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Women in Stem: Strategies for Women to Promote Workplace Status

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Abstract. Women are still significantly underrepresented in STEM (Science, Technology, Engineering and Mathematics) fields, accounting for only 27% of the workforce, and are even less represented in senior positions. This study explores strategies for women to enhance their workplace status in STEM, addressing obstacles such as gender bias, limited guidance, and the challenge of work-life balance. The sequential interpretation mixed method was adopted. Data were collected through surveys (n=40) and semi-structured interviews (n=5), and the interviewees included STEM women from the academic, industrial and government departments in China. The survey results show that networks and master-apprentice relationships are the most common and effective strategies, although their success depends on the support of the organization. This paper emphasized the importance of self-promotion and alliances with female colleagues, as well as the persistent cultural barriers, such as male-dominated environments. This study contributes to the literature by providing empirical insights into the interaction between individual and organizational factors in the career development of STEM women. It offers practical advice for women to proactively build networks and seek mentors, while urging organizations to implement inclusive policies and policymakers to fund leadership programs. By promoting individual initiative and systemic change, this study aims to reduce gender differences in STEM and enhance the diversity of STEM.

Keywords: Gender, STEM, Empowering, Strategies

1. Introduction

Although science, technology, engineering and mathematics (STEM) fields play a crucial role in driving global innovation, women's participation and career status remain significantly underrepresented among males. According to the Women in STEM Statistics [1], while the proportion of women in STEM workplaces is slightly increasing, until 2022 women made up 26% of the STEM workforce. Also, according to the World Economic Forum Annual Meeting [2], women only make up 28% of the global STEM workforce and only 22% of Artificial intelligence (AI) professionals. This gender gap not only reflects the in-depth societal biases, but also reveals the unique barriers women face in promoting their careers, such as stereotypes, lack of mentorship support, and work-life balance pressure. Challenges that limit women's impact in STEM fields and undermine the industry's overall diversity and innovation potential.

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However, there is growing evidence and studies to focus on promoting STEM women in workplace. Firstly, there are studies to explain "Why so few women in STEM", it uncovers the male-dominated, highly impersonal and individualistic culture of STEM fields [3]. There are also studies that point out methods for promoting women's participation in STEM programs [4]. Also, there are studies reveal the impacts of using gender equitable teaching strategies (GETS) [5]. Additionally, "Success strategies from women in STEM fields: Portable mentors" offers comprehensive strategic guidelines for the career success of women of all genders in STEM fields, including networking, guidance, and self-improvement, although it lacks attention to non-Western backgrounds and unconscious biases [6]. Besides that, the study by Chao Gu [7] recognize the cultural challenges faced by Chinese women scientists, and giving several observations and suggestions. Furthermore, there are studies that focus on the Australian STEM women experiences in the workplace [8]. Despite these, there are no documented methodology analyses to evaluate different strategies. This paper mainly analyzes the problems that women are facing and the practical strategies that individuals and corporations can use to work together to achieve. Through survey and interview, this paper evaluates which strategies are the most effective ones and explores the mechanism behind the strategies.

The purpose of this research is not only to provide practical suggestions for women in STEM fields, but also to provide insights to organizations and policymakers to promote more inclusive working environments. This paper will first review the existing literature, then introduce the research methods, and finally discuss the analysis results and their implications for the future. Through this systematic exploration, we hope to contribute to closing the gender gap in STEM fields.

2. Methodology

This study adopted a mixed research design, specifically a sequential interpretation design (quantitative → qualitative), to investigate the strategies of women in the STEM field for improving their job status. In the quantitative stage, extensive data is collected through questionnaires to identify common strategies and their effects. In the qualitative stage, the questionnaire results were deeply explored through semi-structured interviews to explain the implementation details and background of the strategy.

2.1. Qualitative stage (questionnaire)

2.1.1. Participants

The target population in the quantification stage is women working in STEM fields, including practitioners in the academic industry and government departments. convenience sampling was adopted through snowball sampling [9] and STEM organizations recruited approximately 50 participants. The average age of the participants is 30 years old. Participants needed to meet the following criteria: currently working in the STEM field and voluntarily participating in the research

2.1.2. Tool development

The questionnaire is designed based on a literature review of career strategies for STEM women. The questionnaire include:

Closed questions: Multiple choices and net promoter score (0=utterly useless, 10=totally recommended), used to evaluate the willingness to recommend such strategies.

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Open questions: Used to capture strategies or insights not covered in closed questions, for example, “What other strategies did you use?”

The questionnaire was optimized through a small-scale test (pilot test) involving 2 STEM women before distribution to ensure that the questions were clear, relevant and had surface validity.

2.1.3. Data collection program

The questionnaires are conducted through Microsoft Forms. The data collection period was from April 16th to May 1st, 2025. Participants received invitations via social media to understand the research purpose and sign the electronic informed consent form. The completion time of the questionnaire was approximately 10 minutes.

2.1.4. Data analysis

Comparing the scores of different strategies in order to see whether the strategies stated are useful in real STEM workforce.

2.2. Qualitative stage (interview)

2.2.1. Participants

Purposive sampling was adopted, and 3 women were selected from the questionnaire participants for interviews. The selection criteria were based on questionnaire responses, especially those participants who reported a high or low frequency of strategy usage, to ensure a diverse perspective on the effectiveness of the strategy.

