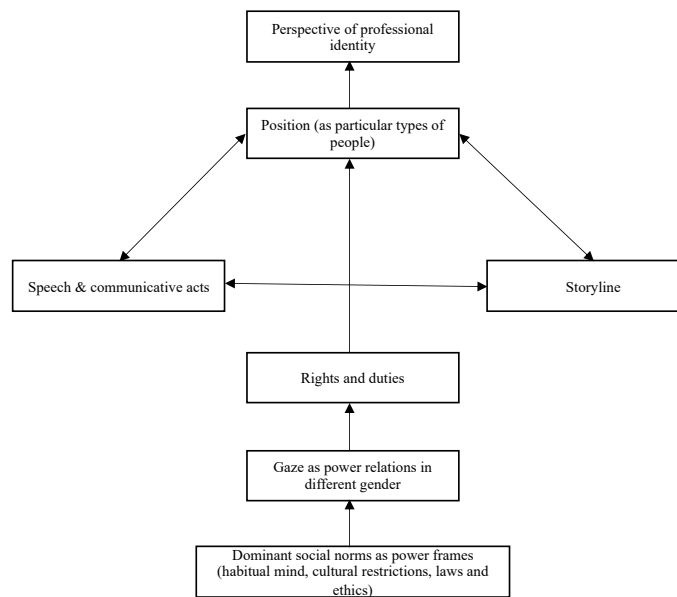


Figure 2. Theoretical framework based on positioning theory

Method

This qualitative study deployed the interpretative phenomenological analysis (IPA) approach to collect and analysis data. This study was conducted at a transnational university (i.e., the case University) in China, where most of its faculty hold Ph.D. degrees issued by western universities. The Case university encouraged teachers to take student-centered teaching activities [28]. After sending out invitations to 64 female teachers in computer science and engineering department at the case University in November 2022, six teachers agreed to be interviewed. Previous studies had used the interpretative phenomenological analysis (IPA) method to collect data from a small sample size (e.g., six interviewees in Wartenweiler’s study and Five interviewees in Wood et al.’s study [29][30][31]). The researcher decided to deploy the IPA method to work with the six female CS and engineering teachers. During interviews, the questions were asked based on these guiding research questions: What perceived role and responsibilities do female faculty of computer science and engineering hold? In what ways faculty’s gender identity influence their perceived roles and responsibilities? How do they carry out their roles and responsibilities in interactions with students, especially with female students?

After analyzing six participants’ data, the researcher proposed a tentative framework with femininity to gain insights into the concept of female faculty identity as educator. Then, the study started a second round of interviews with male faculties to validate the initial findings in February 2023. Eight additional male teachers were invited for interview. Similar questions were asked of male faculty. The additional interviews confirmed the previously proposed gender characteristics in attitudes, behaviors, and performances. Table 1 shows the demographic overview of male and female participants.

Age	
31-41	9
41-51	5

Gender	
Female	6
Male	8
Years of teaching	
less than 10 years	10
more than 10 years	4
Academic title	
Assistant Professor	10
(Senior) Associate Professor	4
Marital Status	
Married	11
Single	3

Table 1 The demographic overview of the participants

IPA focused on the individual experience, which analyzed the discursive process of positioning (e.g., conversations and storylines) to understand participants' multiple roles (see Figure 3) [22]. Semi-structured interviews were carried out independently in person or via online meetings, which ranged in length from 60 to 120 minutes. We began the interview by providing ample time for developing rapport with each participant and then gradually shifted the conversation to asking questions about their background and identity meaning-making. Identity meaning-making referred to questions that ask participants to be reflective about their multiple roles (e.g., teacher, researcher, and family role) around their rights and duties, which was fundamental to the execution of IPA and helped to reveal individuals' understanding of their experience of the phenomenon. By analyzing the discursive process of positioning (e.g., conversations and storylines) with exploratory notes, we were able to understand participants' perceptions of their roles and responsibilities with careful interpretation of how such social interactions involve their multiple roles.

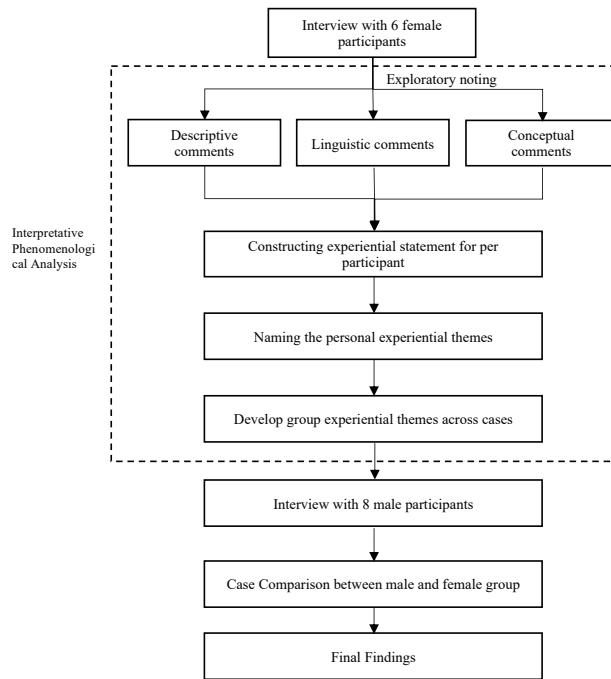


Figure 3. The process of interpretative phenomenological analysis (IPA)

Preliminary Findings and Conclusion

- RQ1: What perceived role and responsibilities do computer science, and engineering teachers have in high education?
- RQ2: Whether teachers' gender identity influences their perceived roles and responsibilities?
- RQ3: How do they carry out their roles and responsibilities in interactions with students, especially female students?

Research data reveals that gender identity contributes to teaching strategies and positioning as educators. Male teachers tend to use power generated from their dominant positions when transferring educator influence on students; on the contrary, female teachers tend to build rapport with students to exert influence on students. Male teachers in masculine discipline reveal entitled gender privilege that enables them to subconsciously gravitate towards expert power in their thoughts and communications with students; on the contrary, female teachers feel that they need to explicitly identify their expert power by explicitly establish connection to external recognitions, such as publishing in top journals or winning national research funding. Female teachers likely to hold high academic standards on oneself so that they could overcome gender bias hidden in the discipline. Female faculty expects themselves to provide validations of equal professional competence to men, while such validation did not deem to be note-worthy among male faculty.

Female faculty prioritize their educators' identities in relation to the extent of helping students. Although they enjoy great achievements from academic research, their expectation of success as educator is predicated on how successful students are. Empathy and trust play a key role in female faculty's rationales of constructing their educators' identities. When

students give trust and ask for help, they put “helping students to solving problems” as the responsibility of teacher and provide mental and professional support. Some married female faculty treat students as your own children and take ownership in their well-being.

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