2.2.2. Interview guideline

Semi-structured interviews use interview guidelines developed based on questionnaire results. The guide includes open-ended questions aimed at delving into the strategies identified in the questionnaire, such as: Please describe specific examples of your use of “a certain strategy” and its impact on job status. The interview guidelines remain flexible, allowing for follow-up questions based on the participants' responses.

2.2.3. Data collection program

The interview is implemented on Tencent Meeting, depending on participants’ preferences. Each interview lasts approximately 20 to 30 minutes. All interviews are recorded with the consent of the participants and transcribed word by word into text. The identities of the participants are protected through anonymization.

2.2.4. Data integration

The integration of quantitative and qualitative data in the interpretation stage. Specifically, qualitative interview results are used to explain or expand quantitative questionnaire results. For example, if the results in the questionnaire suggest that the mentorship support is not useful, the reasons behind the answer can be asked in the interview. The integration results will be presented in the discussion section of the paper. By integrating the data from both stages, a comprehensive understanding of the research questions will be provided.

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3. Results and discussion

3.1. Quantitative results

According to the questionnaire, over 30% of the STEM women reported that they have experienced gender discrimination or bias at work. Most of the reported forms of discrimination are "lack of promotion opportunities", "pay gap", and "exclusion from key projects or meetings". Also, nearly half of the participants reported that their gender has affected their career development in STEM. And the average rates for the effectiveness (0=very ineffective, 10=very effective) and standard deviation of different strategies are shown below in Table 1.

Table 1: The average rates and standard deviation of different strategies

Different strategies	Mean rate	SD
Networking with colleagues and professionals	6.48	1.53
Mentorship support of seeking senior colleagues	6.91	1.67
Taking on leadership and additional responsibility	7.22	1.70
Pursuing further education or training strategies	6.59	1.62
Self-promotion (highlighting achievements)	6.65	2.09
STEM women's alliance-building strategy	6.28	1.84

About one third of the participants report that they wish to have additional internship opportunities for women. And 80% of the participants report that they plan to improve themselves and show achievements to enhance their workplace status.

3.2. Qualitative results

In the interview session, it conducted about these several themes:

3.2.1. Networking with colleagues and professions

A participant (Data designer in the medical research industry) stated that "background is very important for graduate or PhD students in the United States. A supervisor's network is also crucial; there will be benefits along the way, especially in the academic field."

A participant (blood cell product manager) stated that "a network of contacts is very important. It is crucial for career breakthroughs and path planning. The workplace is not a solitary entity."

Four out of the five respondents emphasized the importance of networking with others.

3.2.2. Stem women form an alliance

A participant stated that, "In the eyes of the public, women need to be more courageous and form alliances with other female colleagues to strive for opportunities."

Three of the five respondents highlighted the importance of forming connections with other female colleagues.

(1) Self-promoting

A participant stated that: "It is very important to achieve self-fulfillment. Let others see your strength and convince them with your ability."

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All of the respondents emphasized the importance of self-promotion.

(2) Structural change

All of the respondents reported there are bias in the interview stage of entering the workplace, such as “it is more male-friendly”, “the tendency to think women may not put effort on works”, and “HR would ask me about my family life.”

And many respondents reported that they think policy change can help to protect women’s rights in workplace. For example, providing maternity leave welfare for both father and mother, or emphasizing the equality in the workplace for both genders.

3.3. Discussion

This research found that networking and self-promoting are the key strategies to promote the workplace status for STEM women. This is consistent with "6 Things Successful Women in STEM Have in Common" [10], emphasizing the role of social capital. The result also shows that the legal change for promoting gender equality in the workplace is also crucial to promote the workplace status, such as providing maternity leave welfare.

4. Conclusion

This study aimed to explore the strategies for women in STEM to enhance their workplace status, using a sequential mixed-methods approach that combined a survey (n=38) and follow-up interviews (n=5). The findings revealed that networking, mentorship, and self-promotion are the most effective and used strategies. Survey results indicated that 70% of participants regularly used networking (M=6.5, SD=1.5), while interviews highlighted the critical role of mentors in securing leadership opportunities. However, barriers, such as male-dominated environments and work-life balance, were noted as persistent challenges.

This study provides empirical evidence for the interaction between personal strategies and organizational factors in the career development of STEM women, fills the gap in specific context research, and thus contributes to the literature. In fact, it provides actionable insights for STEM women to proactively build networks and seek mentors, while urging organizations to implement gender-neutral mentorship programs and diverse training to create an inclusive environment. Encourage policymakers to provide funds for leadership development programs tailored for STEM women. By combining individual institutions with systemic change, this study highlights the potential to reduce gender differences in STEM fields. In addition, there are also some limitations in this study. (1) Inconsistency of data: the rate of effectiveness of networking with colleagues or professionals is low, while the respondents in the interview highlighted this strategy as a very important factor. This may be due to the interviewer’s question asking leading to the researcher’s desirable answer. (2) Inadequate data collection: the data collected is not large enough to be generalizable since the interviewers are not interviewed with the distribution of different STEM industries. (3) The results only take into account the Chinese and U.S. STEM women, which may not be generalizable for other regions. Future work should focus on longitudinal research and a broader sample to further enhance workplace fairness and pave the way for a more diverse and innovative STEM workforce.

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